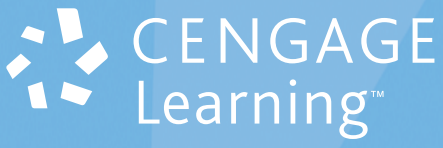
FOOD SOLUTIONS

Food Studies
Units 3 & 4

5TH EDITION

Glenis Heath • Heather McKenzie • Laurel Tully • Belinda Page • Melanie Ranieri





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FOOD SOLUTIONS

Food Studies
Units 3 & 4

5TH EDITION

Nelson

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5th Edition
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Laurel Tully
Belinda Page
Melanie Ranieri
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CONTENTS

About this book vi
Key concepts in Food Studies xii

1 EATING AND DIGESTING FOOD 3

What is food and why do we eat it? 4
What is hunger? 4
What is appetite? 4
Satiety 4
The sensory appreciation of food 5
Digestion 7
The digestive system 8
The absorption of macronutrients 12
Carbohydrates 12
Protein 14
Fats 16
Gut microbiota for health 17
Thinking skills 21
Examination-style questions 21
Recipes 23

2 THE AUSTRALIAN DIETARY GUIDELINES 29

The development of the Australian Dietary Guidelines 30
The nutritional rationale of the Australian Dietary Guidelines 32
The Australian Dietary Guidelines 34
The Australian Guide to Healthy Eating 39
Thinking skills 48
Examination-style questions 48
Recipes 50

3 DIETARY REQUIREMENTS, ALLERGIES AND INTOLERANCES 57

Differences in dietary requirements across the life span 58
Food allergies and intolerances 62
Examination-style questions 69
Recipes 70

4 AUSTRALIAN EATING PATTERNS 77

Patterns of eating in Australia 78
Recent developments in food purchasing and consumption 78
Changes and trends in food purchasing and consumption 82
Social factors that influence food choices 88
Establishing healthy diets in children 96
Drinking water 100
Thinking skills 105
Examination-style questions 105
Recipes 106

5 THE SOCIAL AND EMOTIONAL ROLES OF FOOD 113

The social and emotional roles of food 114
Sharing and celebrating with a peer group 116
Sharing and celebrating with communities 117
The role of food in influencing mental health 122
Thinking skills 123
Examination-style questions 123
Recipes 124

6 FOOD AND THE MEDIA 133

Food information and the media 134
Digital media 135
Strategies used to influence food information 141
Emotional and psychological responses to food 144
Thinking skills 150
Examination-style questions 151
Recipes 152

7 FOOD SYSTEMS AND THEIR IMPACT ON CONSUMER BEHAVIOUR 161

Food systems, behaviours and effects on health 162
Political influences on the food system 174
Thinking skills 182
Examination-style questions 183
Recipes 184

8 ASSESSING FOOD INFORMATION 191

The principles of evidence-based research 192
Food fads, trends and diets 196
Assessing claims made by nutrient supplement companies 202
Thinking skills 204
Examination-style questions 205
Recipes 206

9 FOOD KNOWLEDGE AND SKILLS 213

Contexts in which we learn food knowledge and skills 214
Australian health information platforms 215
Using food labels to compare, select and prepare food 219
Nutrition content claims and health claims 221
Applying the Australian Dietary Guidelines in everyday life 224
Thinking skills 229
Examination-style questions 229
Recipes 230

10 FOOD SECURITY 239

Feeding an increasing global population 240
What is food security? 241
Solutions to food insecurity 245
Improved equity in food access and distribution 255
Improving food access and distribution for Australians 256
Australia's role in improving food access and distribution across the globe 262
Food security, food sovereignty and food citizenship 269
Thinking skills 275
Examination-style questions 275
Recipes 276

11 FOOD ETHICS 285

Sociocultural and ethical concerns for Australian consumers 286
Sociocultural factors 286
Ethical principles of concern to Australian consumers 288
Consumer concern about animal welfare 288
Environmental stewardship 298
Social justice issues 302
Thinking skills 304
Examination-style questions 305
Recipes 306

12 SUSTAINABLE PRIMARY FOOD PRODUCTION 313

Sustainable farming practices 314
The environmentally sustainable use of chemicals in primary food production 320
Use of water in primary food production systems 323
Choice of crops and animals for farming 327
Thinking skills 336
Examination-style questions 337
Recipes 338

13 RISKS TO ENVIRONMENTAL SUSTAINABILITY 345

Risks to environmental sustainability in Australia 346
What is biosecurity? 346
Biosecurity on Australian farms 346
Climate change 351
Loss of biodiversity 358
Thinking skills 361
Examination-style questions 361
Recipes 362

14 FOOD PROCESSING, MANUFACTURING AND THE ENVIRONMENT 369

The environmental impact of food processing and retailing 370
Energy use 370
Water use 372
Improving environmental sustainability in marketing, retailing and food service 373
Food packaging and the environment 376
Food transportation 383
Food waste 386
Thinking skills 395
Examination-style questions 395
Recipes 396

Glossary 402
Recipe index 406
Index 408

ABOUT THIS BOOK

The fifth edition of *Food Solutions Units 3 & 4* has been written to meet the VCE Food Studies Study Design 2023–27.

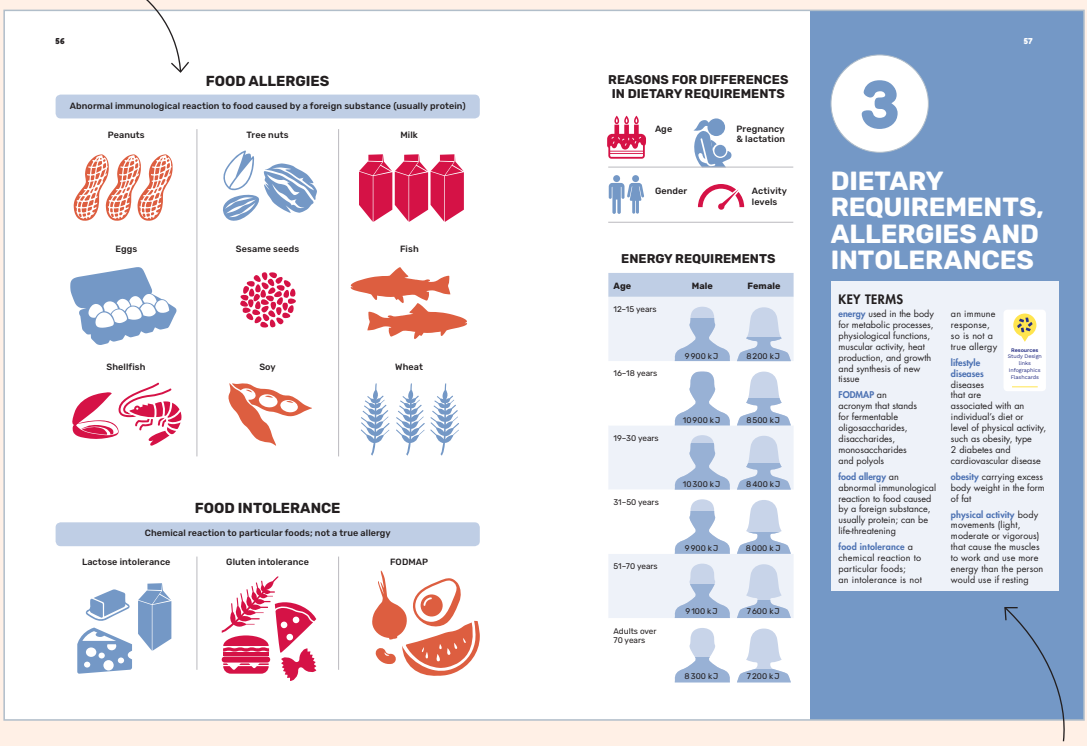
The trusted and well-respected author team have drawn on their vast experience and knowledge of Food Studies both as teachers and examiners to create a new edition that retains in-depth coverage of the Study Design as well as the key features that you have come to expect in this long-standing and successful series. This edition also includes new features, such as:

- new and on-trend recipe dishes from around the world included in each chapter
- practical activities
- a greater focus on exam-style questions and exam support.

Featuring fully updated case studies and activities, designed to increase students' understanding and awareness of the issues surrounding food supply and consumption, *Food Solutions* builds a foundation of learning for students to live better and pursue further training and employment in food-related industries.

Infographics

Visually engaging infographics scaffold key information contained within each chapter.

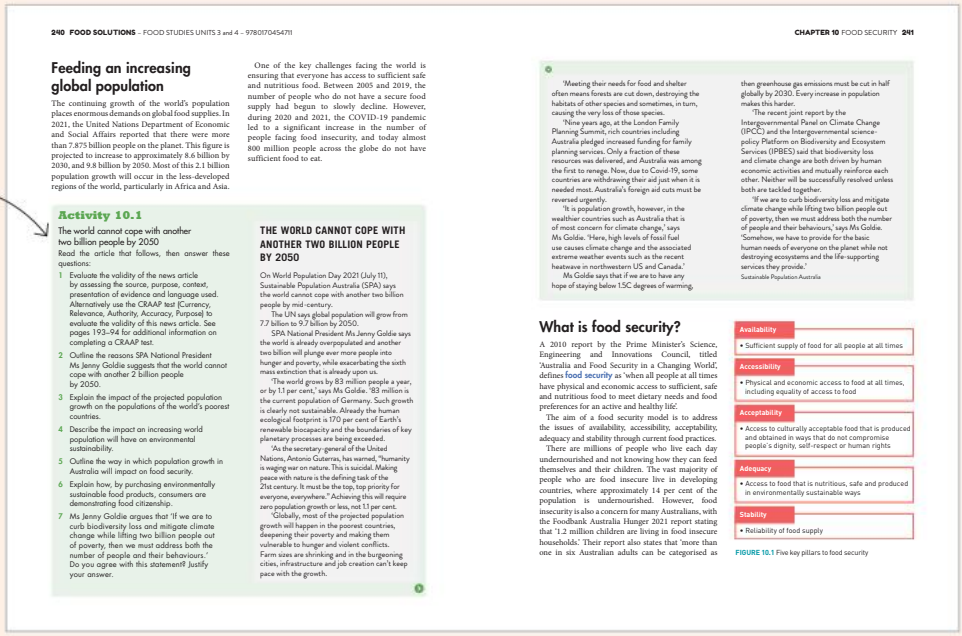


Key Terms

Key terms in each chapter are highlighted, with definitions provided at the start of each chapter.

Activities

A range of exercises that address and reinforce learning outcomes. Activity types include media and case study analysis, and collection and analysis of data.



240 FOOD SOLUTIONS – FOOD STUDIES UNITS 3 and 4 – 9780170454711

CHAPTER 10 FOOD SECURITY 241

Feeding an increasing global population

The continuing growth of the world's population places enormous demands on global food supplies. In 2021, the United Nations Department of Economic and Social Affairs reported that there were more than 7.875 billion people on the planet. This figure is projected to increase to approximately 8.6 billion by 2030, and 9.8 billion by 2050. Most of this 2.1 billion population growth will occur in the less-developed regions of the world, particularly in Africa and Asia.

One of the key challenges facing the world is ensuring that everyone has access to sufficient safe and nutritious food. Between 2005 and 2019, the number of people who do not have a secure food supply had begun to slowly decline. However, during 2020 and 2021, the COVID-19 pandemic led to a significant increase in the number of people facing food insecurity, and today almost 800 million people across the globe do not have sufficient food to eat.

Activity 10.1

The world cannot cope with another two billion people by 2050

Read the article that follows, then answer these questions:

1. Evaluate the validity of the news article by assessing the source, purpose, context, presentation of evidence and language used. Alternatively use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this news article. See pages 193–94 for additional information on completing a CRAAP test.
2. Outline the reasons SPA National President Ms Jenny Goldie suggests that the world cannot cope with another 2 billion people by 2050.
3. Explain the impact of the projected population growth on the populations of the world's poorest countries.
4. Describe the impact an increasing world population will have on environmental sustainability.
5. Outline the way in which population growth in Australia will impact on food security.
6. Explain how, by purchasing environmentally sustainable food products, consumers are demonstrating food citizenship.
7. Ms Jenny Goldie argues that 'If we are to curb biodiversity loss and mitigate climate change while lifting two billion people out of poverty, then we must address both the number of people and their behaviours.' Do you agree with this statement? Justify your answer.

THE WORLD CANNOT COPE WITH ANOTHER TWO BILLION PEOPLE BY 2050

On World Population Day 2021 (July 11), Sustainable Population Australia (SPA) says the world cannot cope with another two billion people by mid-century.

The UN's own global population will grow from 7.7 billion to 9.7 billion by 2050.

SPA National President Ms Jenny Goldie says the world is already overpopulated and another two billion will plunge ever more people into hunger and poverty, while exacerbating the sixth mass extinction that is already upon us.

'The world grows by 83 million people a year, or by 1.1 per cent,' says Ms Goldie. '83 million is the current population of Germany. Such growth is clearly not sustainable. Already the human ecological footprint is 170 per cent of Earth's renewable biocapacity and the boundaries of key planetary processes are being exceeded.

'As the secretary-general of the United Nations, Antonio Guterres, has warned, "humanity is waging war on nature. This is suicidal. Making peace with nature is the defining task of the 21st century. It must be the top, top priority for everyone, everywhere." Achieving this will require zero population growth or less, not 1.1 per cent.

'Globally, most of the projected population growth will happen in the poorest countries, deepening their poverty and making them vulnerable to hunger and violent conflicts. Farm sizes are shrinking and in the burgeoning cities, infrastructure and job creation can't keep pace with the growth.

'Meeting their needs for food and shelter often means forests are cut down, destroying the habitats of other species and sometimes, in turn, causing the very loss of those species.

'Nine years ago, at the London Family Planning Summit, rich countries including Australia pledged increased funding for family planning services. Only a fraction of these resources was delivered, and Australia was among the first to renege. Now, due to Covid-19, some countries are withdrawing their aid just when it is needed most. Australia's foreign aid cuts must be reversed urgently.

'It is population growth, however, in the wealthier countries such as Australia that is of most concern for climate change,' says Ms Goldie. 'Here, high levels of fossil fuel use causes climate change and the associated extreme weather events such as the recent heatwave in northwestern US and Canada.'

Ms Goldie says that if we are to have any hope of staying below 1.5C degrees of warming, then greenhouse gas emissions must be cut in half globally by 2030. Every increase in population makes this harder.

'The recent joint report by the Intergovernmental Panel on Climate Change (IPCC) and the Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services (IPBES) said that biodiversity loss and climate change are both driven by human economic activities and mutually reinforce each other. Neither will be successfully resolved unless both are tackled together.

'If we are to curb biodiversity loss and mitigate climate change while lifting two billion people out of poverty, then we must address both the number of people and their behaviours,' says Ms Goldie. 'Somehow, we have to provide for the basic human needs of everyone on the planet while not destroying ecosystems and the life-supporting services they provide.'

Sustainable Population Australia

What is food security?

A 2010 report by the Prime Minister's Science, Engineering and Innovations Council, titled 'Australia and Food Security in a Changing World', defines **food security** as 'when all people at all times have physical and economic access to sufficient, safe and nutritious food to meet dietary needs and food preferences for an active and healthy life'.

The aim of a food security model is to address the issues of availability, accessibility, acceptability, adequacy and stability through current food practices.

There are millions of people who live each day undernourished and not knowing how they can feed themselves and their children. The vast majority of people who are food insecure live in developing countries, where approximately 14 per cent of the population is undernourished. However, food insecurity is also a concern for many Australians, with the Foodbank Australia Hunger 2021 report stating that '1.2 million children are living in food insecure households.' Their report also states that 'more than one in six Australian adults can be categorised as

Availability
- Sufficient supply of food for all people at all times

Accessibility
- Physical and economic access to food at all times, including equality of access to food

Acceptability
- Access to culturally acceptable food that is produced and obtained in ways that do not compromise people's dignity, self-respect or human rights

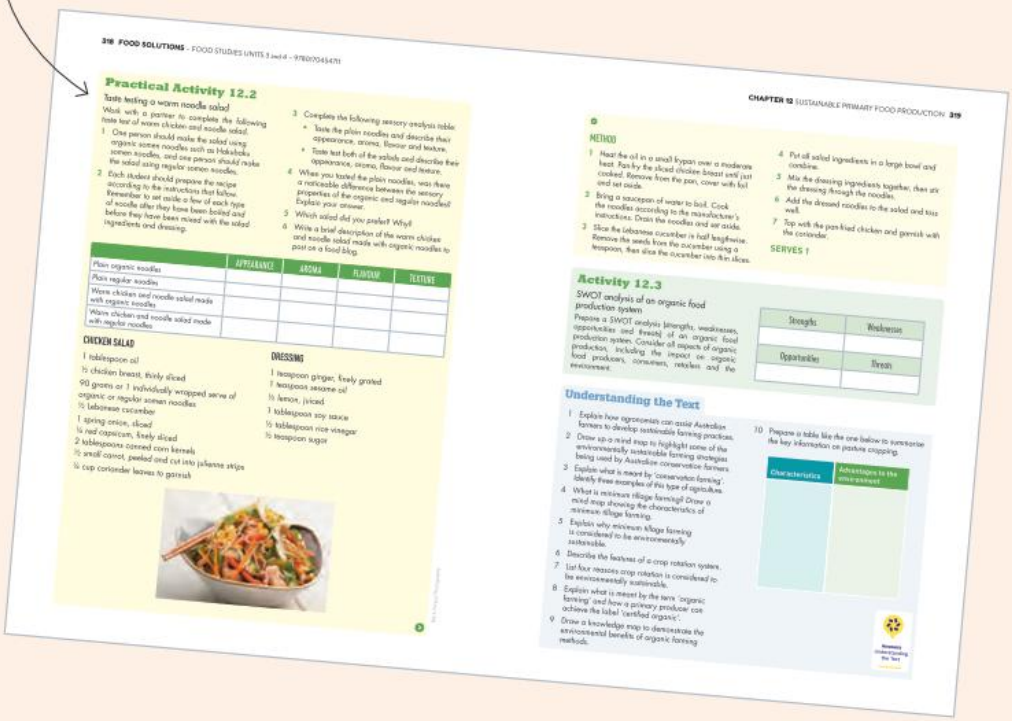
Adequacy
- Access to food that is nutritious, safe and produced in environmentally sustainable ways

Stability
- Reliability of food supply

FIGURE 10.1 Five key pillars to food security

Practical Activities

New in this edition, these activities are designed to provide students with the opportunity to engage in practical and hands-on application of key skills and knowledge.



318 FOOD SOLUTIONS – FOOD STUDIES UNITS 3 and 4 – 9780170454711

CHAPTER 12 SUSTAINABLE PRIMARY FOOD PRODUCTION 319

Practical Activity 12.2

Taste testing a warm noodle salad

Work with a partner to complete the following taste test of warm chicken and noodle salad.

1. One person should make the salad using organic somen noodles such as Hakubaku somen noodles, and one person should make the salad using regular somen noodles.
2. Each student should prepare the recipe according to the instructions that follow. Remember to set aside a few of each type of noodle after they have been boiled and before they have been mixed with the salad ingredients and dressing.
3. Complete the following sensory analysis table:
   - Taste the plain noodles and describe their appearance, aroma, flavour and texture.
   - Taste test both of the salads and describe their appearance, aroma, flavour and texture.
4. When you tasted the plain noodles, was there a noticeable difference between the sensory properties of the organic and regular noodles? Explain your answer.
5. Which salad did you prefer? Why?
6. Write a brief description of the warm chicken and noodle salad made with organic noodles to post on a food blog.

	APPEARANCE	AROMA	FLAVOUR	TEXTURE
Plain organic noodles				
Plain regular noodles				
Warm chicken and noodle salad made with organic noodles				
Warm chicken and noodle salad made with regular noodles				

CHICKEN SALAD

1 tablespoon oil
½ chicken breast, thinly sliced
90 grams or 1 individually wrapped serve of organic or regular somen noodles
½ Lebanese cucumber
1 spring onion, sliced
½ red capsicum, finely sliced
2 tablespoons canned corn kernels
½ small carrot, peeled and cut into julienne strips
¼ cup coriander leaves to garnish

DRESSING

1 teaspoon ginger, finely grated
1 teaspoon sesame oil
½ lemon, juiced
1 tablespoon soy sauce
½ tablespoon rice vinegar
½ teaspoon sugar

METHOD

1. Heat the oil in a small kypan over a moderate heat. Pan-fry the sliced chicken breast until just cooked. Remove from the pan, cover with foil and set aside.
2. Bring a saucepan of water to boil. Cook the noodles according to the manufacturer's instructions. Drain the noodles and set aside.
3. Slice the Lebanese cucumber in half lengthwise. Remove the seeds from the cucumber using a teaspoon, then slice the cucumber into thin slices.
4. Put all salad ingredients in a large bowl and combine.
5. Mix the dressing ingredients together, then stir the dressing through the noodles.
6. Add the dressed noodles to the salad and toss well.
7. Top with the pan-fried chicken and garnish with the coriander.

SERVES 1

Activity 12.3

SWOT analysis of an organic food production system

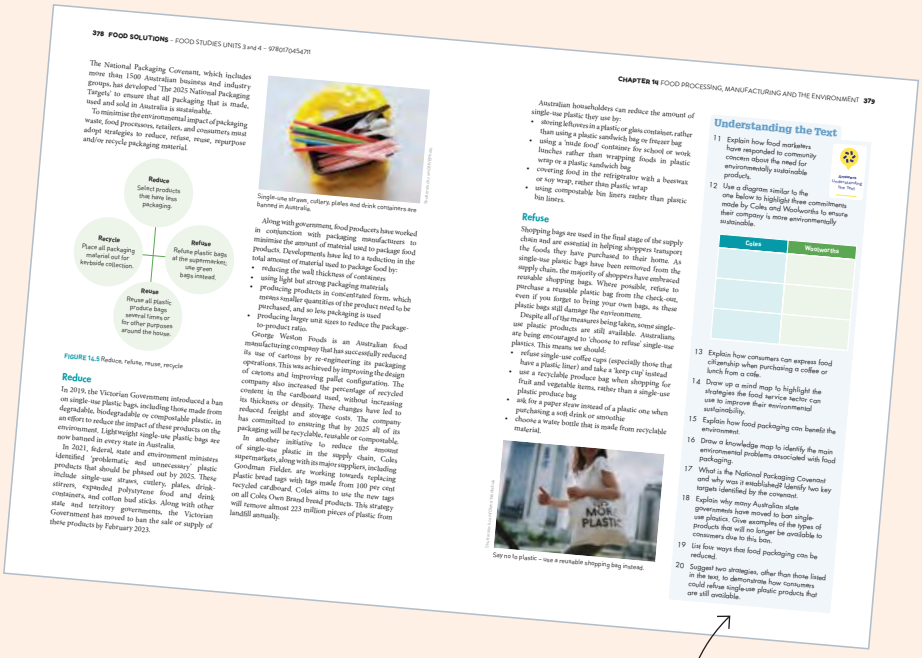
Prepare a SWOT analysis (strengths, weaknesses, opportunities and threats) of an organic food production system. Consider all aspects of organic production, including the impact on organic food producers, consumers, retailers and the environment.

Strengths	Weaknesses
Opportunities	Threats

Understanding the Text

1. Explain how agronomists can assist Australian farmers to develop sustainable farming practices.
2. Draw up a mind map to highlight some of the environmentally sustainable farming strategies being used by Australian conservation farmers.
3. Explain what is meant by 'conservation farming'. Identify three examples of this type of agriculture.
4. What is minimum tillage farming? Draw a mind map showing the characteristics of minimum tillage farming.
5. Explain why minimum tillage farming is considered to be environmentally sustainable.
6. Describe the features of a crop rotation system.
7. List four reasons crop rotation is considered to be environmentally sustainable.
8. Explain what is meant by the term 'organic farming' and how a primary producer can achieve the label 'certified organic'.
9. Draw a knowledge map to demonstrate the environmental benefits of organic farming methods.
10. Prepare a table like the one below to summarise the key information on pasture cropping.

Characteristics	Advantages to the environment



Understanding the Text

These question sets are checkpoints for students' learning and appear at regular intervals throughout the text. The questions follow the text sequentially and provide an opportunity to consolidate learning and identify any gaps requiring further revision. Answers to all the Understanding the Text questions are available on Nelson MindTap.

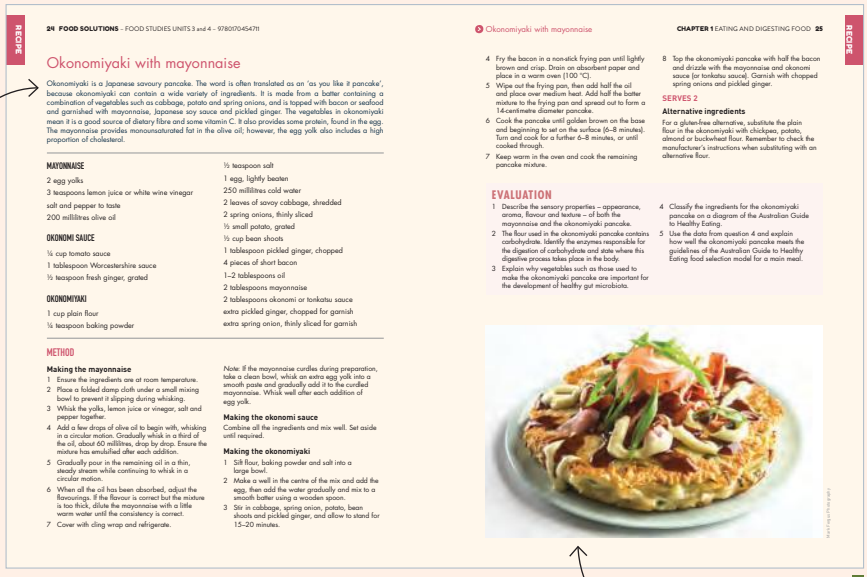


Case Studies

These include real-life examples that broaden student understanding and link to the wider context of food production, distribution and manufacturing. They also include links to key knowledge and analysis questions.

Recipes

The recipes at the end of each chapter are extensively tried and tested for completion within practical sessions. They incorporate a broad range of food preparation processes and cooking techniques, thereby developing and reinforcing students' key skills and knowledge.



24 FOOD SOLUTIONS – FOOD STUDIES UNITS 3 and 4 – 9780170454711

RECIPE

Okonomiyaki with mayonnaise

Okonomiyaki is a Japanese savoury pancake. The word is often translated as an 'as you like it pancake', because okonomiyaki can contain a wide variety of ingredients. It is made from a batter containing a combination of vegetables such as cabbage, potato and spring onions, and is topped with bacon or seafood and garnished with mayonnaise, Japanese soy sauce and pickled ginger. The vegetables in okonomiyaki mean it is a good source of dietary fibre and some vitamin C. It also provides some protein, found in the egg. The mayonnaise provides monounsaturated fat in the olive oil; however, the egg yolk also includes a high proportion of cholesterol.

MAYONNAISE
2 egg yolks
3 teaspoons lemon juice or white wine vinegar
salt and pepper to taste
200 millilitres olive oil

OKONOMI SAUCE
¼ cup tomato sauce
1 tablespoon Worcestershire sauce
½ teaspoon fresh ginger, grated

OKONOMIYAKI
1 cup plain flour
¼ teaspoon baking powder
½ teaspoon salt
1 egg, lightly beaten
250 millilitres cold water
2 leaves of savoy cabbage, shredded
2 spring onions, thinly sliced
½ small potato, grated
½ cup bean shoots
1 tablespoon pickled ginger, chopped
4 pieces of short bacon
1–2 tablespoons oil
2 tablespoons mayonnaise
2 tablespoons okonomi or tonkatsu sauce
extra pickled ginger, chopped for garnish
extra spring onion, thinly sliced for garnish

METHOD

Making the mayonnaise
1 Ensure the ingredients are at room temperature.
2 Place a folded damp cloth under a small mixing bowl to prevent it slipping during whisking.
3 Whisk the yolks, lemon juice or vinegar, salt and pepper together.
4 Add a few drops of olive oil to begin with, whisking in a circular motion. Gradually whisk in a third of the oil, about 60 millilitres, drop by drop. Ensure the mixture has emulsified after each addition.
5 Gradually pour in the remaining oil in a thin, steady stream while continuing to whisk in a circular motion.
6 When all the oil has been absorbed, adjust the flavourings. If the flavour is correct but the mixture is too thick, dilute the mayonnaise with a little warm water until the consistency is correct.
7 Cover with cling wrap and refrigerate.

Note: If the mayonnaise curdles during preparation, take a clean bowl, whisk an extra egg yolk into a smooth paste and gradually add it to the curdled mayonnaise. Whisk well after each addition of egg yolk.

Making the okonomi sauce
Combine all the ingredients and mix well. Set aside until required.

Making the okonomiyaki
1 Sift flour, baking powder and salt into a large bowl.
2 Make a well in the centre of the mix and add the egg, then add the water gradually and mix to a smooth batter using a wooden spoon.
3 Stir in cabbage, spring onion, potato, bean shoots and pickled ginger, and allow to stand for 15–20 minutes.

Okonomiyaki with mayonnaise

CHAPTER 1 EATING AND DIGESTING FOOD 25

RECIPE

4 Fry the bacon in a non-stick frying pan until lightly brown and crisp. Drain on absorbent paper and place in a warm oven (100 °C).
5 Wipe out the frying pan, then add half the oil and place over medium heat. Add half the batter mixture to the frying pan and spread out to form a 14-centimetre diameter pancake.
6 Cook the pancake until golden brown on the base and beginning to set on the surface (6–8 minutes). Turn and cook for a further 6–8 minutes, or until cooked through.
7 Keep warm in the oven and cook the remaining pancake mixture.
8 Top the okonomiyaki pancake with half the bacon and drizzle with the mayonnaise and okonomi sauce (or tonkatsu sauce). Garnish with chopped spring onions and pickled ginger.

SERVES 2

Alternative ingredients
For a gluten-free alternative, substitute the plain flour in the okonomiyaki with chickpea, potato, almond or buckwheat flour. Remember to check the manufacturer's instructions when substituting with an alternative flour.

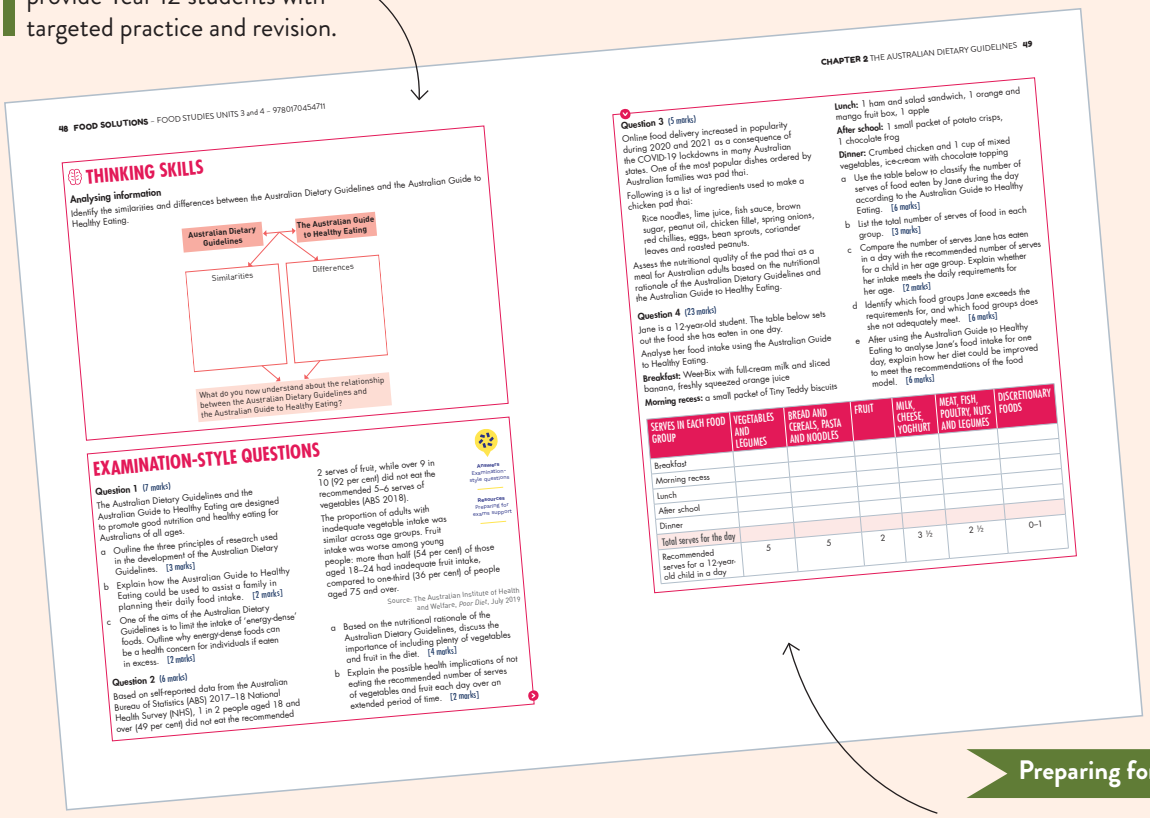
EVALUATION
1 Describe the sensory properties – appearance, aroma, flavour and texture – of both the mayonnaise and the okonomiyaki pancake.
2 The flour used in the okonomiyaki pancake contains carbohydrate. Identify the enzymes responsible for the digestion of carbohydrate and state where this digestive process takes place in the body.
3 Explain why vegetables such as those used to make the okonomiyaki pancake are important for the development of healthy gut microbiota.
4 Classify the ingredients for the okonomiyaki pancake on a diagram of the Australian Guide to Healthy Eating.
5 Use the data from question 4 and explain how well the okonomiyaki pancake meets the guidelines of the Australian Guide to Healthy Eating food selection model for a main meal.

Thinking Skills

These sections appear at the end of each chapter to challenge students to apply, analyse and evaluate the information in the preceding chapter. They are designed to provide Year 12 students with targeted practice and revision.

Recipes

All recipes have been reviewed to ensure they are consistent with the Australian Dietary Guidelines and the Australian Guide to Healthy Eating. A wide range of new 'on trend' recipes have been included in this edition. Each recipe is supported by a set of evaluation questions.



48 FOOD SOLUTIONS – FOOD STUDIES UNITS 3 and 4 – 9780170454711

THINKING SKILLS

Analysing information
Identify the similarities and differences between the Australian Dietary Guidelines and the Australian Guide to Healthy Eating.

What do you now understand about the relationship between the Australian Dietary Guidelines and the Australian Guide to Healthy Eating?

EXAMINATION-STYLE QUESTIONS

Athena's Examination-style questions

Rathbone Preparing for exams support

Question 1 (7 marks)
The Australian Dietary Guidelines and the Australian Guide to Healthy Eating are designed to promote good nutrition and healthy eating for Australians of all ages.
a Outline the three principles of research used in the development of the Australian Dietary Guidelines. [3 marks]
b Explain how the Australian Guide to Healthy Eating could be used to assist a family in planning their daily food intake. [2 marks]
c One of the aims of the Australian Dietary Guidelines is to limit the intake of 'energy-dense' foods. Outline why energy-dense foods can be a health concern for individuals if eaten in excess. [2 marks]

Question 2 (6 marks)
Based on self-reported data from the Australian Bureau of Statistics (ABS) 2017–18 National Health Survey (NHS), 1 in 2 people aged 18 and over (49 per cent) did not eat the recommended 2 serves of fruit, while over 9 in 10 (92 per cent) did not eat the recommended 5–6 serves of vegetables (ABS 2018).
The proportion of adults with inadequate vegetable intake was similar across age groups. Fruit intake was worse among young people: more than half (54 per cent) of those aged 18–24 had inadequate fruit intake, compared to one-third (36 per cent) of people aged 75 and over.
Source: The Australian Institute of Health and Welfare, *Poor Diet*, July 2019
a Based on the nutritional rationale of the Australian Dietary Guidelines, discuss the importance of including plenty of vegetables and fruit in the diet. [4 marks]
b Explain the possible health implications of not eating the recommended number of serves of vegetables and fruit each day over an extended period of time. [2 marks]

CHAPTER 2 THE AUSTRALIAN DIETARY GUIDELINES 49

Question 3 (5 marks)
Online food delivery increased in popularity during 2020 and 2021 as a consequence of the COVID-19 lockdowns in many Australian states. One of the most popular dishes ordered by Australian families was pad thai.
Following is a list of ingredients used to make a chicken pad thai:
Rice noodles, lime juice, fish sauce, brown sugar, peanut oil, chicken fillet, spring onions, red chillies, eggs, bean sprouts, coriander leaves and roasted peanuts.
Assess the nutritional quality of the pad thai as a meal for Australian adults based on the nutritional rationale of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating.

Question 4 (23 marks)
Jane is a 12-year-old student. The table below sets out the food she has eaten in one day.
Analyse her food intake using the Australian Guide to Healthy Eating.
Breakfast: Weet-Bix with full-cream milk and sliced banana, freshly squeezed orange juice
Morning recess: a small packet of Tiny Teddy biscuits
Lunch: 1 ham and salad sandwich, 1 orange and mango fruit box, 1 apple
After school: 1 small packet of potato crisps, 1 chocolate frog
Dinner: Crumbed chicken and 1 cup of mixed vegetables, ice-cream with chocolate topping
a Use the table below to classify the number of serves of food eaten by Jane during the day according to the Australian Guide to Healthy Eating. [6 marks]
b List the total number of serves of food in each group. [3 marks]
c Compare the number of serves Jane has eaten in a day with the recommended number of serves for a child in her age group. Explain whether her intake meets the daily requirements for her age. [2 marks]
d Identify which food groups Jane exceeds the requirements for, and which food groups does she not adequately meet. [6 marks]
e After using the Australian Guide to Healthy Eating to analyse Jane's food intake for one day, explain how her diet could be improved to meet the recommendations of the food model. [6 marks]

SERVES IN EACH FOOD GROUP	VEGETABLES AND LEGUMES	BREAD AND CEREALS, PASTA AND NOODLES	FRUIT	MILK, CHEESE, YOGHURT	MEAT, FISH, POULTRY, NUTS AND LEGUMES	DISCRETIONARY FOODS
Breakfast						
Morning recess						
Lunch						
After school						
Dinner						
Total serves for the day						
Recommended serves for a 12-year-old child in a day	5	5	2	3 ½	2 ½	0–1

Preparing for Exams

Examination-style questions give students the opportunity to test themselves using questions similar to those that may appear on the end of year examination. Answers and other exam support are provided on Nelson MindTap.

Nelson MindTap

Nelson MindTap is an online learning space that provides students with tailored learning experiences.

Access tools and content that make learning simpler yet smarter to help you achieve success in VCE Food Studies. Nelson MindTap includes an eText with integrated interactives and online assessment.

Margin links in the student book signpost multimedia student resources found on MindTap.

Nelson MindTap for students

- Links to Key Knowledge and skills in the Study Design for each chapter
- Worksheets
- Activities/Collaborative Activities
- Weblinks
- Chapter review tests
- Answers to Understanding the Text questions
- Exam preparation support, including:
  - Answers to Examination-style questions
  - Videos unpacking exemplar responses to exam questions
  - Glossary for command terms
- Videos (demonstrating cooking techniques)



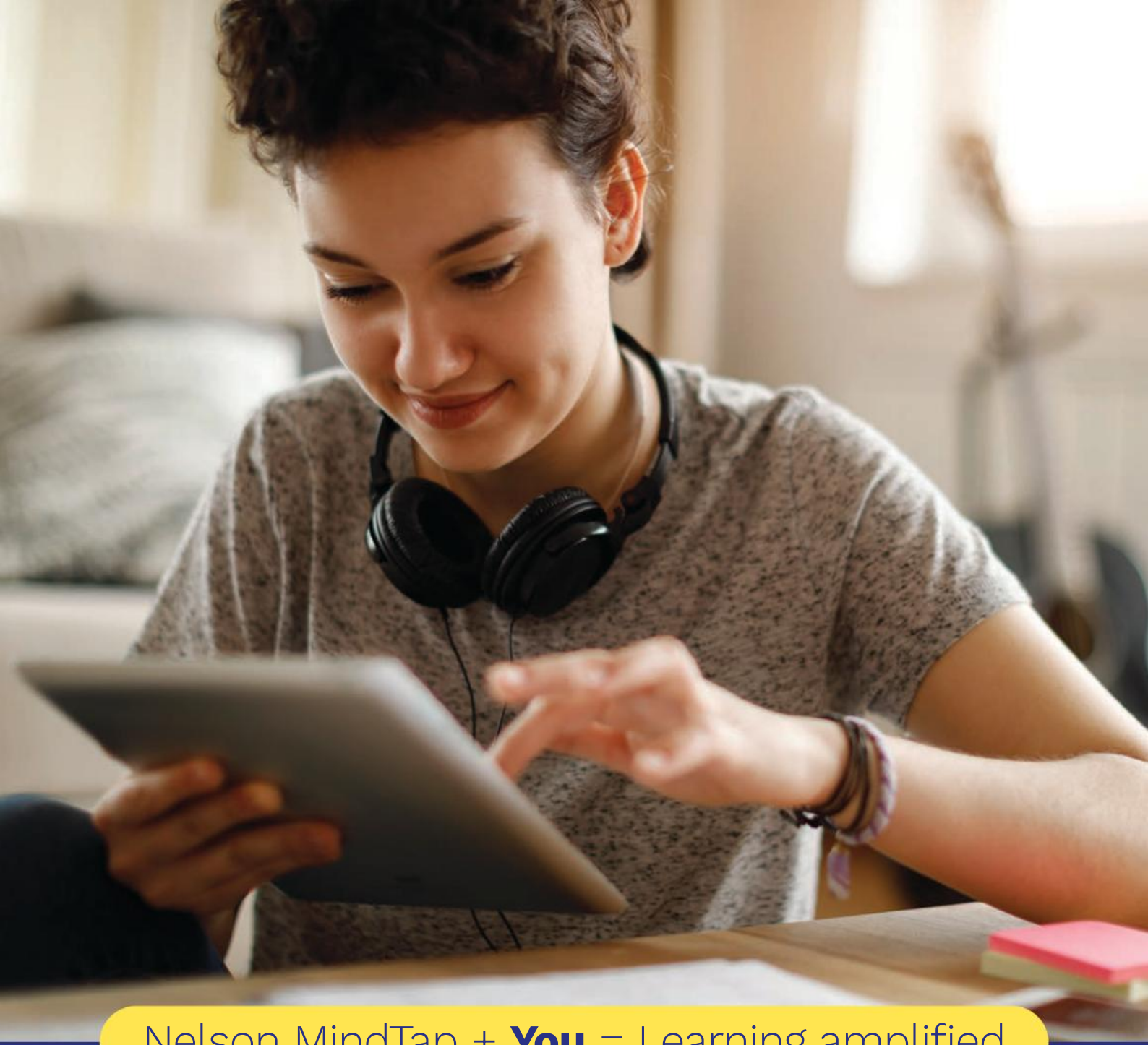




Nelson MindTap for teachers*

- Tailor content to different learning needs – assign directly to the student, or the whole class.
- Monitor progress using assessment tools like Gradebook and Reports.
- Integrate content and assessment directly within your school's LMS for ease of access.
- Access Scope and Sequence charts, downloadable recipes and answers to Understanding the Text and Examination-style questions.
- Access Chapter summaries, including:
  - Links to Key Knowledge and Skills in the Study Design
  - Infographics to introduce and revise Key Knowledge

*Complimentary access to these resources is only available to teachers who use this book as part of a class set, book hire or booklist. Contact your Cengage Education Consultant for information about access codes and conditions.



Nelson MindTap + **You** = Learning amplified

"I love that everything is interconnected, relevant and that there is a clear learning sequence. I have the tools to create a learning experience that meets the needs of all my students and can easily see how they're progressing."

— **Sarah,** Secondary School Teacher

KEY CONCEPTS IN FOOD STUDIES

FOOD SECURITY

When all people at all times have physical, social and economic access to sufficient, safe and nutritious food to meet dietary needs for an active and healthy life.



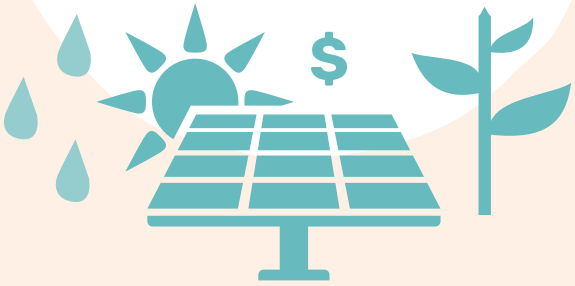
HEALTHY EATING

The Eat for Health program includes the Australian Dietary Guidelines and the Australian Guide to Healthy Eating to promote health and wellbeing and to reduce diet-related disease.



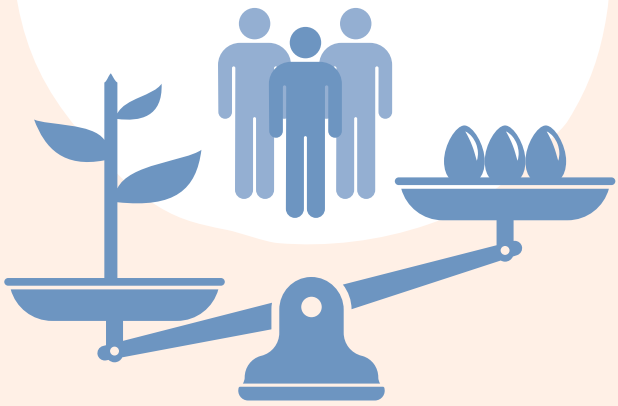
SUSTAINABILITY

Sustainability enables current generations to meet their needs without compromising the needs of future generations. This encompasses the dimensions of environment, economics and social needs.



FOOD CITIZENSHIP

Food citizenship involves individuals participating in and making informed choices at all stages of the food system such as sustainability, ethics or health.



FOOD SYSTEMS

A food system is a complex series of activities that enables food to move from farm to consumer and includes growing, harvesting, processing, transporting, manufacturing, consuming, disposing and recycling of food.



FOOD SOVEREIGNTY

Food sovereignty challenges the control of the food supply by large corporations and allows the community to access culturally appropriate food by having control over the way food is produced, traded and consumed.



ABORIGINAL AND TORRES STRAIT ISLANDER KNOWLEDGE, CULTURE & HISTORY

Food and cooking knowledge, growing and food preparation practices and the social and kinship act of sharing meals.



INNOVATION & TECHNOLOGIES

New innovations and technologies can be utilised at any stage of the food system. Examples include 3D food printing, automated farming and processing systems, lab-grown meat and development of insect protein.



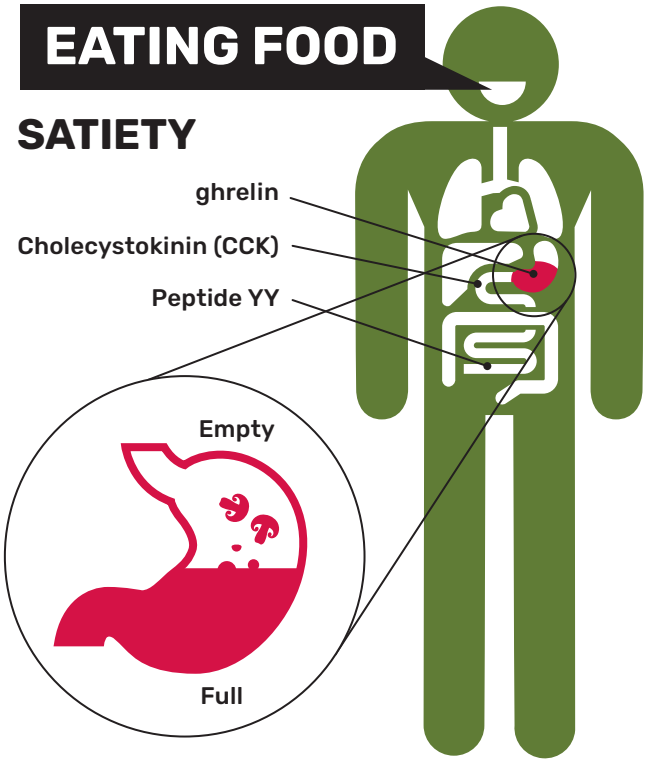
ISSUES IN FOOD

Contemporary issues related to the supply and consumption of food such as food insecurity in Australia, food marketing to children, food security and climate change, genetically modified food and political influences and a sugar tax.

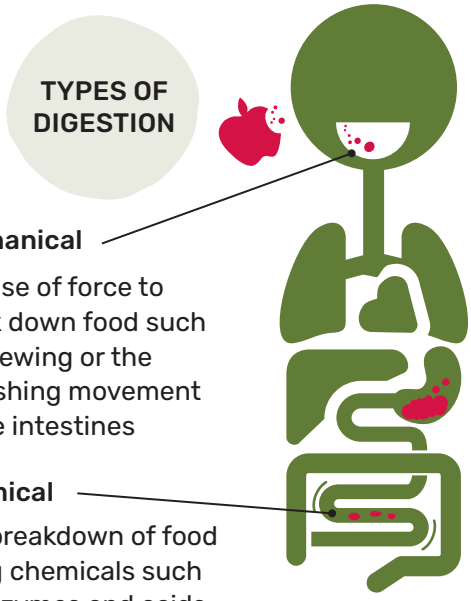


EATING FOOD

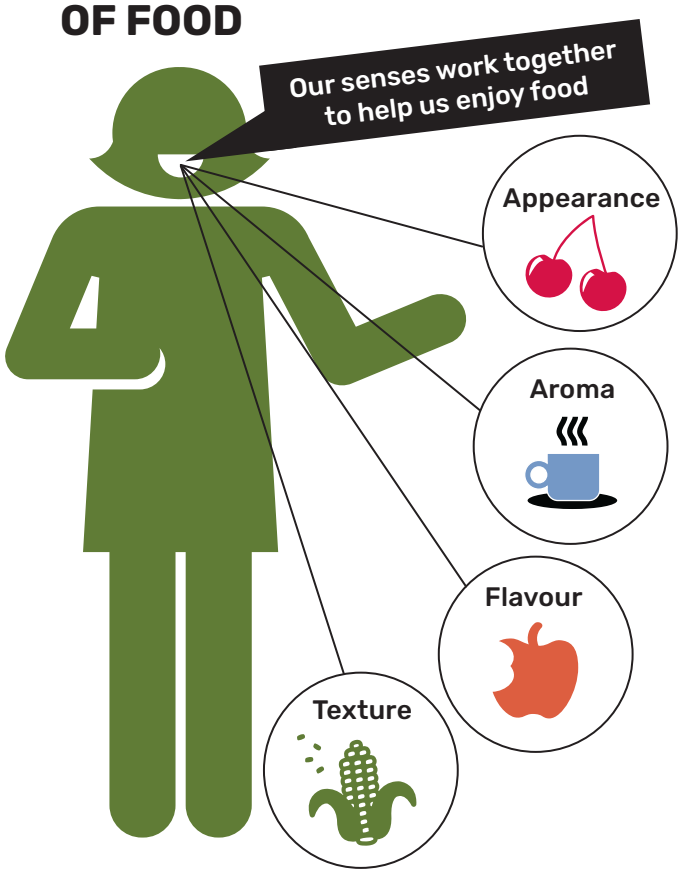
SATIETY



DIGESTING FOOD



SENSORY APPRECIATION OF FOOD – THE ENJOYMENT OF FOOD



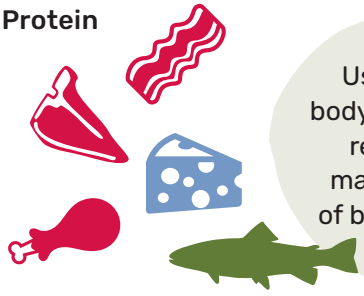
MACRONUTRIENTS

Carbohydrates

Used in the body to provide a source of energy



Protein



Used in the body for growth, repair and maintenance of body tissues

Fats

Used in the body as concentrated sources of energy, sources of vitamins A, D, E and K



1

EATING AND DIGESTING FOOD

GUT MICROBIOTA

100 trillion individual bacteria live in the small and large intestines





A gut that is densely populated with healthy microbiota will have a positive impact on physical health



Growing research confirms the link between gut health and certain mental health conditions such as depression

KEY TERMS

appetite the desire for food

bile a chemical produced in the liver that is released into the duodenum to physically break down or emulsify fat

chemical digestion the breakdown of food using chemicals such as enzymes and acids

cholecystokinin (CCK) a hormone produced in the small intestine that suppresses the appetite after eating a meal high in fat

digestion a process by which food is converted into substances that can be absorbed and utilised by the body

enzymatic hydrolysis a chemical digestive process that breaks down food by breaking the bonds that hold together the molecular 'building blocks' within the food

ghrelin an appetite-stimulating hormone produced by the stomach

glycaemic index (GI) a measure of how fast and how much a food raises blood glucose levels

leptin a hormone produced by cells that store fat, which suppresses appetite

macronutrients the essential nutrients required by the body in large amounts

mechanical digestion the use of physical force to break down food, such as chewing or the squashing movement of the intestines

microbiota microscopic living organisms such as bacteria, yeast and viruses that live in the small and large intestine of all human beings

peptide YY (PYY) a hormone produced in the lower part of the small intestine that sends a signal to the brain, telling it to decrease the appetite

satiety a state or feeling of fullness after eating food

sensory appreciation of food the information humans get from their senses about food and how they interpret that information – sight, smell, taste, touch and hearing

sensory properties the characteristics of foods as they are perceived by the senses – appearance, aroma, flavour and texture

trans fats fats that are created artificially by a process called hydrogenation

unsaturated fats monounsaturated or polyunsaturated fats

Resources
Study Design
links
Infographics
Flashcards

What is food and why do we eat it?

Our basic need for food is due to the nutrients it provides, which ensure our survival. Food contains nutrients that provide energy, promote growth and repair of tissues and regulate body processes. This is referred to as the physiological function of food.

Hunger and **appetite** are two reasons for eating food, but they are not the same thing.

What is hunger?

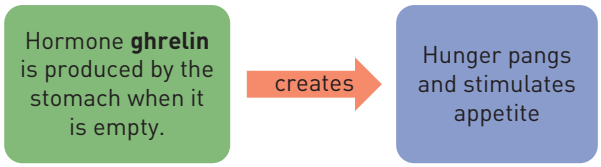


FIGURE 1.1 Production of the hormone ghrelin stimulates appetite.

Hunger is the drive to satisfy the body's need for food. When the stomach is empty it produces the appetite-stimulating hormone **ghrelin**. This hormone is secreted into the bloodstream and travels to the hypothalamus, a small gland at the base of the brain, where it triggers the feeling of hunger. We feel the physical sensation of hunger as 'hunger pangs', which prompt us to eat and restore our depleted blood sugar levels.

What is appetite?

Appetite is defined as the desire for food, even when the body is not hungry. Unlike hunger, appetite is a learned behaviour that can be triggered by the sight or smell of food, or even the mention of food in conversation. For example, when you sit down to eat pizza for dinner, the sight and aroma of the pizza causes a sensory response. This triggers stimuli that cause you to salivate (your mouth waters); simultaneously, a tingling sensation occurs in the pit of your stomach that strongly encourages you to eat the pizza.

However, we can control our appetite. Eating more slowly and mindfully enables our brain to recognise our body's signs of **satiety**, and helps prevent our appetite from overriding the feeling of fullness.

Satiety

Satiety is the state of fullness we feel after eating food and when there is no further desire for food. Several hormones are involved in suppressing appetite and providing a sense of satiety.

- **Leptin** is produced by adipose tissue (cells that store fat). It sends a signal to the hypothalamus in the brain to suppress the sensation of hunger. This hormone therefore works in opposition to ghrelin by curbing the appetite, and therefore helps to regulate body weight.
- **Peptide YY (PYY)** is produced in the lower part of the small intestine and sends a signal to the brain telling it to decrease the appetite, particularly after eating foods that are high in fat or protein.
- **Cholecystokinin (CCK)** is produced in the small intestine and suppresses the appetite when a high-fat meal is eaten. CCK slows the rate at which the stomach empties, helping to suppress the appetite.

Leptin	Peptide YY (PYY)	Cholecystokinin (CCK)
↓	↓	↓
produced by adipose tissue	produced in the lower part of the small intestine	produced in the small intestine
↓	↓	↓
opposes the action of ghrelin	sends signals of fullness to the brain	slows rate at which stomach empties, suppressing appetite

FIGURE 1.2 Hormones that suppress appetite

SATIETY LEVELS OF FOOD

Foods differ in their ability to give us a sense of satiety. This is due to the nutrients they contain, and also the way in which they are processed and prepared. The foods that provide the greatest level of satiety are high-protein foods such as meat, fish, poultry and dairy products.

The foods next most likely to satisfy hunger are high-carbohydrate foods, especially those with a low **glycaemic index (GI)**. The glycaemic index is a measure of how quickly and how much a food raises blood glucose levels. These low-GI foods delay the onset of hunger because they are broken down slowly during digestion. Foods with a low GI include wholemeal pasta, basmati and Doongara rice, multigrain and sourdough bread, soya beans, kidney beans and lentils.

Weblink
The glycemic index

Foods with a high fat content do not satisfy hunger as well as those containing protein or carbohydrates. We are often enticed by advertising to choose processed or fast foods, which are often high in fat or sugar. These foods are energy-dense rather than nutrient-dense, meaning they can provide more energy than we need, and do not satisfy hunger for long.

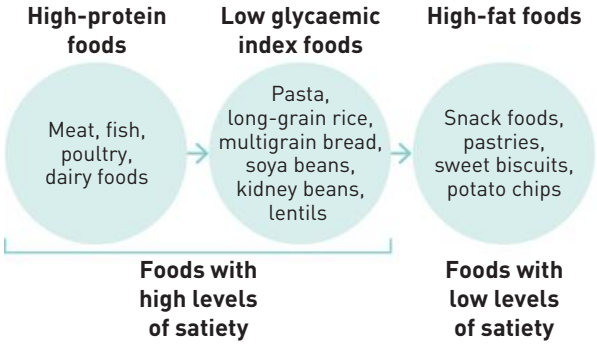


FIGURE 1.3 Satiety levels of food

The sensory appreciation of food

Our choice of food is strongly influenced by our senses or **sensory appreciation of food**; that is, the information our senses provide about food and how we interpret that information.

The appearance, aroma, flavour, texture and even the sound of food can change the way it tastes, and our senses work together with our memory to influence our enjoyment of food.

APPEARANCE

Most of us first assess our food by using our sense of sight to observe the appearance of the food. No matter how good the food might taste, if it is not visually appealing, most people will be reluctant to eat it.

Colour plays a major role in our perception of food. We expect yellow cordial to have a lemon flavour and strawberry-flavoured foods to be pink or reddish in colour. The colour of food also serves as a useful guide for judging its quality – it can indicate deterioration or spoilage, the degree of ripeness or the level of cooking.

We use our sight to assess the shape and size of food. This is a very important consideration for primary producers of fresh fruit and vegetables, for example, as most consumers today will choose unblemished, even-sized produce.



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A colourful fruit salad has an appealing appearance.

AROMA

Aroma refers to the smell or 'fragrance' of food. The smell is created by the many different chemicals the food contains. We can only identify four or five basic flavours using our sense of taste, but we can detect thousands of different aromas using our sense of smell. We detect the chemicals from food as they escape into the air and are then inhaled by the nose to reach the olfactory cells. Our senses of taste and smell work together to distinguish the sometimes minute differences between food – for example, the difference between the aroma of ripe and unripe strawberries.

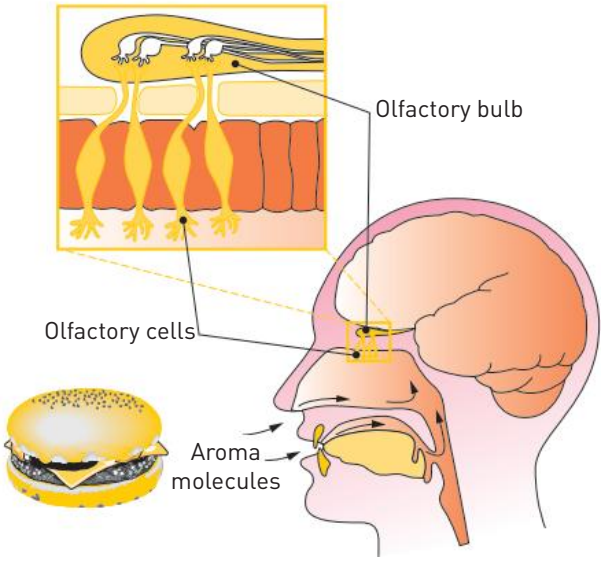


FIGURE 1.4 Olfactory cells allow us to appreciate the aroma of food.



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Cooking meat and vegetables on a barbecue creates delicious aromas.

Hot foods generally have a stronger aroma than cold foods. This is because when foods are heated, the aromas are often accentuated due to the chemicals becoming more volatile. Our sense of smell also helps us judge the safety of foods, because the aroma of 'off' food is often obvious to the nose. Our senses of smell and taste are so closely linked, if we hold our nose while eating or if we have a blocked nose, it can be difficult to identify the exact flavour of foods.

FLAVOUR

Flavour is a combination of the taste and aroma of food; the total sensory impression formed when food is eaten. The ability to detect an array of flavours and aromas varies between people, and influences an individual's food preferences. Some people find strong flavours such as curry overpowering, whereas others really enjoy the spiciness, full flavour and aroma of these dishes. The salty taste of ingredients such as olives, fish sauce and feta cheese is very appealing to some, while others find these flavours too strong.

Taste sensations begin when the papillae on the upper surface of the tongue are stimulated. Tastebuds are found within the papillae on the surface of the tongue, cheek and soft palate. As food enters the mouth, saliva begins to dissolve the flavour chemicals. At the same time, the olfactory cells in the nose detect the aromas of the food, and the nerve endings in the skin within the mouth detect the food's temperature. The tastebuds are concentrated on the tongue, and are specialised to detect specific taste sensations such as sweet, sour, salty and bitter.

There is a fifth taste associated with Japanese and Chinese cuisine, known as umami. This flavour is sometimes referred to as savoury, delicious, more-ish or meaty. Many centuries ago, Japanese cooks discovered that the use of stock made from seaweed produced a delicious meaty flavour. Umami also occurs in other foods such as tomatoes, parmesan cheese and salami. Cooks and food manufacturers use monosodium glutamate (MSG) to create the umami flavour.

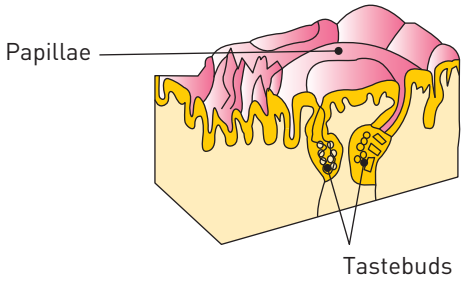


FIGURE 1.5 Papillae and tastebuds on the tongue.

TEXTURE

Texture is the tactile sense, and determines the way food feels in the mouth. Our tongue and skin within the mouth experience the mouthfeel of food. We feel the effervescence of a carbonated soft drink, an astringent sensation from unripe bananas, the pungency of wasabi or fresh chilli and the cooling of menthol from a peppermint lolly. We determine the ripeness of fruit by gently squeezing it, and when chewing food, we can feel if it is smooth, crunchy, firm, moist, lumpy or hard.



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The texture of ice-cream is created by its smooth mouthfeel and cold temperature.

The temperature of food is felt in the mouth. Temperature is important to our enjoyment of particular foods – for example, the coldness of ice-cream or the heat of a hot chocolate drink.

The texture of food is sensed when it is chewed. The food can feel chewy and cohesive, like chewing gum, or sticky like honey, or it may coat the mouth, like peanut butter. The sound of food being eaten also links with texture – for example, the crisp, crunchy sound of potato chips being chewed.

Understanding the Text

1 Explain the role of the hormone ghrelin in the sensation of hunger.
2 What is appetite and how does it influence the amount of food we eat?
3 Explain what is meant by 'satiety'.
4 What is leptin and how does it influence the feeling of satiety?
5 Explain the role of peptide YY in reducing the sensation of hunger.
6 Discuss how foods with a low GI can delay the onset of hunger.
7 Explain how the appearance of food influences our enjoyment of what we eat.
8 Describe how we smell the different aromas of food. How can temperature affect the aroma of food?
9 Explain how we detect the flavour of food. How is the umami flavour different to the four major taste sensations?
10 Explain how we determine the texture of food.

Answers Understanding the Text

Digestion

Digestion is the process by which food is broken down into substances that can be absorbed and used by the body for energy, growth and repair and to build new tissue. During this process the large particles in food are broken down into smaller components that can be readily absorbed into the bloodstream.

The digestive process begins as soon as we look at or smell food. Inhaling the aromas from food and seeing appealing images of food sends messages to the thalamus in the brain. This stimulates digestive enzymes and initiates the digestive process.

A main feature of the digestive system is the **alimentary canal** or gastrointestinal tract, which is a long tube that starts in the mouth and ends at the anus.

The teeth, tongue, salivary glands, pancreas, liver and gall bladder are **accessory organs** that also contribute to the digestive process.

Digesting food involves both mechanical (also known as physical) processes and chemical processes.

MECHANICAL DIGESTION

Mechanical digestion involves the use of force, such as chewing, or the churning or squashing movements of the stomach or intestines, to break down food.

This mechanical process begins in the mouth as the teeth tear and grind the food into smaller pieces that can be swallowed without choking. The tongue helps in this process, moving the food around the mouth as we chew and then pushing it to the back of the mouth so we can swallow. The muscular walls

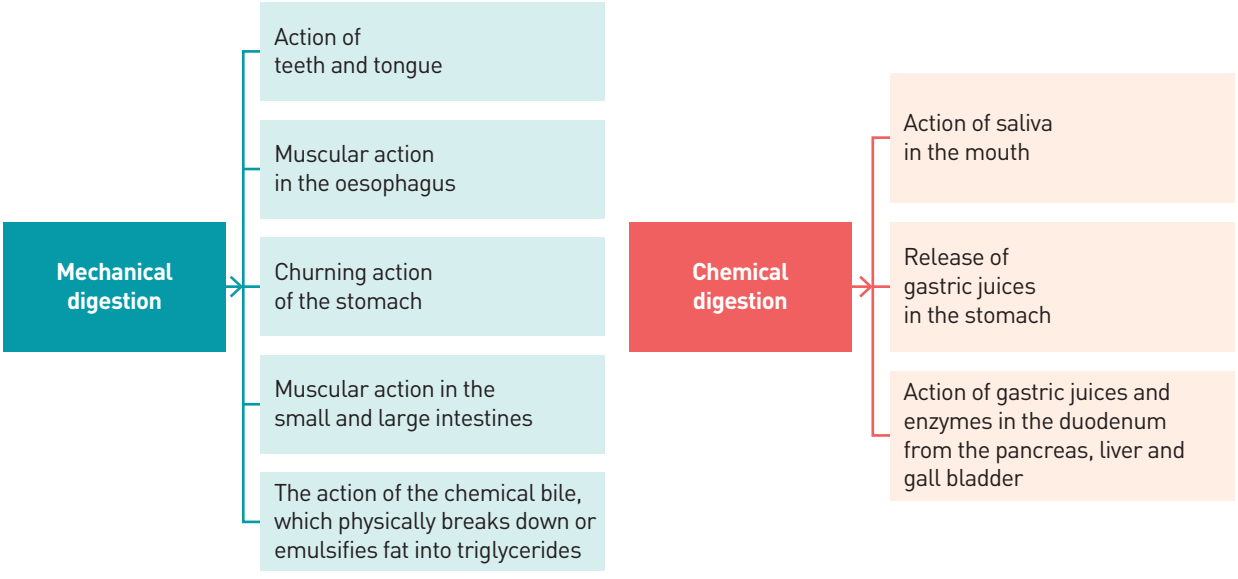


FIGURE 1.6 The mechanical and chemical processes of digestion

of the oesophagus, stomach and intestines continue the mechanical processes by pushing food along and churning and breaking it into smaller particles.

The chemical **bile** also uses a form of mechanical digestion as it physically breaks down or emulsifies triglycerides (fats) so that they can be acted on and chemically digested by enzymes.

CHEMICAL DIGESTION

Chemical digestion is the breakdown of food using chemicals such as enzymes and acids. Chemical processes occur at every point in the digestive system, beginning when food is first seen or smelt. The appearance and aroma of the food set off nerve impulses from the eyes and nose. These nerve impulses trigger the release of enzymes that will eventually break the food down and release the nutrients it contains.

Enzymatic hydrolysis

Enzymatic hydrolysis is a chemical digestive process that breaks down food by breaking the bonds that hold the molecular 'building blocks' within the food together. In enzymatic hydrolysis, reactions occur when an enzyme incorporates a water molecule across the bond, allowing it to break.

Enzymatic hydrolysis occurs when an enzyme such as pepsin breaks down protein into amino acids in the stomach. Another example of enzymatic hydrolysis is when lipase breaks down fats into fatty acids and glycerol, or the enzyme pancreatic amylase breaks down starch into maltose.

The digestive system

Collaborative Activity

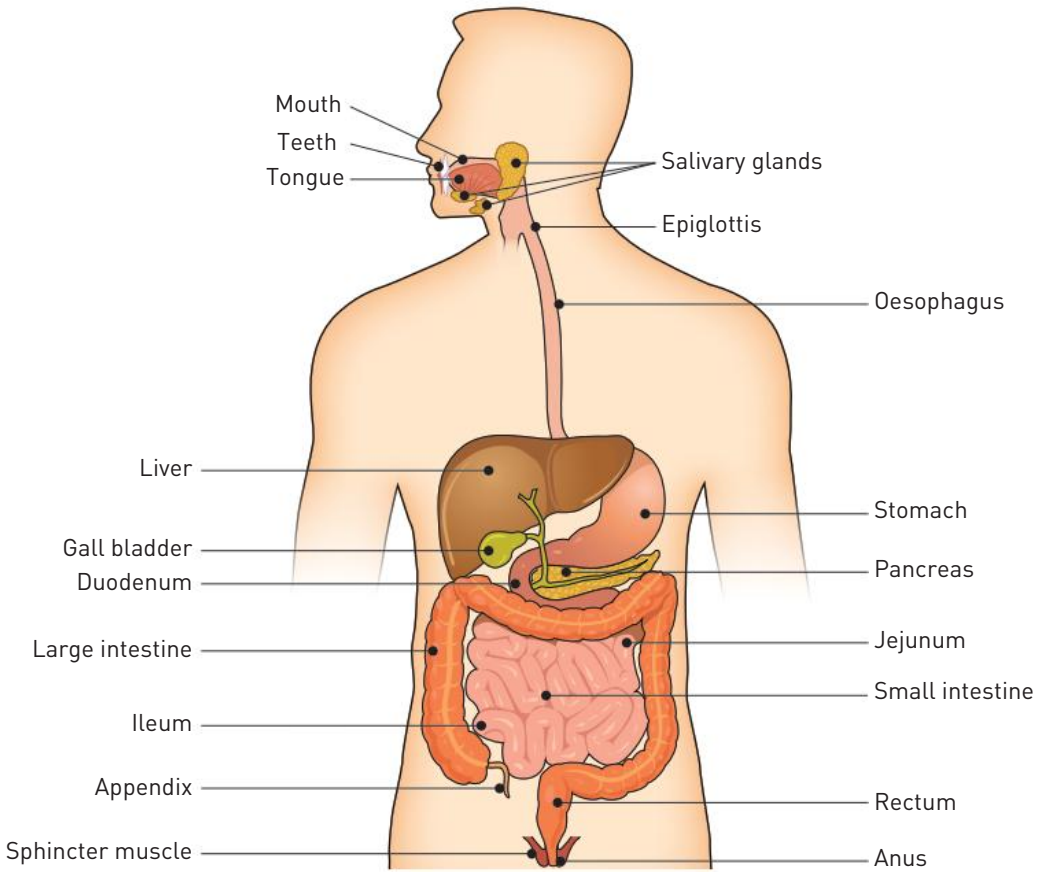


FIGURE 1.7 The digestive system

THE PHYSIOLOGY OF THE DIGESTIVE SYSTEM

ORGAN OF THE ALIMENTARY CANAL	DIGESTIVE PROCESSES	MACRONUTRIENT DIGESTION
	Mouth	
Teeth	The teeth bite off pieces of food and chew the food into smaller pieces so that a greater surface area can be exposed to the enzymes in the saliva.	No digestion of macronutrients takes place.
Salivary glands	Three pairs of salivary glands produce saliva that contains the enzyme salivary amylase. Saliva helps to lubricate the food and form it into a soft bundle called a bolus, making it easier to swallow.	The enzyme, salivary amylase, begins the digestion of carbohydrates in the food, converting the **starch** to the disaccharide maltose, through the process of enzymatic hydrolysis.
Tongue	The tongue helps to move the food around in the mouth. It pushes the food towards the sphincter, which opens to allow food to pass into the oesophagus. The enzyme lingual lipase begins the digestion of triglycerides. Before swallowing, the epiglottis, an elastic cartilage, covers the trachea to prevent food going down the windpipe.	The enzyme **lingual lipase** is produced by the tongue to begin the breakdown of fat by acting on triglycerides to free fatty acids from glycerol.
	Oesophagus	
	As food enters the oesophagus, its passage is assisted by a 'rush' of saliva. The oesophagus is ringed with muscles that contract to form wavelike motions called peristalsis. This movement pushes the bolus towards the stomach. A muscular valve at the base of the oesophagus opens, allowing the bolus to enter the stomach.	No digestion of macronutrients takes place.
	Stomach	
	The bolus enters the stomach. The walls of the stomach are strong and muscular. They contract with force to further break down the food and churn the bolus into a liquefied mass called chyme. The wavelike contractions squeeze the chyme towards the first section of the small intestine – the duodenum. The stomach is highly acidic, with a pH of between 1.5–2.5. Hydrochloric acid in the stomach helps destroy bacteria and extract the nutrients from food.	Mucous membranes that line the stomach produce and store the enzyme **pepsinogen**. When pepsinogen is released into the stomach it mixes with hydrochloric acid and is converted into **pepsin**. Pepsin begins the breakdown of protein into amino acids. **Gastric lipase** in the stomach begins the breakdown of fats into diglycerides and fatty acids. The breakdown of protein and fat occurs through enzymatic hydrolysis.
	Small intestine	
• Duodenum • Jejunum • Ileum	The small intestine is made up of three sections – the duodenum, the jejunum and the ileum. The **duodenum** is the first and shortest section of the small intestine. Enzymes from the **liver**, **gall bladder** and **pancreas** are released into the duodenum to continue the digestion of the macronutrients – protein, carbohydrates (starches) and fats.	• The **liver** produces **bile,** a chemical, that is released into the duodenum to physically break down or emulsify fat. • The **gall bladder** also stores **bile** produced by the liver and releases it into the duodenum to aid in the emulsification of fats.

ORGAN OF THE ALIMENTARY CANAL	DIGESTIVE PROCESSES	MACRONUTRIENT DIGESTION

	The **jejunum** is the middle section of the small intestine, between the duodenum and the ileum. Most nutrients in food are absorbed into the bloodstream through the villi that line the jejunum.
	The **ileum** is the final section of the small intestine and is responsible for the absorption of any nutrients not absorbed through the jejunum.
		• The **pancreas** secretes enzymes into the duodenum to break down fats, proteins and starches by enzymatic hydrolysis:
		  • **Lipase** breaks down fats into fatty acids and glycerol.
		  • **Pancreatic amylase** breaks down starch into maltose.
		  • **Protease** splits proteins into separate amino acids.
		  • **Trypsin** is also involved in breaking down protein into amino acids.
		• The intestinal epithelial cells that line the villi secrete:
		  • **Sucrase** to break down sucrose to glucose and fructose
		  • **Lactase** to break down lactose to glucose and galactose
		  • **Maltase** to break maltose to glucose

Large intestine (colon)		
	Once the nutrients have been absorbed through the jejunum and ilium, the indigestible remainder of food moves on to the large intestine. Water is absorbed from the waste, and the remains are bundled together. The resulting faeces are removed from the body through the anus by muscular contractions.	**Gut microbiota** that live in the large intestine or colon break down **soluble and insoluble dietary fibre** through a process of fermentation to produce short-chain fatty acids that keep the epithelial cells lining the colon healthy. Dietary fibre is not absorbed into the bloodstream.

Understanding the Text

11 Explain the term 'digestion' and outline the differences between mechanical and chemical digestion.

12 What is enzymatic hydrolysis? Outline two examples of the role of enzymatic hydrolysis in the digestive process.

13 Outline the role of the salivary glands and tongue in digestion after food is placed in the mouth.

14 Explain how food is assisted in its passage down the oesophagus.

15 Outline the chemical actions that take place when food enters the stomach.

16 Identify and describe the role of two enzymes released by the pancreas in the enzymatic hydrolysis of protein.

17 Explain the role of the liver in the digestive process.

18 Describe the changes that occur to the following sugars in the small intestine:

- sucrose
- lactose
- maltose.

19 Describe what happens to any indigestible matter once it enters the large intestine.

20 Outline the role of gut microbiota in the large intestine.



Answers
Understanding the Text

Practical Activity 1.1

Scientific experiment: the effect of mechanical and chemical digestion on white bread

Aim: To examine the effect of mechanical and chemical digestion on white bread.
Materials: 1/2 slice of white bread

METHOD

1. Before you begin this practical activity, develop a hypothesis for what you think may happen in this experiment.
2. Take half a slice of white bread and begin chewing it.
3. Concentrate on your chewing, and notice how your teeth and tongue are involved in the chewing action.
4. Chew on the bread for at least one minute. You should end up with a wet ball of bread in your mouth.
5. As you chew, pay close attention to the sensory properties, in particular the taste and texture of the bread.

Hypothesis

Write your hypothesis:

Analysis

1. Record the changes you observed in the sensory properties of the bread after one minute of chewing.

Taste	
Texture	

2. Explain how the physical and chemical properties of the bread changed after chewing for one minute.

Conclusion

Using your knowledge and the information gained from this experiment, write a paragraph to explain the process of digestion that occurred while chewing the white bread. Include all of the key terms listed below in your explanation.

Key terms: digestion, mechanical digestion, chemical digestion, enzymatic hydrolysis, tongue, salivary glands, bolus, enzymes, salivary amylase, glucose

Practical Activity 1.2

The sequential processes involved in digesting a burger

1. Prepare one quantity of the chicken sliders with soy and ginger glaze (see page 23).
2. Access a diagram of the digestive system on the Food Solutions Student Resource page.
3. Annotate the diagram of the digestive system to demonstrate the sequential processes involved in eating and digesting the macronutrients – protein, carbohydrate, fat – found in the components that make up the chicken sliders:
   - meat patty
   - burger bun
   - Kewpie mayonnaise.

The absorption of macronutrients

The absorption of the **macronutrients** carbohydrates, protein and fat occurs mainly in the jejunum and ilium of the small intestine. Food is slowly passed along the small intestine, taking about 2–3 hours before it reaches the large intestine. This allows plenty of time for the absorption of nutrients to take place.

Collaborative Activity

THE VILLI IN THE SMALL INTESTINE

The walls of the small intestine are lined with thousands of tiny finger-like projections called villi. These villi create a large surface area that allows the tiny units of each nutrient to pass through into either the bloodstream or the lymphatic system.

The surface of the villi is surrounded by a wall of single cells that allow nutrients to pass through. Within each villus is a network of blood capillaries, linking to veins and an artery. In the centre of each villus is the lacteal. The lacteal, a lymphatic capillary, is surrounded by tiny blood capillaries, which are connected to larger blood vessels. Fats are absorbed into the lacteal, which is connected to the lymphatic system.

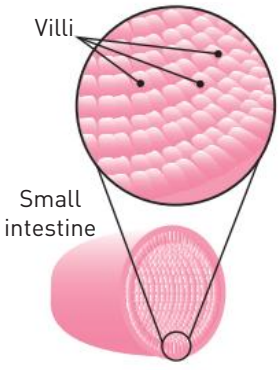


FIGURE 1.8 Villi in the small intestine

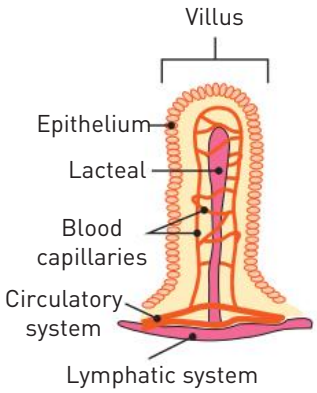


FIGURE 1.9 Cross-section of a villus in the wall of the small intestine

Carbohydrates

Carbohydrates contain the elements of carbon, hydrogen and oxygen. The body's complex metabolism requires a source of energy in order to function, and carbohydrates are the body's preferred fuel source. Foods that contain carbohydrates include breakfast cereals, rice, pasta, legumes, corn, potato, fruit, yoghurt, sugar, biscuits, cakes and lollies.

Carbohydrates contribute 16 kilojoules of energy per gram of carbohydrate. It is recommended that 45–65 per cent of our daily energy intake is derived from carbohydrates.



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Carbohydrate foods contribute 16 kilojoules of energy per gram.

TYPES OF CARBOHYDRATES

There are three types of carbohydrates that are found in a wide variety of the foods we eat – monosaccharides, disaccharides and polysaccharides.

Monosaccharides

These single units of sugar are the base unit from which other carbohydrates are built. They have a sweet taste and are referred to as single sugars. Monosaccharides come in a number of forms. Glucose is the form of carbohydrate the body uses as energy and is found in onions, unripe potatoes and sweet fruits. Fructose is a single sugar found in fruit, plant juices and honey. Galactose is found in the milk of mammals such as cows, goats and sheep.



iStock.com/AnthiaCumming

Honey contains the simple sugar fructose.

Disaccharides

Disaccharides are formed when two monosaccharides join together. These are often called double sugars. They have a sweet taste and readily dissolve in water.

Sucrose is formed from one unit of glucose plus one unit of fructose, and is found in fruits, vegetables and cane sugar. Lactose is formed from one unit of glucose plus one unit of galactose, and is found in milk.

Polysaccharides

Polysaccharides are carbohydrates made from many sugar units and are known as starches. These form during photosynthesis in plants from a varying number of monosaccharide units joined together in a chain. Polysaccharides are tasteless, readily dissolve in water and are converted to glucose during digestion. Starches are found mainly in cereals and starchy vegetables such as potatoes.

Fibre

Fibre is another form of carbohydrate and is only found in plant food. It is not digested in the stomach or small intestine; instead, it is broken down by bacteria in the large intestine into short-chain fatty acids through a process of fermentation. These fatty acids are essential in keeping the epithelial cells that line the bowel healthy. The National Health and Medical Research Council recommends a total daily fibre intake for women of 28 grams, and says men should consume 38 grams of fibre daily.

- **Insoluble fibre** includes cellulose and lignin, which make up the structural part of plants. Insoluble fibre retains water and provides bulk to the diet. It is slowly and only partially fermented, and keeps the bowels regular. Sources of insoluble fibre include wholegrains and wholemeal breads and cereals, wheat and rice bran, fruit and vegetables with the skin on, nuts and seeds.
- **Soluble fibre** differs from insoluble fibre in that it dissolves in water and other gastro-intestinal fluids and is broken down into a gel-like substance in the large intestine. Soluble fibre provides bulk to the digestive system and is almost completely broken down by bacteria in the large intestine. Good sources of soluble fibre include oats, legumes, nuts, seeds, psyllium husks, lentils and peas.
- **Resistant starch** promotes the growth of healthy bacteria in the colon. It resists digestion in the small intestine and is therefore valuable for bowel health. Foods containing resistant starch include baked beans, firm bananas, legumes, unprocessed cereals and grains. Resistant starches, Hi-Maize and BARLEYmax™ can also be added to some breads and breakfast foods.



iStock.com/whitewish

Wholemeal bread contains insoluble fibre.

ABSORPTION OF CARBOHYDRATES

During digestion, sugars and starches are broken down into the monosaccharide, glucose. Glucose molecules are then absorbed from the jejunum into the blood capillaries and transported by the bloodstream to cells in other parts of the body, to provide energy.

The pancreas secretes a hormone called insulin, which helps the glucose move from the bloodstream into the cells. Once inside the cell, the glucose is 'burned' along with oxygen to produce energy: glucose + oxygen → energy + CO_2 + water.

Any excess glucose is converted to glycogen and stored in the liver and muscle tissue. It can be used to supplement blood sugar levels during physical activity.

UTILISATION OF CARBOHYDRATES

Carbohydrates (along with fat) provide energy for a wide range of body functions, including:

- physical and mental exertion, such as walking, playing sport, studying and reading
- physiological functions, including heartbeat, breathing, blood circulation and digestion
- body cell functions such as the production of new protein, cell reproduction and the movement of fluids across the cell membrane.

Protein

Proteins are made up of simple units in chain formation called amino acids, and contain carbon, oxygen, hydrogen and nitrogen. Amino acids are often referred to as the building blocks of life. The number and type of amino acids in each type of protein chain vary considerably. The pattern of amino acids that form in the protein molecule determines the shape of that molecule and, consequently, its physical properties and the type of protein food. Each amino acid has its own chemical name, and there are about 20 different types.

There are eight amino acids that cannot be produced by the body – these are called essential amino acids. Those that can be produced by the body are called non-essential amino acids.

TYPES OF PROTEINS

Complete proteins

Complete proteins come mainly from animal sources, and contain all the essential amino acids. They are said to be of high biological value as they contain the amino acids required for growth and repair of body tissue. Sources of complete proteins include meat, fish, eggs, cheese, milk and yoghurt. A small number of plant foods contain complete protein, including soya bean products, quinoa and amaranth, a leafy green consumed in Asia and the Mediterranean.



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Sources of complete protein

Incomplete proteins

Incomplete proteins come mainly from plant sources, and lack one or more of the essential amino acids. They are said to be of low biological value, as they do not contain all the essential amino acids required for growth and repair of body tissue. Sources of incomplete proteins include cereals such as wheat, oats and rye, pulses such as peas and beans, and lentils and nuts.

Eating a diet that includes a variety of both complete and incomplete proteins ensures that all the essential amino acids will be supplied.



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Legumes are a good source of incomplete protein.

ABSORPTION OF PROTEIN

Protein is broken down into amino acids during digestion. The amino acids are absorbed from the jejunum into the capillaries, where they dissolve in the blood and are carried to the liver for storage. The liver then directs the distribution of the amino acids for use throughout the body.

UTILISATION OF PROTEIN

The body utilises protein for the growth and repair of bone and muscle cells, the production of blood cells, and the formation and repair of connective tissue and cartilage. Amino acids – the building blocks of protein – are also the precursors in the creation of body chemicals, such as enzymes, hormones and antibodies.

If we consume more protein than is required for these key functions, it can be converted to kilojoules and utilised as energy. If it is not used, it will be stored as body fat. If there is insufficient carbohydrate and fat in the diet, protein can also be used as an energy supply. In this case, it is referred to as a secondary source of energy. About 10 per cent of the body's energy comes from protein.

Understanding the Text

21 Briefly explain where the absorption of nutrients takes place during digestion and how long this process takes.

22 Explain how the structure of the villi assists with the absorption of nutrients.

23 Outline the role of carbohydrates in the production of energy.

24 Explain the difference between soluble and insoluble fibre, and why it is important to consume both types of fibre.

25 Outline why resistant starch is valuable in the digestive process.

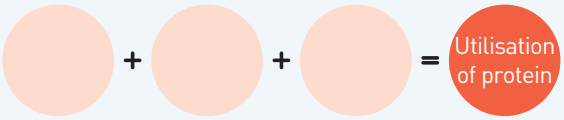
26 Describe how carbohydrates are absorbed and utilised by the body.

27 Explain why protein is a valuable macronutrient for the body.

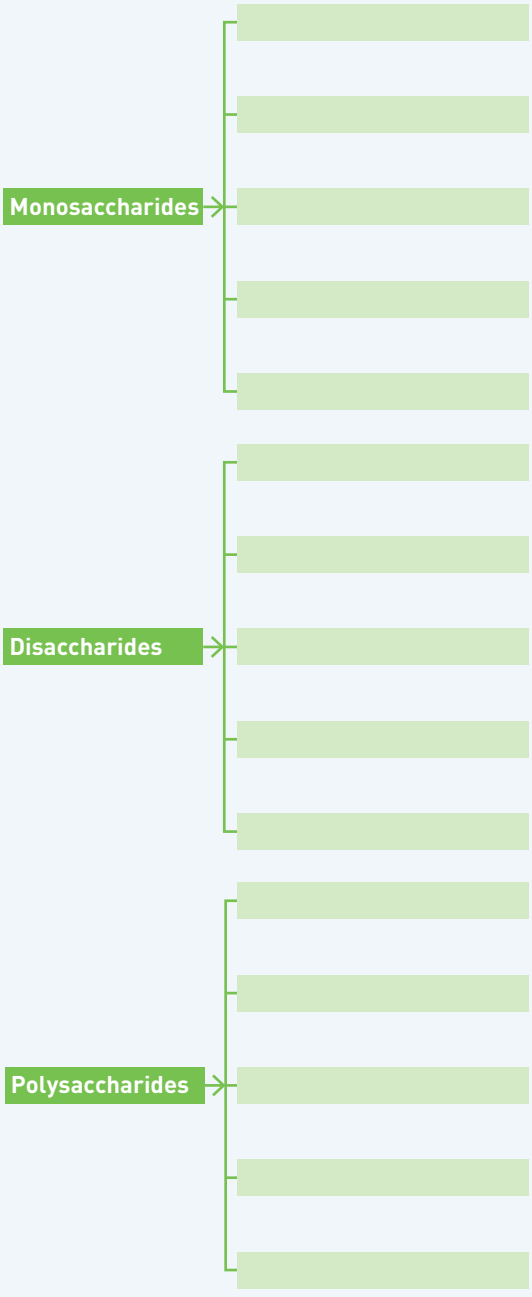
28 Complete the following table to demonstrate your understanding of the different types of proteins.

PROTEIN TYPE	CHEMICAL MAKE-UP	FOOD SOURCES
Complete		
Incomplete		

29 Draw up a diagram like the one below to summarise how protein is utilised by the body.



30 Draw up a diagram like the one below to summarise key information about the different types of carbohydrates.



Fats

Fats and oils have the same chemical elements as carbohydrates – carbon, hydrogen and oxygen – but the structure varies, so the foods have different properties. The elements are linked together to form fatty acids and glycerol. Fats and oils can be classified according to:

- their source – animal or vegetable
- the way in which they are distributed throughout foods – visible or invisible
- their chemical composition – saturated or unsaturated
- their state at room temperature – liquid or solid.

TYPES OF FAT

Saturated fats

Saturated fats contain the maximum amount of hydrogen. A fatty acid is a long carbon chain with hydrogen atoms attached. When each carbon chain and oxygen atom has its full complement of hydrogen atoms, it is said to be saturated. Saturated fatty acids are predominantly present in fats that are solid at room temperature, and are mainly of animal origin. They tend to increase low-density lipoproteins (LDL), or 'bad' cholesterol, which increases the risk of heart disease. The main food sources of saturated fats include milk, butter and fats on meats. Coconut oil and palm oil are exceptions, because they are saturated fats of plant origin.

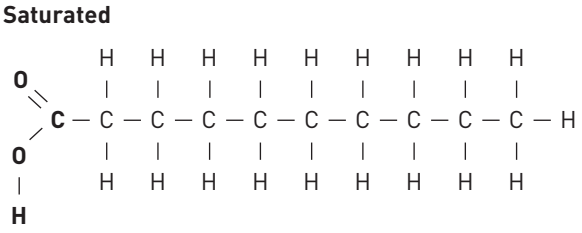


FIGURE 1.10 The chemical structure of saturated fats

Unsaturated fats

Unsaturated fats can be monounsaturated and polyunsaturated fats. These fats do not contain the maximum amount of hydrogen – each carbon chain has less than the full number of hydrogen atoms attached. Double bonds exist between the carbon atoms, so the fatty acid is said to be unsaturated. Unsaturated fatty acids are mostly present in plant and vegetable oils. These fats can help to decrease cholesterol. Unsaturated fats are found mainly in peanut, olive, maize and canola oils, nuts, seeds and soy products.

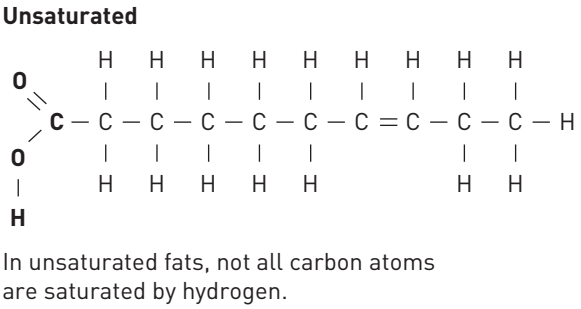


FIGURE 1.11 The chemical structure of unsaturated fats

Trans fats

Trans fats are created artificially through a process called hydrogenation. Liquid oil is converted to a solid fat with the carbon chain and oxygen atoms featuring the maximum amount of hydrogen atoms. Like saturated fats, they are considered to be more harmful to health as they increase the level of bad (LDL) cholesterol and lower the level of high-density lipoproteins (HDL), or good cholesterol. Trans fats are thought to increase the risk of coronary heart disease. The main food sources of trans fats are pastries, cakes, biscuits, deep-fried foods and processed foods.

ABSORPTION OF FATS

During digestion, fats are broken down to fatty acids and glycerol, which are then absorbed into the lacteal – the inner section of the villi in the small intestine. There, they recombine to form fats, which mix with lymphatic fluid. They then pass around the body in the lymphatic system, and join the blood circulation as insoluble fat. They are converted to soluble fat in the liver.

UTILISATION OF FATS

Fat is a concentrated source of energy containing 37 kilojoules per gram. Fats provide more than twice the amount of energy per gram that carbohydrates or proteins do. While carbohydrates are the body's preferred source of energy, if insufficient energy is available in the food consumed, the body uses fat for energy production.

Another key use of fat is to insulate the body and maintain its core temperature. Fat is stored in the

adipose tissue, and also surrounds vital organs such as the kidneys, protecting them from injury.

Fats are also utilised in the absorption and storage of vitamins A, D, E and K. These vitamins are described as 'fat soluble' vitamins, as they are only soluble in fats, not water. Fat-soluble vitamins are essential to ensuring the health of the eyes (vitamin A), assisting in calcium absorption and bone formation (vitamin D), protecting cells by neutralising free radicals (vitamin E) and aiding blood clotting (vitamin K).

Gut microbiota for health

The microbiology of the intestinal tract refers to the **microbiota** or microscopic living organisms such as bacteria, yeast and viruses that live in the small and large intestine. The intestinal tract is a complex ecosystem and contains over 400 species and over 100 trillion individual bacteria called microbiota. The large intestine is densely populated with a microbial ecosystem, but the small intestine is home to a smaller quantity and fewer species of these microbiota.

THE ROLE OF THE DIET IN INFLUENCING GUT MICROBIOTA

The number and health of gut microbiota are clearly linked to the type of diet individuals consume. Eating a diet featuring a broad range of 'whole foods' that are naturally high in fibre and are minimally processed will encourage the growth and health of beneficial gut microbiota. Foods such as plant foods, especially wholegrains, legumes, vegetables, fruit, nuts and seeds, are very important for the development of healthy gut microbiota. A gut health diet should also include a moderate amount of high-quality protein foods such as seafood, lean meat and poultry and dairy foods. However, it is important to limit the amount of highly processed foods in the diet, as these foods can have a detrimental impact on gut microbiota.

Increasing the consumption of foods that contain probiotics and prebiotics can also support the natural microbiota that live in the large and small intestine. Probiotics are live bacteria such as *bifidobacterium* and *lactobacillus* that have significant health benefits for individuals. Probiotics are commonly found in yoghurt and fermented foods, including fermented cabbage dishes such as kimchi and sauerkraut, fermented soybean foods such as miso, and kefir, a type of fermented cow, goat or sheep's milk.



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Kimchi is a good source of probiotics.

Prebiotic components are compounds that naturally occur in certain foods or that are added to food products that are non-digestible. Prebiotic components feed bacteria by stimulating the growth or activity of naturally occurring colonic bacteria, thereby improving the health of the gut, which in turn improves overall health. Defined as dietary fibre, prebiotic substances such as resistant starches and non-starch polysaccharides are substances that can be metabolised by the microbiota to allow the bacteria to grow. To be classified as a prebiotic substance, components must not be broken down or absorbed in the small intestine. Instead, they act as a substrate to allow beneficial colonic microbiota to grow, and consequently improve the ratio of beneficial colonic microflora. Foods high in prebiotics include chickpeas, oats, unripe bananas, apples and walnuts.



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A breakfast bowl of oats, bananas, apples and walnuts provides a good source of prebiotics.

THE RELATIONSHIP BETWEEN GUT MICROBIOTA AND PHYSICAL HEALTH

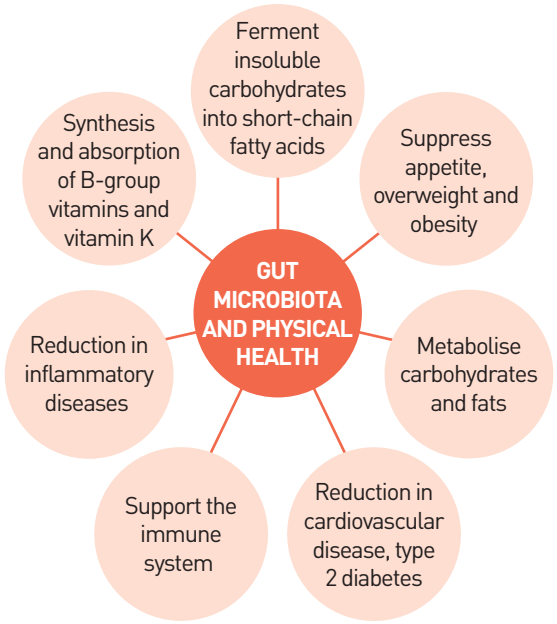


FIGURE 1.12 Gut microbiota and physical health

A gut that is densely populated with healthy microbiota will have a positive impact on physical health. Gut microbiota assist the digestion of fibre by fermenting indigestible carbohydrates and resistant starches such as pectin, cellulose and hemicellulose, found in plant foods, into short-chain fatty acids (SCFAs). These short-chain fatty acids are important for physical health, as they:

- suppress appetite and therefore help maintain a healthy weight and prevent individuals from becoming overweight or obese
- metabolise carbohydrates and fats
- reduce the likelihood of developing lifestyle diseases such as cardiovascular disease, type 2 diabetes and some forms of cancer
- support the immune system and improve resistance to infections by inhibiting the growth of harmful microorganisms or pathogenic bacteria that are detrimental to good health
- reduce the risk of developing inflammatory diseases such as rheumatoid arthritis and inflammatory bowel disease
- assist in the synthesis and absorption of B group vitamins and vitamin K.

THE RELATIONSHIP BETWEEN GUT MICROBIOTA AND MENTAL HEALTH

A network of neurons, hormones and immunological messages called the 'gut–brain axis' enables the brain and gut to communicate. The gut–brain axis is established soon after birth and continues to develop throughout life. It is regulated by the gut microbiota, and is a bidirectional mechanism that enables the gastrointestinal tract and the brain to interact.

Recent research has shown that the composition and function of the microbiota in the gut can influence mental and brain health. A healthy gut with thriving microbiota contributes to normal brain function and can influence our mood and behaviour, including our levels of stress, anxiety and fear. Scientists have found that 90 per cent of serotonin – the chemical associated with happiness and depression – is produced in the gut, while only 10 per cent is produced in the brain. Dopamine, another important neurotransmitter or chemical messenger associated with our mood and anxiety levels, is produced by the gut microbiota.

Scientific evidence has shown that high levels of stress can reduce the diversity of gut microbiota, creating an imbalance of good and bad microbiota. This imbalance is called 'dysbiosis' and can reduce the gut's immune response, allowing harmful bacteria to thrive and making an individual more vulnerable to disease and infection.

The role of the gut–brain axis can be seen in individuals who suffer from anxiety and depression. Some of these individuals are more likely to be susceptible to inflammatory conditions, including those that affect the gut such as inflammatory bowel disease. For other people, feeling stressed, anxious or depressed can affect their gastrointestinal tract, making them feel physically



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A plant-based diet produces healthy gut microbiota and can lead to improved mental health.

ill. They may develop symptoms such as having an upset stomach, or may suffer from diarrhoea or constipation.

Similarly, the role of the gut–brain axis is also apparent in individuals who suffer from serious health conditions such as obesity, diabetes or cardiovascular disease, who often report feeling depressed or anxious.

By consuming a whole-food diet that contains mainly plant-based foods and is therefore high in dietary fibre, it is possible to improve mental health and become more resilient to feelings of stress, depression and anxiety.

Practical Activity 1.3

Product analysis: Examining the role of probiotics in diet

Aim: To analyse the sensory properties of a range of probiotics available to consumers

Method

1 Your teacher will provide a selection of three probiotic foods available for product analysis.

KIMCHI	TEMPEH	KEFIR YOGHURT
		

Shutterstock.com/sasimoto
Shutterstock.com/dani daniar
Alamy Stock Photo/PackStock

2 Taste test each type of probiotic food and record the results of your sensory analysis in a table similar to the one below.

	KIMCHI	TEMPEH	KEFIR YOGHURT
Appearance			
Aroma			
Flavour			
Texture			

Analysis

1 After completing the taste test, make recommendations of how consumers could include or serve each of the probiotic foods into their daily food plan:
- kimchi
- tempeh
- kefir yoghurt.

2 Discuss how including probiotic foods in the diet will support the gut microbiota.

Conclusion

Outline the benefits to the consumer's physical and mental health of including probiotic foods in their daily eating patterns.

Understanding the Text

31 Outline the chemical make-up of fats and oils.

32 Explain why it is important to minimise the amount of saturated fat in the diet.

33 Outline the difference in the health risks associated with consuming unsaturated fats and trans fats.

34 Describe how fats are absorbed and utilised by the body.

35 What are microbiota and where are they found in the body?

36 Discuss the optimum diet for healthy gut microbiota.

37 Explain how prebiotic substances can impact on gut microbiota.

38 Describe three ways in which gut microbiota can influence physical health.

39 What is the 'gut–brain axis' and how is it regulated?

40 Draw up a mind map to demonstrate how gut microbiota can influence an individual's mental and brain health.

Answers
Understanding the Text

Activity 1.4

Healthy gut, improved mood? The link between your microbiome and mind

Read the article 'Healthy gut, improved mood? The link between your microbiome and mind', then answer these questions:

1. Evaluate the validity of the news article by assessing the source, purpose, context, presentation of evidence and language used. Alternatively use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this news article. See pages 193–94 for additional information on completing a CRAAP test.
2. Explain why Nicole Dynan decided to launch her '30 plants in 7 days' program.
3. Describe the eating habits of Australians that have led to poor health outcomes, according to the Australian Institute of Health and Welfare.
4. Describe how scientists were able to detect the presence of gut microbiota before the development of specialist technology.
5. Outline the main effect of gut microbiota on mental health.

HEALTHY GUT, IMPROVED MOOD? THE LINK BETWEEN YOUR MICROBIOME AND MIND

It was her colleagues' declining health, both mental and physical, that first got Nicole Dynan thinking there had to be a better way to live.

After a decade of working in a corporate environment, Dynan noticed that burnout had become commonplace and bad eating habits, such as an over-reliance on greasy, processed foods and little plants and vegetables, had become so entrenched that people's overall wellbeing was suffering.

'I also experienced first-hand the challenges of maintaining my own health while working within a stressful corporate environment,' says the accredited dietitian and owner of The Good Nutrition Company, which she founded in 2012.

Dynon has made it a personal mission to not only educate corporates about the benefits of eating better, but to try and convey her nutritional knowledge to the wider public by launching her '30 plants in 7 days' program, which aims to improve people's gut health by encouraging them to eat a variety of vegetables, grains, nuts and fruit.

According to the Australian Institute of Health and Welfare, Australians of all ages tend to have a poor diet, meaning they do not eat enough of the five food groups (vegetables and legumes; fruit; grain (cereal) foods; lean meats and poultry, eggs, fish, tofu, nuts and seeds; dairy) and instead eat too many discretionary foods high in salt, fat and sugar such as cakes, chips and sugary drinks.

Dynon's program comes as renewed interest in gut health and bacteria, alongside a growing body of research, shows that what we eat has implications far beyond the waistline and can influence our mood and even contribute to positive mental health by helping fight symptoms of depression.

Even Dr Michael Mosley – the British scientist behind the 5:2 diet – has pivoted to gut health, turning his attention to the workings of the microbiome in his latest book, *The Clever Guts Diet*, in which he examines how the gut communicates with the body and mind, and how our microbiome affects health, weight and mood.

'It's only recently that the connection between the gut and mental health has emerged,' says Dr Nicole Kellow from Monash University's Be Active Sleep & Eat (BASE) Facility.

'The main reason research into gut health has exploded is that we can now detect which bacteria are present in the gut – we never used to be able to do that.'

Dr Kellow says that before we could detect gut bacteria with special technology, researchers would remove bacteria from the human gut in a bid to grow it outside the body in a Petri dish.

But it was quickly discovered that gut bacteria wouldn't grow in the presence of oxygen.

'And while these technologies are becoming more sophisticated, we still don't know what the bacteria is actually doing in there, even though we know more than ever about what and who is living in the gut,' she says.

What is emerging, however, is the growing link between gut health (measured by diversity of microbiome) and certain mental health conditions such as depression.

Head of the Nutraceutical Research stream at Deakin University's Food & Mood Centre, Dr Wolf Marx, says that a growing library of evidence points to the 'bacteria from our gut seeming to have anti-inflammatory properties that can influence our mood.'

'Healthy gut, improved mood? The link between your microbiome and mind', by Caroline Zielinski, *Sydney Morning Herald*, 30 September 2020. The use of this work has been licensed by Copyright Agency except as permitted by the Copyright Act, you must not re-use this work without the permission of the copyright owner or Copyright Agency

Chapter Test
Chapter review

THINKING SKILLS

Applying knowledge

Annotate a diagram of the digestive system similar to the one on page 8 to highlight:

- the key organs of the alimentary canal and accessory digestive organs
- the location of enzymes associated with the digestion of carbohydrates, proteins and fats.

Analysing information

Analyse each of the following macronutrients and describe the way they are absorbed and utilised in the body:

- carbohydrate
- protein
- fat.

Evaluating concepts

Rank the importance of hunger, appetite, satiety and the senses in determining an individual's food intake. Justify your ranking.

EXAMINATION-STYLE QUESTIONS

Answers
Examination-style questions

Resources
Preparing for exams support

Question 1 (6 marks)

Complete the table below by:

a identifying two hormones that assist in suppressing appetite

b explaining where each hormone is produced and its role in providing a sense of satiety.

HORMONE (1 + 1 mark)	WHERE HORMONE IS PRODUCED (1 + 1 mark)	ROLE IN PROVIDING A SENSE OF SATIETY (1 + 1 mark)

Question 2 (5 marks)

Enzymatic hydrolysis is a key feature of the digestive process.

a Explain the role of enzymatic hydrolysis in the digestive process. [3 marks]

b Describe how enzymatic hydrolysis is utilised in the digestion of protein. [2 marks]

Question 3 (10 marks)

Weet-Bix is a popular breakfast food.

a Complete the table below to describe one physical and one chemical process that takes place in the mouth to begin the digestion of the carbohydrate in the Weet-Bix.

Physical process of digestion that occurs in the mouth [2 marks]	**Chemical** process of digestion that occurs in the mouth [2 marks]

[4 marks]

b Explain how carbohydrate is absorbed by the body during digestion. [2 marks]

c Describe the role of the hormone insulin in the absorption and utilisation of carbohydrates in the Weet-Bix. [4 marks]

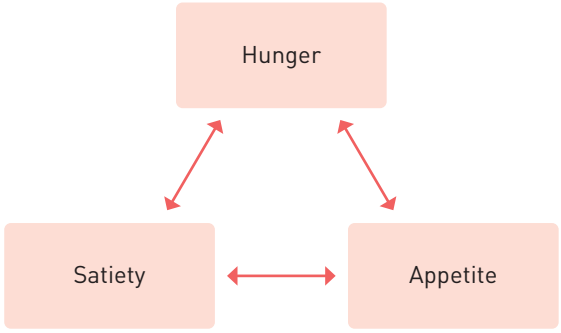
Question 4 (8 marks)

a Discuss the difference between hunger and satiety. [2 marks]

b Complete the table below by identifying one hormone involved in the sensation of hunger and one involved in satiety, and describing the role of each. [6 marks]

	HORMONE (1 + 1 mark)	ROLE OF HORMONE (2 + 2 mark)
HUNGER		
SATIETY		

Question 5 (8 marks)



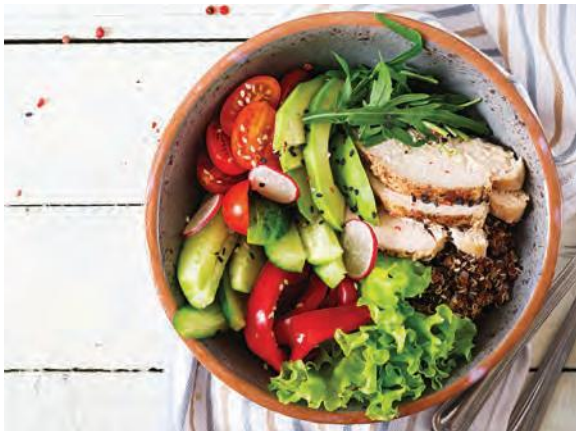
The sensations of hunger, appetite and satiety are closely interrelated. Discuss the physiology and conditioning of hunger, appetite and satiety, including the hormones involved in these processes.

Question 6 (8 marks)

A common health message directed to all Australians is to 'eat more fibre'. Explain why including a wide range of fibre in the diet is important for good health. Your answer should include reference to:

- the way in which fibre is processed by the body
- characteristics of soluble and insoluble fibre and resistant starch and their impact on health
- food sources of each type of fibre.

Question 7 (10 marks)



Shutterstock.com/Timolina

The buddha bowl pictured above contains a range of healthy ingredients including wholegrain rice, leafy greens, poached chicken, avocado, cucumber and tomato.

Discuss the physiological processes of eating and digesting the macronutrients contained in these ingredients. Your response should include a discussion of:

- the sensory appreciation of the ingredients contained in the buddha bowl
- how these ingredients will contribute to a feeling of satiety
- the sequential process of the digestion of the macronutrients contained in the buddha bowl.

Question 8 (8 marks)

> The Food and Mood Centre at Deakin University is exploring the complex ways in which the food we eat influences our brain, mood, and our physical and mental health. They state that 'having a diverse and abundant mix of "good" gut bacteria is linked to better health outcomes.'
>
> Source: Deakin University, 'Dietary interventions in obesity linked to changes in gut bacteria', 29 January 2020

Discuss the way in which gut microbiota can impact on the physical and mental health of individuals.

RECIPE

Chicken sliders with soy and ginger glaze

CHICKEN SLIDERS

150 grams minced chicken

50 grams pork mince

¼ cup (20 grams) fresh breadcrumbs

1 small (20 grams) Swiss brown mushroom, finely diced

2 teaspoons fresh ginger, finely grated

1 tablespoon soy sauce

1 tablespoon finely chopped coriander leaves

olive oil spray

SOY AND GINGER GLAZE

2 tablespoons soy sauce

2 tablespoons mirin

2 teaspoons caster sugar

1 teaspoon finely grated ginger

1 teaspoon brown rice vinegar

TO SERVE

4 small hamburger buns or bao buns, split in half

Asian slaw (page 188)

Japanese kewpie mayonnaise

METHOD

1. Cover a baking tray with aluminium foil.
2. Combine minced chicken and pork, fresh breadcrumbs, diced mushroom, ginger, soy sauce and coriander in a bowl and mix well.
3. Divide the mixture into six small patties; they should weigh approximately 60 grams each. Using damp hands, roll each patty into a 5–6-centimetre ball and flatten slightly.
4. Place on the foil-lined tray and refrigerate for 10–15 minutes.
5. For the soy and ginger glaze, place all ingredients except for the vinegar in a small saucepan. Simmer over a medium–high heat for 3–4 minutes, until the mixture thickens slightly and a glaze forms. Remove from the heat, stir in the vinegar and set aside.
6. Heat the oven-grill to 240 °C. Spray the meatballs lightly with olive oil spray and grill for 5 minutes. Remove the patties from the grill and turn carefully.
7. Spoon a little of the soy and ginger glaze over each patty. Return to the grill and cook for a further 5 minutes, until lightly brown and cooked through.
8. To serve, place the patties in the buns, and top with Asian slaw and kewpie mayonnaise.

SERVES 2

Alternative ingredients

For a meat-free alternative, substitute the chicken and pork mince with a plant-based mince.

EVALUATION

1. Describe the sensory properties – appearance, aroma, flavour and texture – of the chicken sliders with soy and ginger glaze.
2. The chicken sliders are high in protein. Explain how protein is utilised by the body.
3. Classify the ingredients for the chicken sliders on a diagram of the Australian Guide to Healthy Eating.
4. Using the data from question 3, explain how well the chicken sliders meet the guidelines of the Australian Guide to Healthy Eating food selection model for a main meal.
5. Explain why, after eating the chicken sliders, your hunger is likely to be satisfied.



Mark Fergus Photography

Okonomiyaki with mayonnaise

Okonomiyaki is a Japanese savoury pancake. The word is often translated as an 'as you like it pancake', because okonomiyaki can contain a wide variety of ingredients. It is made from a batter containing a combination of vegetables such as cabbage, potato and spring onions, and is topped with bacon or seafood and garnished with mayonnaise, Japanese soy sauce and pickled ginger. The vegetables in okonomiyaki mean it is a good source of dietary fibre and some vitamin C. It also provides some protein, found in the egg. The mayonnaise provides monounsaturated fat in the olive oil; however, the egg yolk also includes a high proportion of cholesterol.

MAYONNAISE

2 egg yolks

3 teaspoons lemon juice or white wine vinegar

salt and pepper to taste

200 millilitres olive oil

OKONOMI SAUCE

¼ cup tomato sauce

1 tablespoon Worcestershire sauce

½ teaspoon fresh ginger, grated

OKONOMIYAKI

1 cup plain flour

¼ teaspoon baking powder

½ teaspoon salt

1 egg, lightly beaten

250 millilitres cold water

2 leaves of savoy cabbage, shredded

2 spring onions, thinly sliced

½ small potato, grated

½ cup bean shoots

1 tablespoon pickled ginger, chopped

4 pieces of short bacon

1–2 tablespoons oil

2 tablespoons mayonnaise

2 tablespoons okonomi or tonkatsu sauce

extra pickled ginger, chopped for garnish

extra spring onion, thinly sliced for garnish

METHOD

Making the mayonnaise

1. Ensure the ingredients are at room temperature.
2. Place a folded damp cloth under a small mixing bowl to prevent it slipping during whisking.
3. Whisk the yolks, lemon juice or vinegar, salt and pepper together.
4. Add a few drops of olive oil to begin with, whisking in a circular motion. Gradually whisk in a third of the oil, about 60 millilitres, drop by drop. Ensure the mixture has emulsified after each addition.
5. Gradually pour in the remaining oil in a thin, steady stream while continuing to whisk in a circular motion.
6. When all the oil has been absorbed, adjust the flavourings. If the flavour is correct but the mixture is too thick, dilute the mayonnaise with a little warm water until the consistency is correct.
7. Cover with cling wrap and refrigerate.

Note: If the mayonnaise curdles during preparation, take a clean bowl, whisk an extra egg yolk into a smooth paste and gradually add it to the curdled mayonnaise. Whisk well after each addition of egg yolk.

Making the okonomi sauce

Combine all the ingredients and mix well. Set aside until required.

Making the okonomiyaki

1. Sift flour, baking powder and salt into a large bowl.
2. Make a well in the centre of the mix and add the egg, then add the water gradually and mix to a smooth batter using a wooden spoon.
3. Stir in cabbage, spring onion, potato, bean shoots and pickled ginger, and allow to stand for 15–20 minutes.

4 Fry the bacon in a non-stick frying pan until lightly brown and crisp. Drain on absorbent paper and place in a warm oven (100 °C).
5 Wipe out the frying pan, then add half the oil and place over medium heat. Add half the batter mixture to the frying pan and spread out to form a 14-centimetre diameter pancake.
6 Cook the pancake until golden brown on the base and beginning to set on the surface (6–8 minutes). Turn and cook for a further 6–8 minutes, or until cooked through.
7 Keep warm in the oven and cook the remaining pancake mixture.
8 Top the okonomiyaki pancake with half the bacon and drizzle with the mayonnaise and okonomi sauce (or tonkatsu sauce). Garnish with chopped spring onions and pickled ginger.

SERVES 2

Alternative ingredients

For a gluten-free alternative, substitute the plain flour in the okonomiyaki with chickpea, potato, almond or buckwheat flour. Remember to check the manufacturer's instructions when substituting with an alternative flour.

EVALUATION

1 Describe the sensory properties – appearance, aroma, flavour and texture – of both the mayonnaise and the okonomiyaki pancake.
2 The flour used in the okonomiyaki pancake contains carbohydrate. Identify the enzymes responsible for the digestion of carbohydrate and state where this digestive process takes place in the body.
3 Explain why vegetables such as those used to make the okonomiyaki pancake are important for the development of healthy gut microbiota.
4 Classify the ingredients for the okonomiyaki pancake on a diagram of the Australian Guide to Healthy Eating.
5 Use the data from question 4 and explain how well the okonomiyaki pancake meets the guidelines of the Australian Guide to Healthy Eating food selection model for a main meal.



Mark Fergus Photography

Brunch curry with poached egg

VEGETABLE CURRY

1 tablespoon vegetable oil
½ onion, finely diced
15 grams ginger, finely grated
½ long red chilli, finely diced
1 garlic clove, finely chopped
1 teaspoon mustard seeds
1 teaspoon ground turmeric
½ teaspoon cumin seeds
½ teaspoon ground cumin
½ teaspoon ground coriander
½ teaspoon garam masala
1 cardamom pod, seeds extracted and crushed
2 ripe tomatoes, diced
2 teaspoons honey
½ cup (100 grams) green split peas
1 medium carrot (200 grams)
½ sweet potato (200 grams), peeled
¼ cauliflower (250 grams)
olive oil spray
100 grams spinach
juice ½ lemon
1 tablespoon white vinegar
2 eggs

TURMERIC YOGHURT

¼ cup Greek yoghurt
juice ½ lemon
½ garlic clove, crushed
¼ teaspoon ground turmeric
¼ teaspoon ground cumin

TO SERVE

coriander sprigs
2 roti, warmed just before serving

METHOD

1. Heat the oil in a medium saucepan. Add onion and sauté over a moderate heat until translucent. Add the ginger, chilli and garlic and sauté for a further minute.
2. Stir in all of the spices and cook for 2 minutes, until fragrant.
3. Add the tomato, cover with a lid, and cook for 2–3 minutes, until softened. Stir in the honey.
4. Add the split peas and 500 millilitres of water. Bring to the boil, reduce heat to low and simmer for 35 minutes, until the split peas are tender.
5. Preheat the oven to 200 °C. Line an oven tray with baking paper.
6. Cut the carrot and sweet potato into 2-centimetre dice. Cut the cauliflower into florets.
7. Place the vegetables on the lined baking tray and spray with olive oil spray.
8. Roast in the preheated oven for approximately 20 minutes, until tender and starting to brown.
9. Stir the roasted vegetables into the curry base, add the spinach and stir until wilted. Add the lemon juice. Season to taste with salt.
10. To make the turmeric yoghurt, combine all the ingredients in a bowl and stir, then set aside.

To poach the eggs

1. Fill a saucepan or frying pan with water and heat to just below boiling point, then add the vinegar.
2. Crack each egg into a small dish. Stir the water briskly with a wooden spoon to create a whirlpool, then gently lower the eggs, one at a time, into the swirling water. The whirlpool will ensure the egg forms a neat shape.
3. Reduce the heat and poach the egg until the yolk is set to your taste.

To serve

Divide the curry between two serving bowls and top each with a poached egg. Scatter with coriander sprigs and serve with turmeric yoghurt and warmed roti.

SERVES 2

EVALUATION

1 Describe the sensory properties of the brunch curry with poached egg – appearance, aroma, flavour and texture – and comment on the overall appeal.
2 Using the nutritional rationale of the Australian Dietary Guidelines, explain why it is important to eat a variety of vegetables of different colours and structures.
3 Explain why pulses such as split peas are included in both the vegetable and lean meats sections of the Australian Guide to Healthy Eating.
4 Discuss why including the turmeric yoghurt dressing with the breakfast curry will help support the gut microbiota.
5 Plot the ingredients for brunch curry with poached egg onto a diagram of the Australian Guide to Healthy Eating and explain how well this meal meets the guidelines of this food selection model.



Mark Fergus Photography

AUSTRALIAN DIETARY GUIDELINES



GUIDELINE #1

Achieve and maintain a healthy weight, be physically active and choose nutritious food and drink to meet your energy needs.

Enjoy a wide variety of nutritious foods from grains, lean meats, vegetables, legumes, fruit and dairy.



GUIDELINE #2

GUIDELINE #3

Limit intake of foods containing saturated fat, added salt, added sugars and alcohol.



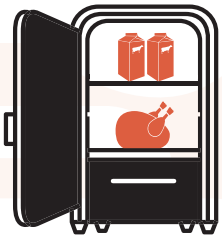
Encourage, support and promote breastfeeding.



GUIDELINE #4

GUIDELINE #5

Care for your food; prepare and store it safely.



AUSTRALIAN GUIDE TO HEALTHY EATING



Go for grains, particularly wholegrains.



Eat a wide variety of vegetables.



Choose lean meat, poultry and eggs and/or plant-based alternatives.



Consume at least two serves of fruit daily.



Select milk, yoghurt, cheese and/or alternatives that are mostly reduced fat.



Limit foods high in fats, added sugars and salt.



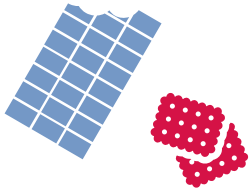
Use small amounts of unsaturated fats/oils and spreads.



Drink plenty of water.

LIFESTYLE AND DIET-RELATED DISEASES

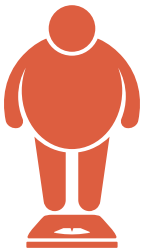
Type 2 diabetes



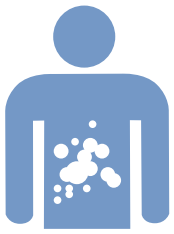
Cardiovascular disease



Obesity



Some cancers



PRINCIPLES OF RESEARCH

1. **Recognition of credible sources**
   Food, nutrition and health experts, government authorities

2. **Evidenced-based information**
   55 000 pieces of published scientific research; literature review

3. **Accurate analysis of data**
   Data review by NHMRC nutrition and medical experts

2

THE AUSTRALIAN DIETARY GUIDELINES

KEY TERMS

Australian Dietary Guidelines guidelines that were developed to guide and promote good nutrition and health, and reduce diet-related disease

Australian Guide to Healthy Eating a practical pictorial guide for food selection

chronic disease a condition that is lasting, with persistent effects that impact on the quality of people's lives

discretionary food choices food and drink choices that do not necessarily provide nutrients the body needs

energy required in the body for metabolic processes, physiological functions, muscular activity, heat production, and growth and synthesis of new tissue

energy-dense foods foods that are high in energy, usually because of their high fat and sugar content

Resources
Study Design links
Infographics
Flashcards

kilojoule (kJ) a unit for measuring energy intake or expenditure

lifestyle diseases diseases that are associated with an individual's diet or level of physical activity, such asobesity, type 2 diabetes and cardiovascular disease

obesity carrying excess body weight in the form of fat

trans fats fats that are created artificially by a process called hydrogenation

The development of the Australian Dietary Guidelines

In 1992 the federal government developed Australia's Food and Nutrition Policy in order to improve the population's food and nutrition knowledge and skills. The Australian Dietary Guidelines (ADGs) were developed by food and nutrition experts to guide and promote good nutrition and health, and to reduce diet-related diseases. These guidelines give advice on healthy food choices and their contribution to a healthy lifestyle in order to reduce the risk of diet-related diseases or lifestyle diseases, such as obesity, type 2 diabetes and cardiovascular disease.

In February 2013 the National Health and Medical Research Council (NHMRC) launched a review of the Dietary Guidelines and published an updated version based on current scientific advice. The Dietary Guidelines are evidence based and focus on food choices rather than nutrients. They provide a comprehensive approach to the promotion of healthy eating. The NHMRC is currently reviewing and updating the 2013 Australian Dietary guidelines, and will release the updated guidelines in 2024.

Weblink
National Health and Medical Research Council

The Australian Dietary Guidelines incorporate the Australian Guide to Healthy Eating, a visual representation of Dietary Guideline 2. This pictorial food model was developed by the Australian Government as a visual guide to the proportions of each food group that should be consumed daily.

Weblink
Australian Guide to Healthy Eating

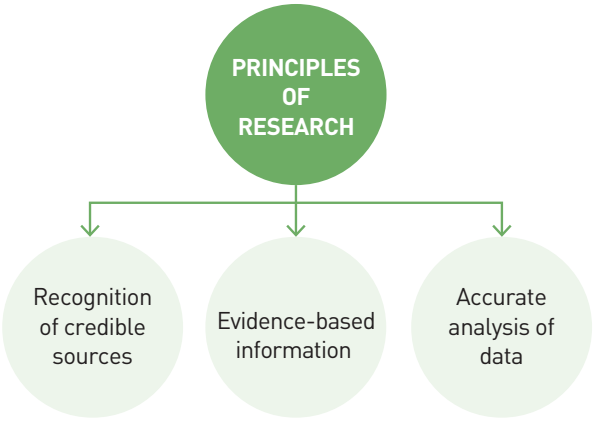


FIGURE 2.1 The principles of research

PRINCIPLES OF RESEARCH IN THE DEVELOPMENT OF THE AUSTRALIAN DIETARY GUIDELINES

Research is a systematic collection of information about a particular subject. It is then a process of inquiry in order to discover and interpret facts, events, behaviours or theories.

According to the NHMRC, both the 2013 review of the Australian Dietary Guidelines and the review currently underway 'will ensure the Guidelines remain a trusted resource by considering the best and most recent scientific evidence'.

The development of the Australian Dietary Guidelines and Australian Guide to Healthy Eating is based on three main principles of research.

Recognition of credible sources

A credible source of information is one that is trustworthy and presents unbiased information backed by facts that are supported by evidence. It is written by someone who is an expert in their field, and the information is free of errors and bias.

It is crucial for the ADGs to be developed using credible sources to ensure the validity of the research data, and to ensure that the information is written by unbiased, professional experts who have no personal or commercial interest.

In the 2013 review of the ADGs, the NHMRC consulted with credible sources including:

- food, nutrition and health experts around Australia and other parts of the world on factors influencing dietary choice, including Nutrition Australia
- government departments including individual state health departments such as the Victorian Health Promotion Unit
- the food industry, including Meat and Livestock Australia and Sanitarium Australia, about their views on healthy eating
- 218 submissions that were made through a public consultation process. This process was undertaken by the NHMRC through an advisory committee that included representation of consumer issues and choices and involved three separate focus testing groups. Public consultation periods allowed for further consumer input and comment. All sources of information were carefully cited and referenced.

The use of credible sources of information is also a key feature of the review of the ADGs to be released in 2024. However, while the NHMRC is seeking a wide range of responses from health professionals, industry experts and individuals, they have determined that a range of responses will not be considered, including:

- detailed personal history/narratives
- personal medical information/records
- opinion pieces/blogs/newspaper articles.

Credible sources

- Review of 2003 Guidelines
- Nutrition reference values for Australians
- Report: *Modelling system to inform the revision of the Australian Guide to Healthy Eating 2011*
- Report: *A review of the evidence to address target questions to inform the revision of the ADGs 2011*
- Review: *Nutritional requirements and dietary advice targeted for pregnant and breastfeeding women 2013*
- Other key authoritarian reports such as the World Cancer Research Fund

FIGURE 2.2 Credible sources considered by the NHMRC in 2013

Evidence-based information

The 2013 Australian Dietary Guidelines are underpinned by the use of evidence-based information, and built upon the evidence and the scientific base gained from the 2003 guidelines. New evidence was assessed by the working committees, which included leading Australian and international experts in nutrition, public health and the food industry. They considered the associations between food and dietary patterns, and whether the information had weakened, strengthened or stayed the same since the last review.

The key focus of the review of the Australian Dietary Guidelines was on evidence-based information, and included:

- a review of over 55 000 pieces of published scientific research that had been rigorously tested and peer reviewed
- a systematic literature review that created a huge body of evidence that became the basis for the development of the guidelines
- detailed randomised controlled trials. According to the NHMRC, randomised trials are considered to provide the highest level of evidence in relation to the effects of dietary intake on health
- scientific evidence from the 2003 Dietary Guidelines that remained current, identifying the daily nutritional needs of individuals (Nutritional Reference Values for Australia and New Zealand 2006)
- a report by the NHMRC that identified the serving sizes and minimum number of serves required to meet the nutritional needs of individuals
- other reports recognised throughout the world for their scientific rigour, such as the World Cancer Research Fund report.

The use of evidence-based information is also paramount in the review of the Australian Dietary Guidelines to be released in 2024. According to the NHMRC, their process involves:

- 'a literature scoping review which will determine if new evidence is available to add further support or question the recommendations of the current Guidelines, and
- a review of food-based dietary guidelines from other countries'.

Accurate analysis of data

To collect accurate data for the review of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating, nutrition and medical experts associated with the NHMRC analysed the data from 55 000 published scientific research articles. They systematically analysed recent evidence and data in the literature in regard to 'the complex inter-relationships between food, diet and health and food and nutrition, social diversity and the food supply'.

The review panel also sought advice from a wide range of experts, including clinical and public health professionals, the nutrition research sector, dieticians, the food industry, consumer groups and governments across Australia. This information enabled the expert panel to ensure the information reviewed was relevant and accurate.

Another example of the way in which the NHMRC undertook the accurate analysis of data was in relation to the review of guidelines for infant feeding. A literature review was undertaken in 2012 and included 2700 full text articles. The review included information from mothers who came from countries including Australia, the United Kingdom, India, Vietnam and China, whose children were born in Australia in 2008.

The nutritional rationale of the Australian Dietary Guidelines

According to the NHMRC 'Eat for Health' program, more than 30 per cent of all premature deaths and disability in Australia are the result of preventable chronic diseases such as cardiovascular disease, type 2 diabetes and some forms of cancer. Evidence has shown that many of these chronic lifestyle and diet-related diseases are linked to overweight and obesity. Poor nutrition is often associated with a diet that is too high in energy-dense foods. These are foods that are high in kilojoules – a unit for measuring energy intake or expenditure of foods – usually because they are high in saturated fat and added or refined sugar. Another significant concern is that many Australians consume a diet that is high in salt and contains insufficient nutrient-dense foods, especially vegetables, fruit and wholegrain cereals.

Therefore, the rationale underpinning the Australian Dietary Guidelines is to:

- encourage good health and wellbeing within the Australian population by promoting a diet containing nutritious foods
- provide practical information, enabling individuals to select those foods that make a substantial contribution towards providing the range of nutrients needed for good health, and that have an appropriate nutrient density
- encourage individuals to not only select nutritious foods but also to focus on the amounts consumed. Overconsumption, even of nutritious foods, can lead to excessive energy intake, resulting in an increase in body weight.
- help Australians determine the food they should eat each day according to their age, gender, body size, activity levels and other factors such as pregnancy and breastfeeding
- promote good nutrition and the contribution it can make to healthy weight, quality of life and wellbeing, resistance to infection and protection against chronic diseases and premature death.

OBESITY AND RELATED LIFESTYLE DISEASES

Obesity means carrying excess body weight in the form of fat. For adults, obesity is defined as having a body mass index (BMI) of over 30 or a waist measurement of more than 89 centimetres for women, or 102 centimetres for men.

According to a report released in July 2020 by the Australian Institute of Health and Welfare, and based on data released by the Australian Bureau of Statistics, 'in 2017–18, an estimated 1 in 4 (25 per cent) children and adolescents aged 2–17 were overweight or obese (1.2 million children and adolescents).' Data included in the same report showed that approximately two-thirds of Australians aged 18 and over were overweight or obese – approximately 12.5 million Australian adults. The report also highlighted that men were at greater risk of being overweight and obese than women (75 per cent of men, compared to 60 per cent of women), and recorded higher rates of obesity (33 per cent of men, compared to 30 per cent of women).

There is increasing scientific evidence that the consumption of certain foods is associated with the risk of excess weight gain, while other foods are associated with a reduced risk of weight gain. Fat is a concentrated source of energy, so it has a large influence on energy intake. Sugar and sugar-sweetened soft drinks are associated with weight gain in adults and children. Evidence suggests that vegetables and fruit reduce the risk of weight gain. Portion size has also been shown to have a direct relationship to weight gain.

If a nutritious dietary intake is adopted and people who are overweight or obese lose weight and maintain an active lifestyle, obesity-related conditions are preventable.

Monash University Centre for Obesity Research and Education states that 'the link between type 2 diabetes and overweight/obesity is established beyond doubt'. Their research indicates that, given the projected growth in levels of obesity, 'by 2023, type 2 diabetes will become the leading cause of disease burden for males and the second leading cause for females.' More than 280 Australians develop diabetes every

day; that's over 100 000 Australians annually. People who develop type 2 diabetes have an increased risk of developing heart disease and/or kidney disease. They are also more susceptible to blindness and limb amputations.

Tips for a healthy weight

- Enjoy a healthy breakfast.
- Eat slowly and savour every mouthful.
- Listen to your body. Stop when, or even before, you feel full.
- Don't shop when you're hungry – and use a list.
- Plan healthy, quick and easy meals for busy days.
- Make meal times special occasions for the whole family. And turn off the TV!
- When eating out, make healthy choices. For example, choose grilled or steamed foods and avoid creamy sauces.
- Choose water instead of soft drink, cordial, fruit drinks, vitamin waters, energy drinks, sports drinks or alcoholic drinks.
- When hungry, fill up with fruit and vegetables.
- Don't spend a long time sitting down. Turn off the computer!
- Be physically active every day in as many ways as you can. Go for a walk, play active games, go for a ride, start a vegetable garden.
- Find a friend or family member who will support you to eat healthily and be active.

THE AUSTRALIAN DIET

According to the Dietary Guidelines, most Australians need to eat more:

- vegetables and fruit, particularly green, orange and red vegetables, such as broccoli, carrots, capsicum and sweet potatoes, and leafy vegetables like spinach, and legumes/beans like lentils
- grain (cereal) foods, particularly wholegrain cereals like wholemeal breads, wholegrain/high fibre breakfast cereals, oats, wholegrain rice and pasta
- reduced-fat milk, yoghurt and cheese varieties (reduced-fat milks are not suitable for children under the age of two years as a main milk drink)
- lean meats and poultry, fish, eggs, nuts and seeds and legumes/beans (except many Australian men would benefit from eating less red meat)
- drink water instead of soft drink, cordials, energy drinks, sports drinks and sweetened fruit juices and/or alcoholic drinks.

The Dietary Guidelines also state that most Australians need to eat less:

- meat pies, sausage rolls and fried hot chips
- potato crisps, savoury snacks, biscuits and crackers
- processed meats like salami, bacon and sausages
- cakes, muffins, sweet biscuits and muesli bars
- confectionary (lollies), chocolate, ice-cream and desserts
- cream and butter
- jam and honey
- soft drinks, cordial, energy drinks and sports drinks
- wine, beer and spirits.

Source: *Australian Dietary Guidelines – Summary*, National Health and Medical Research Council, 2013

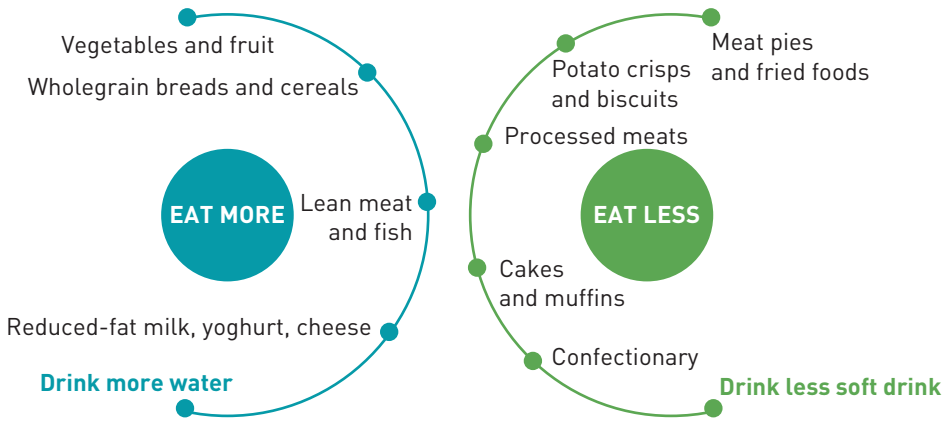


FIGURE 2.3 Foods to eat more of and foods to eat less of

Understanding the Text

Answers
Understanding the Text

1 Outline the reasons for the development of the Australian Dietary Guidelines.
2 Explain why the Australian Guide to Healthy Eating is a valuable tool for Australians.
3 What is meant by a credible source of information, and why is it important when reviewing the Dietary Guidelines?
4 Identify two sources of evidence-based information used to update the Dietary Guidelines in 2013.
5 Identify three expert groups that were consulted to accurately analyse data and model and inform the Australian Guide to Healthy Eating.
6 Describe two aspects of the nutritional rationale that underpins the Australian Dietary Guidelines.
7 Draw a diagram similar to the one below to highlight the foods that are associated with the risk of excess weight gain and those associated with a reduced risk of weight gain.

+ Foods that contribute to excess weight gain	− Foods that reduce the risk of weight gain

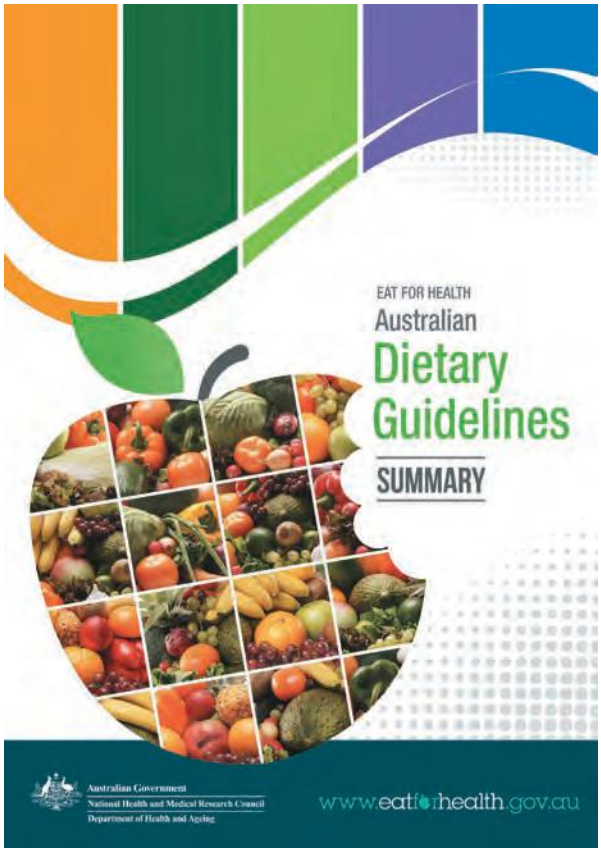
8 List the physical lifestyle diseases that can result from people being overweight or obese.
9 Write a short comment to include on a health blog about the importance of maintaining a healthy weight. Include five tips for healthy eating that consumers can follow to ensure they maintain a healthy weight.
10 Describe the recommendations that the Australian Dietary Guidelines make in reference to eating vegetables and fruit and consuming beverages.

The Australian Dietary Guidelines

Collaborative Activity

The 'Eat for Health' program was developed in 2013 by the National Health and Medical Council as a 'single comprehensive program relevant to all healthy Australians'.

It provides detailed information on the Australian Dietary Guidelines and the Australian Guide to Healthy Eating. According to the NHMRC, the 'Eat for Health' program, including the Australian Dietary Guidelines, 'has been developed to provide more detailed information on the amounts and types of foods for optimal health and wellbeing.'



National Health and Medical Research Council

Australian Dietary Guidelines summary

Guideline 1

To achieve and maintain a healthy weight, be physically active and choose amounts of nutritious food and drinks to meet your energy needs.

Guideline 2

Enjoy a wide variety of nutritious foods from these five food groups every day.

Guideline 3

Limit intake of foods containing saturated fat, added salt, added sugars and alcohol.

Guideline 4

Encourage, support and promote breastfeeding.

Guideline 5

Care for your food; prepare and store it safely.

Source: *The Australian Dietary Guidelines – Summary*, National Health and Medical Research Council, 2013

Activity 2.1

Quiz: Are you eating for health?

1. Access the website of the *Australian Dietary Guidelines – Summary*. Take the quiz on page 6: Are you eating for health?
2. Once you have completed the quiz, remember to rate yourself.
3. Evaluate your diet. If your score was 4–6 points or below, suggest ways you could improve your diet. Use the Australian Guide to Healthy Eating as a guide.



National Health and Medical Research Council

DIETARY GUIDELINE 1

To achieve and maintain a healthy weight, be physically active and choose amounts of nutritious food and drinks to meet your energy needs.

- Children and adolescents should eat sufficient nutritious foods to grow and develop normally. They should be physically active every day and their growth should be checked regularly.
- Older people should eat nutritious foods and keep physically active to help maintain muscle strength and a healthy weight.

Guideline 1 encourages people to maintain a healthy weight and to be physically active, choosing amounts of nutritious food and drinks to meet the body's energy needs. Unhealthy weight refers to being underweight, overweight or obese. Evidence suggests that a healthy weight reduces the risk of chronic disease, including cardiovascular disease, type 2 diabetes and some cancers. As a consequence, people who are overweight or obese increase the risk of high blood pressure, muscle, bone and respiratory disorders and reduced life expectancy. Medical research has also demonstrated that there is a strong link between obesity and lifestyle diseases and a person's physical and mental health. People who are overweight may suffer mental health issues such as depression due to social discrimination and poor body image. Being underweight also has health risks such as decreased immunity to some infectious diseases, osteoporosis and decreased muscle strength.

Source: *The Australian Dietary Guidelines – Summary*, National Health and Medical Research Council 2013

DIETARY GUIDELINE 2

Enjoy a wide variety of nutritious foods from these five food groups every day.

- Plenty of vegetables, including different types and colours, and legumes/beans
- Fruit
- Grain (cereals) foods, mostly wholegrain and/or high cereal fibre varieties, such as bread, cereals, rice, pasta, noodles, polenta, couscous, oats, quinoa and barley
- Lean meats and poultry, fish, eggs, tofu, nuts and seeds, and legumes/beans
- Milk, yoghurt, cheese and/or alternatives, mostly reduced fat (reduced fat milks are not suitable for children under 2 years)
- And drink plenty of water

Source: *The Australian Dietary Guidelines – Summary*, National Health and Medical Research Council 2013

This guideline encourages the consumption of a wide variety of nutritious foods from the five food groups every day.

Evidence suggests that dietary patterns that include a wide variety of foods from the five food groups will promote health and wellbeing. These five food groups make up the plate or main circle on the Australian Guide to Healthy Eating. The Australian Guide to Healthy Eating, a part of the 'Eat for Health' program, groups foods primarily on the basis of their type and nutrient contribution.

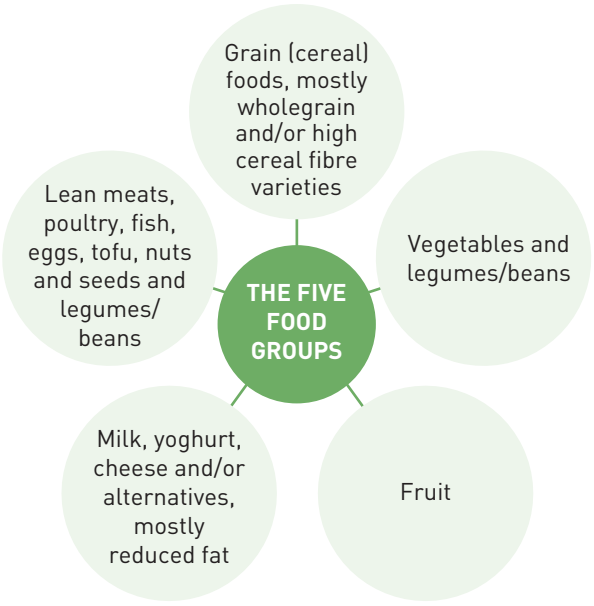


FIGURE 2.4 The five food groups

DIETARY GUIDELINE 3

Limit intake of foods containing saturated fat, added salt, added sugars and alcohol.

a Limit intake of foods high in saturated fat such as many biscuits, cakes, pastries, pies, processed meats, commercial burgers, pizza, fried foods, potato chips, crisps and other savoury snacks.
   - Replace high fat foods which contain predominately saturated fats such as butter, cream, cooking margarine, coconut and palm oil with foods which contain predominately polyunsaturated and monounsaturated fats such as oils, spreads, nut butters/pastes and avocado.
   - Low fat diets are not suitable for children under the age of 2 years.

b Limit intake of foods and drinks containing added salt
   - Read labels to choose lower sodium options among similar foods.
   - Do not add salt to foods in cooking or at the table.

c Limit intake of foods and drinks containing added sugars such as confectionary, sugar-sweetened soft drinks and cordials, fruit drinks, vitamin waters, energy and sports drinks.

d If you choose to drink alcohol, limit intake. For women who are pregnant, planning a pregnancy or breastfeeding, not drinking alcohol is the safest option.

Source: *The Australian Dietary Guidelines – Summary*, National Health and Medical Research Council 2013

This guideline provides advice on foods and drinks that are not essential parts of the diet but are discretionary choices. These foods appear on the outside of the circle in the Australian Guide to Healthy Eating, and contain significant amounts of saturated fat, added salt and added sugars. When a person gains weight or becomes obese, the excess fat that surrounds key organs in the body, such as the heart and liver, is known as visceral fat or 'toxic' fat. Visceral fat has been shown to increase the risk of obesity and chronic disease, including heart disease, stroke, type 2 diabetes and some cancers.



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It is important to limit the amount of biscuits and pastries we eat, as these are high in saturated fat.

Fats

All fats are high in kilojoules, but saturated and trans fats increase the risk of heart disease. These fats, which include butter, cream, coconut and palm oils, should be replaced by monounsaturated fats such as olive oil, canola oil, oil from nuts such as cashew nuts and almonds, polyunsaturated fats from oily fish, nuts such as Brazil nuts, and seeds, corn, safflower or soy oil.

Foods such as butter, cream, biscuits, cakes, pies, hamburgers, untrimmed meat, fried foods, pizza, potato crisps and full-cream milk and cheese all contain saturated fats. These foods should be replaced where possible with those that contain unsaturated fats. These fats are found in foods including nuts, avocados, fish, lean meat, poultry and eggs.



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Avocados are a good source of unsaturated fats.

Plant foods including sunflower seeds, safflower seeds, soya beans and sesame seeds contain mainly polyunsaturated fats. The best sources of monounsaturated fats include canola seeds, most varieties of nuts, rice bran and olives.



Shutterstock.com/Mariyana M

Olives are a good source of monounsaturated fats.

Sugar

Sugars occur naturally in fruit, vegetables and milk. These sugars are healthy to consume; it is the sugar added to drinks and foods to sweeten or preserve them that we must be wary of. Added sugars are energy dense but nutrient poor, and increase the kilojoule content of the diet. They also reduce the percentage of foods consumed that are nutrient dense and that come from the five food groups.

Evidence shows that sugar-sweetened drinks increase the risk of excess body fat and weight gain, as well as tooth decay. Artificially sweetened drinks, such as those containing aspartame, have little to no kilojoules, but are still a concern as they are acidic and may erode the tooth enamel.



Shutterstock.com/Chones

Canned soft drinks are high in sugar.

Salt

Many Australians eat too much salt. Most of the sodium we consume comes from processed foods, because salt is used in food processing to enhance the flavour of foods and to preserve them. It is important to cut down on sodium intake, as there is strong evidence that a diet high in salt increases blood pressure, which in turn increases the risk of heart disease and stroke.



iStock.com/yalcinsonat1

Potato crisps are high in salt.

DIETARY GUIDELINE 4

Encourage, support and promote breastfeeding.

Source: *The Australian Dietary Guidelines – Summary*, National Health and Medical Research Council 2013

Breastfeeding is encouraged for at least the first six months of a baby's life, because breastmilk is an ideal food for the growth and development of an infant, and provides many benefits for both mother and

baby. Breastmilk provides a unique mix of nutrients and substances that reduce the risk of infections and allergies such as asthma and eczema. Research shows that breastfeeding babies can reduce the risk of high blood pressure in childhood, and the risk of becoming obese in childhood, adolescence and adulthood. Lowering the risk of obesity will, in turn, reduce the risks of type 2 diabetes and stroke later in life.

DIETARY GUIDELINE 5

Care for your food; prepare and store it safely.

Source: *The Australian Dietary Guidelines – Summary*, National Health and Medical Research Council 2013

Although the Australian food supply is reliable, safe and nutritious, food poisoning can occur. Foods can become contaminated when they are not stored at the correct temperature, when raw and cooked foods are not separated, when tools and hands are unhygienic and when food handlers prepare food when they are unwell. Food must be prepared and stored safely.

Understanding the Text

11 Discuss the health advantages of maintaining a healthy weight, and the risks associated with being overweight.

12 Identify the impact that obesity or being overweight can have on a person's mental health.

13 Discuss the importance of Dietary Guideline 2 to good health.

14 List three strategies to help reduce the amount of saturated fat, added salt and added sugars in the diet.

15 Explain what is meant by the term 'toxic' fat.

16 Explain why it is important to reduce the amount of saturated and trans fats in the diet. Give two examples each of monounsaturated fats and polyunsaturated fats.

17 Why are 'added sugars' considered to be a problem in the diet?

18 Outline the main benefit of reducing salt in the diet.

19 Why is breastfeeding considered to be important for the first six months of a baby's life?

20 Explain why the National Health and Medical Research Council has included Dietary Guideline 5.

Answers
Understanding the Text

Practical Activity 2.2

Evaluate the nutritional quality of pre-prepared main meals using food labels

Aim: To analyse the nutritional quality of two pre-prepared main meals based on the information on the food label

Method

1 Your teacher will provide you with two different brands of pre-prepared meals available from the supermarket, similar to these products below.





Mark Fergus Photography

2 Compare the nutritional quality of these two similar meals using the nutrition information panel and the product information on each label.

	PRE-PREPARED MEAL 1	PRE-PREPARED MEAL 2
Serves per packet		
Serving size		
Energy per 100 grams		
Protein per 100 grams		
Total fat per 100 grams		
– Saturated		
Carbohydrate per 100 grams		
– Sugars		
Sodium per 100 grams		
Dietary fibre		

Analysis

1 If the average adult requires 8700 kilojoules per day, evaluate which meal would be a better choice for maintaining a healthy weight?

2 How can a nutrition information panel help a consumer monitor their intake of discretionary foods?

3 The ingredient list on a food label must be in descending order by ingoing weight. How might this help a consumer to make good food choices?

4 Both food labels include allergen information. Why is this an important aspect of food labelling requirements?

5 There is an increasing trend for consumers to purchase ready-made meals. Explain how consumers can incorporate these into their diet and still eat a well-balanced diet that adheres to Australian Dietary Guidelines.

Conclusion

After analysing the information on the food labels, which pre-prepared meal would you recommend for a person trying to follow the recommendations of the Australian Dietary Guidelines? Justify your decision.

The Australian Guide to Healthy Eating

The Australian Guide to Healthy Eating (AGTHE) is a food selection model for consumers to assist them in planning, selecting and consuming adequate proportions of foods from the five food groups. It has been designed as a visual model and represents Guideline 2 – *Enjoy a wide variety of nutritious foods from these five groups daily.*

According to the Eat for Health program, the nutritional rationale that underpins the Australian Guide to Healthy Eating, 'groups foods primarily on their type and nutrient contribution... The model on which the five food groups is based assumes that foods within each grouping are eaten in types not too dissimilar to the average intakes in Australia.'

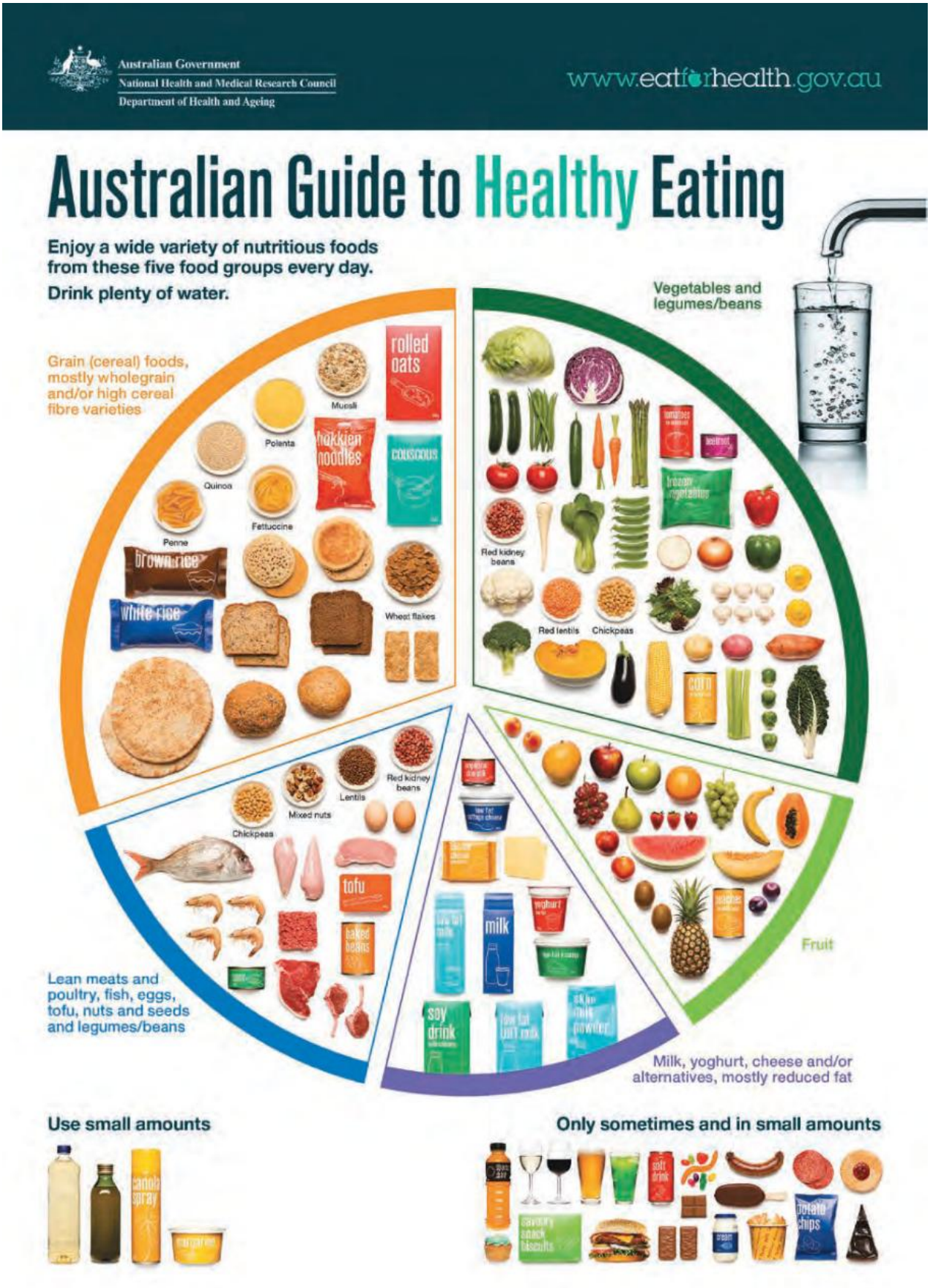
The AGTHE shows a circle broken into five wedges, each representing one of the five food groups; the size of each wedge reflects the proportion of each food group that should be consumed daily. The Eat for Health program advises that 'the amounts recommended for consumption…are based on the nutrient requirements for each age and gender group of different height and activity levels in the population.'

VEGETABLES

It is important to eat a variety of vegetables, particularly those of different colours, textures and structures, including bulbs, leaves, roots, flowers, tubers, legumes, stems, seeds and fungi. These will provide a range of nutrients and health benefits, and also add enjoyment to eating.

The nutritional rationale for eating vegetables

Vegetables are nutrient dense and relatively low in kilojoules. Eating plenty of vegetables is associated with a reduced risk of weight gain and, consequently, a reduced risk of cardiovascular disease and type 2 diabetes. Vegetables are good sources of minerals and vitamins such as magnesium, vitamin C and folate, and a range of phytochemicals including carotenoids. Most vegetables are high in dietary fibre, which takes longer to digest. This increases satiety, reducing the risk of becoming overweight or obese.



National Health and Medical Research Council

The Australian Guide to Healthy Eating

Brassica (or cruciferous) and leafy green vegetables such as broccoli and spinach are generally high in folate, while starchy vegetables such as potatoes are a good source of vitamin C and carbohydrates. Orange-coloured vegetables such as carrots and pumpkin, and yellow and red vegetables such as capsicums and tomatoes are a valuable source of vitamins, particularly vitamin A. Legumes including lentils and dried peas and beans provide a valuable and cost-efficient source of protein, iron, some essential fatty acids, soluble and insoluble dietary fibre and micronutrients when consuming vegetarian or vegan meals.

It is important to limit the intake of fried vegetables such as salted and fried potato chips, as these are considered 'discretionary' food choices.

FIGURE 2.5 Minimum recommended number of serves of vegetables per day

	SERVES PER DAY		
	19–50 years	51–70 years	70+ years
Men	6	5½	5
Women	5	5	5
Pregnant women	5	–	–
Breastfeeding women	7½	–	–

	SERVES PER DAY				
	2–3 years	4–8 years	9–11 years	12–13 years	14–18 years
Boys	2½	4½	5	5½	5½
Girls	2½	4½	5	5	5

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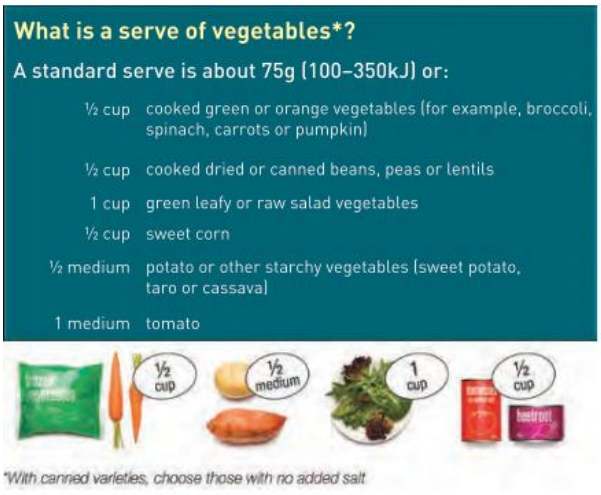


FIGURE 2.6 What is a serve of vegetables?

National Health and Medical Research Council

FRUIT

Fruit plays an important part in the diet when eaten in moderation. Research shows Australians eat only about half the recommended amount of fruit each day. It is recommended that at least two serves of fruit from a wide variety of types be consumed daily.

The nutritional rationale for eating fruit

Evidence suggests that consuming fruit each day may reduce the risk of chronic diseases such as heart disease and some cancers. Fruit is a good source of vitamin C and folate, and also provides potassium, dietary fibre and carbohydrates. The edible skins are particularly high in dietary fibre, which is important for bowel health.

Many people drink too much fruit juice, which provides kilojoules but no dietary fibre and may leave acidic residue on the teeth, increasing the risk of dental decay by eroding the tooth enamel.

FIGURE 2.7 Minimum recommended number of serves of fruit per day

	SERVES PER DAY		
	19–50 years	51–70 years	70+ years
Men	2	2	2
Women	2	2	2
Pregnant women	2	–	–
Breastfeeding women	2	–	–

	SERVES PER DAY				
	2–3 years	4–8 years	9–11 years	12–13 years	14–18 years
Boys	1	1½	2	2	2
Girls	1	1½	2	2	2

National Health and Medical Research Council

What is a serve of fruit?

A standard serve is about 150g (350kJ) or:

1 medium	apple, banana, orange or pear
2 small	apricots, kiwi fruits or plums
1 cup	diced or canned fruit (no added sugar)

Or only occasionally:

125ml (½ cup)	fruit juice (no added sugar)
30g	dried fruit (for example, 4 dried apricot halves, 1½ tablespoons of sultanas)



What is a serve of fruit?

National Health and Medical Research Council

WHOLEGRAIN CEREALS

It is recommended that people eat grain (cereal) foods such as wheat, oats, rice, barley, millet and corn, and choose mostly wholegrain and/or high cereal fibre varieties.

The nutritional rationale for eating wholegrain cereals

Evidence shows that grain (cereal) foods, mostly wholegrain and/or high cereal fibre varieties, are associated with a reduced risk of excess weight gain and obesity, and thus, a reduced risk of cardiovascular disease and type 2 diabetes.

Wholegrains contain more nutrients and phytochemicals in the bran and germ of the grain than are found in processed or refined cereals. These products are valuable for the key nutrients they contain, such as carbohydrate (starch), protein, dietary fibre, B group vitamins, vitamin E, iron, zinc, magnesium and phosphorous. The form of starch contained in these grains may resist digestion in the small intestine, providing a protective environment in the colon and reducing the risk of colorectal cancer in adults. Wholegrains also contain strong antioxidants that may protect against processes involved in developing type 2 diabetes, cardiovascular disease and some forms of cancer. In Australia it is mandatory for wheat flour to be fortified with folic acid and thiamine, and for salt to be iodised.

FIGURE 2.8 Minimum recommended number of serves of grain (cereal) foods per day, mostly wholegrain and/or high cereal fibre varieties

	SERVES PER DAY		
	19–50 years	51–70 years	70+ years
Men	6	6	4½
Women	6	4	3
Pregnant women	8½	–	–
Breastfeeding women	9	–	–

	SERVES PER DAY				
	2–3 years	4–8 years	9–11 years	12–13 years	14–18 years
Boys	4	4	5	6	7
Girls	4	4	4	5	7

National Health and Medical Research Council

What is a serve of grain* (cereal) food?

A standard serve is (500kJ) or:

1 slice (40g)	bread
½ medium (40g)	roll or flat bread
½ cup (75-120g)	cooked rice, pasta, noodles, barley, buckwheat, semolina, polenta, bulgur or quinoa
½ cup (120g)	cooked porridge
⅔ cup (30g)	wheat cereal flakes
¼ cup (30g)	muesli
3 (35g)	crispbreads
1 (60g)	crumpet
1 small (35g)	English muffin or scone



*Grain (cereal) foods, mostly wholegrain and/or high cereal fibre varieties

FIGURE 2.9 What is a serve of grain (cereal) food?

National Health and Medical Research Council



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Wholegrain bread is usually a healthier option than white bread.

LEAN MEAT, FISH, EGGS AND/OR PLANT-BASED ALTERNATIVES

It is recommended that people choose lean meats and poultry, fish, eggs, tofu, nuts and seeds, and legumes/beans. These foods are an important part of the Australian cuisine, culture and lifestyle, but should be chosen carefully.

The nutritional rationale for eating lean meat, fish, eggs and/or plant-based alternatives

This group of foods are protein-rich, but some also contain important nutrients such as iron, iodine, zinc, vitamin B_{12} and essential fatty acids such as omega-3.

Processed and cured meats such as sliced ham, bacon and sausages should not be eaten as substitutes for unprocessed meat, as they are high in added salt and saturated fat, and are considered 'discretionary' food choices.

Plant-based alternatives including nuts, seeds and legumes/beans, such as lentils, tofu and tempeh, are an excellent source of complete protein, and contain high levels of unsaturated fatty acids, and soluble and insoluble dietary fibre. They are nutritious and cost-efficient alternatives to meat, fish and eggs, and provide a valuable source of these important nutrients for people consuming vegan and plant-based meals.

The consumption of fish has been shown to reduce the risk of cardiovascular disease, and nuts are believed to lower cholesterol.



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Sources of protein

FIGURE 2.10 Minimum recommended number of serves of lean meat and poultry, fish, eggs, tofu, nuts and seeds, and legumes/beans per day

	SERVES PER DAY		
	19–50 years	51–70 years	70+ years
Men	3	2½	2½
Women	2½	2	2
Pregnant women	3½	–	–
Breastfeeding women	2½	–	–

	SERVES PER DAY				
	2–3 years	4–8 years	9–11 years	12–13 years	14–18 years
Boys	1	1½	2½	2½	2½
Girls	1	1½	2½	2½	2½

National Health and Medical Research Council

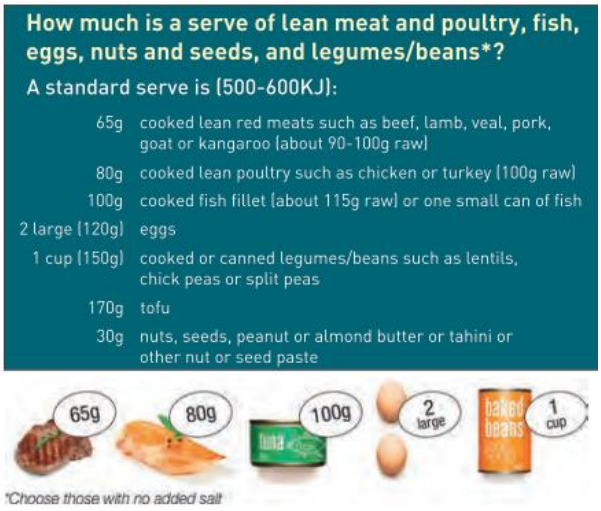


FIGURE 2.11 How much is a serve of lean meat and poultry, fish, eggs, tofu, nuts and seeds, and legumes/beans?

National Health and Medical Research Council

MILK, YOGHURT AND CHEESE AND/OR ALTERNATIVES

It is important to include a variety of milk, yoghurt and cheese and/or alternatives in the diet each day, as they are a valuable source of calcium. Very few other foods included in the Australian diet provide as much of this important nutrient as dairy foods. If using alternative dairy products, check the nutritional panels carefully to ensure the alternative product contains at least 100 milligrams of calcium per 100 millilitres.

The nutritional rationale for eating milk, yoghurt and cheese and/or alternatives

Milk, yoghurt and cheese are rich sources of calcium, protein, iodine, zinc, riboflavin, and vitamins A, D and B_{12}. These foods provide calcium in a readily absorbable way. Studies show that consumption of these foods can protect against heart disease and stroke, reduce the risk of high blood pressure, some cancers and type 2 diabetes, and contribute to stronger bones.

FIGURE 2.12 Minimum recommended number of serves of milk, yoghurt and cheese and/or alternatives per day, mostly reduced fat

	SERVES PER DAY		
	19–50 years	51–70 years	70+ years
Men	2½	2½	3½
Women	2½	4	4
Pregnant women	2½	–	–
Breastfeeding women	2½	–	–

	SERVES PER DAY				
	2–3 years	4–8 years	9–11 years	12–13 years	14–18 years
Boys	1½	2	2½	3½	3½
Girls	1½	1½	3	3½	3½

National Health and Medical Research Council

However, it is essential to choose low-fat varieties of these foods, as full-fat varieties increase the total fat, saturated fat and overall energy components of the diet. Full-fat milk should be given as a drink to children between one and two years of age, when children receive the majority of their energy needs from milk. After this age, children have a more varied diet, and reduced-fat varieties can be introduced.

How much is a serve of milk*, yoghurt*, cheese* and/or alternatives?

A standard serve is (500-600kJ):

1 cup (250ml)	fresh, UHT long life, reconstituted powdered milk or buttermilk
½ cup (120ml)	evaporated milk
2 slices (40g)	or 4 x 3 x 2cm cube (40g) of hard cheese, such as cheddar
½ cup (120g)	ricotta cheese
¾ cup (200g)	yoghurt
1 cup (250ml)	soy, rice or other cereal drink with at least 100mg of added calcium per 100ml



The following foods contain about the same amount of calcium as a serve of milk, yoghurt or cheese:

100g	almonds with skin
60g	sardines, canned in water
½ cup (100g)	canned pink salmon with bones
100g	firm tofu (check the label as calcium levels vary)

*Choose mostly reduced fat

FIGURE 2.13 How much is a serve of milk, yoghurt and cheese and/or alternatives per day?

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Yoghurt is a rich source of calcium and can be eaten for breakfast or as a snack.

WATER

Water is essential for human life, as its unique molecular structure dissolves chemicals and allows them to be transported through the body and throughout the cells. The body requires significant amounts of water that it cannot produce itself.

It is recommended that water should be chosen instead of soft drinks and drinks with added sugar or alcohol. Many popular fluids that are consumed contain water, but many also contain acid, such as fruit juices. Low-kilojoule soft drinks often contain added sugar, alcohol or caffeine.

Health studies show that drinking sugar-sweetened beverages with high kilojoule levels is associated with an increased risk of weight gain in adults and children. It also increases the risk of dental caries in children, and the risk of reduced bone strength.

Australia has an excellent water supply. It is inexpensive, safe and when fluoridated, aids in the development of healthy bones and teeth.

FOODS OUTSIDE THE CIRCLE

Foods such as oils and spreads sit in the bottom left-hand corner of the Australian Guide to Healthy Eating. Where possible, foods that contain saturated fats should be replaced with polyunsaturated and monounsaturated fats such as sunflower, safflower, soybean, canola, peanut or rice bran oils. Oils and spreads should be eaten infrequently and in small amounts, as they are high in energy and can lead to weight gain.

Foods and drinks that appear in the bottom right-hand corner of the Australian Guide to Healthy Eating should only be eaten sometimes, and in small amounts. These foods are known as discretionary foods. Discretionary food choices are food and drinks such as those high in saturated fats, sugar, salt and/or alcohol, that do not necessarily provide nutrients the body needs.

Foods in this section include sweet biscuits, cakes, desserts and pastries, processed meats and sausages, lollies, chocolate, pies, commercially fried foods, potato chips, salty snack foods, cream and butter and spreads, soft drinks, sports and energy drinks and alcoholic drinks. Many of these foods have low levels of essential nutrients. They can contribute many kilojoules and displace other more nutritious foods. Most Australians consume too many of these foods instead of choosing foods from within the circle.

Consumption of foods and drinks that are high in saturated fat and contain added sugars and salt may be associated with an added risk of obesity, which increases the risk of developing chronic diseases such as heart disease, stroke, type 2 diabetes and some forms of cancer.

What is a serve of discretionary choices?

A serve of Discretionary choices provides about 500-600 kilojoules:

2 scoops (75g)	ice-cream
2 slices (50-60g)	processed meats, salami or mettwurst
1½ thick or 2 thin (50-70g)	regular sausages
½ snack-size packet (30g)	salty crackers or crisps
2-3 (35g)	sweat plain biscuits
1 (40g)	doughnut
1 slice (40g)	plain cake/small cake-type muffin
5-6 (40g)	sugar confectionary/small lollies
1 tblsp (60g)	jam or honey
½ bar (25g)	chocolate
2 tblsp (40g)	cream
1 tblsp (20g)	butter
1 can (375ml)	soft drink (sugar-sweetened)
¼ pie or pastie (60g)	commercial meat pie or pastie (individual size)
12 (60g)	fried hot chips
200ml	wine (2 standard drinks; but note this is often 1 glass for many Australian wines)
60ml	spirits (2 standard drinks)
600ml	light beer (1½ standard drinks)
400ml	standard beer (1½ standard drinks)



FIGURE 2.14 What is a serve of discretionary choices?

National Health and Medical Research Council



Shutterstock.com/from my point of view

Snack foods such as sausage rolls should only be eaten in small amounts, as they are high in saturated fats.

Understanding the Text

21 Explain why the Australian Guide to Healthy Eating has been designed to represent a plate, and state the value of this type of food model to Australians.

22 Explain the statement 'vegetables are nutrient dense and relatively low in kilojoules'.

23 Why is it important to limit the consumption of fruit juice?

24 Explain why it is important to include wholegrain cereals in the diet, rather than processed cereals.

25 Describe the value of the resistant starch found in cereals, to a healthy digestive system.

26 Discuss the importance of including lean meat and fish in the diet. Why should we limit our consumption of processed meat such as ham and bacon?

27 List three important reasons for including plant-based alternatives in a healthy diet.

28 Draw up a mind map to demonstrate the value of including dairy products in the diet. Why is it recommended that children under two years of age consume full-fat milk?

29 Explain two reasons why water is a better alternative for children than sugar-sweetened beverages.

30 Outline two recommendations about eating oils and spreads made by the Australian Guide to Healthy Eating. Explain why it is important to limit the amount of discretionary foods you eat.

Answers
Understanding the Text

Practical Activity 2.3

Examining the nutritional properties of a chicken noodle salad

Aim: Evaluate the nutritional properties of chicken noodle salad

Method

1 Prepare the chicken noodle salad on page 50.

2 Access a template of the Australian Guide to Healthy Eating on the Food Solutions Student Resource page.



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3 Categorise each ingredient from the recipe and record it in the correct section of the Australian Guide to Healthy Eating.

Analysis

1 Discuss how well the chicken noodle salad contributes to the daily requirements for a 14–18-year-old girl according to the recommendations of the Australian Guide to Healthy Eating.

2 This recipe includes a range of different vegetables. Use the nutritional rationale of the Australian Guide to Healthy Eating to explain why it is important to eat a range of vegetables.

3 Suggest breakfast and lunch options that would assist in better meeting the recommendations over the course of one day. Explain your choices.

4 Explain why it is recommended that the sesame oil and vegetable oils should be consumed in small amounts.

Conclusion

Based on your evaluation of the nutritional quality of the chicken noodle salad, in your opinion, would this salad be suitable to serve as a healthy meal for a 14–18-year-old girl? Justify your decision.

Chapter Test
Chapter review

Activity 2.4

Dietary behaviour

Read the report 'Dietary behaviour' from the Australian Bureau of Statistics (ABS) then answer the following questions.

1. Evaluate the validity of the report by assessing the source, purpose, context, presentation of evidence, and language used. Alternatively, use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this article. See pages 193–94 for additional information on completing a CRAAP test.
2. Discuss why the ABS would conduct a National Health survey in relation to the consumption of fruit and vegetables.
3. Identify two trends found in this data.
4. Justify how this information may be alarming to governments and health professionals and explain how it does not align with the nutritional rationale of the Australian Guide to Healthy Eating.
5. Using this data, outline the health implications of not eating the recommended daily serves of fruit and vegetables in the Australian Guide to Healthy Eating.

DIETARY BEHAVIOUR

Adult fruit and vegetable consumption

A balanced diet, including sufficient fruit and vegetables, can reduce the risk of developing conditions such as heart disease and diabetes. The National Health and Medical Research Council (NHMRC) 2013 Australian Dietary Guidelines (ADG) recommend a minimum number of serves of fruit and vegetables each day, depending on a person's age and sex, to ensure good nutrition and health.

The National Health Survey 2020-21 was collected online during the COVID-19 pandemic and is a break in time series. Data should be used for point-in-time analysis only and can't be compared to previous years.

Key statistics

- 6.1% of adults ate the recommended amount of both fruit and vegetables
- 8.5% of children ate the recommended amount of both fruit and vegetables
- 6.4% of adults consumed sugar sweetened drinks daily
- 1.2% of children consumed diet drinks daily

In 2020–21, of people aged 18 years and over:

- Over two in five (44.8%) met the fruit recommendation (2 or more serves)
- Almost one in ten (8.7%) met the vegetable recommendation (5 to 6 serves, depending on age and sex)
- 6.1% met both the fruit and vegetable recommendation.

Women aged 18 years and over were more likely to meet any of the recommendations than men:

- 48.3% of women met the fruit recommendation compared to 41.2% of men
- 12.8% of women met the vegetable recommendation compared to 4.4% of men
- 9.0% of women met both recommendations compared to 2.9% of men.

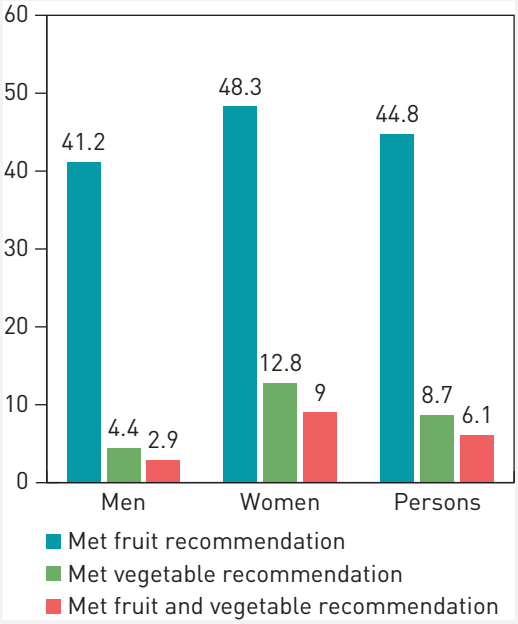


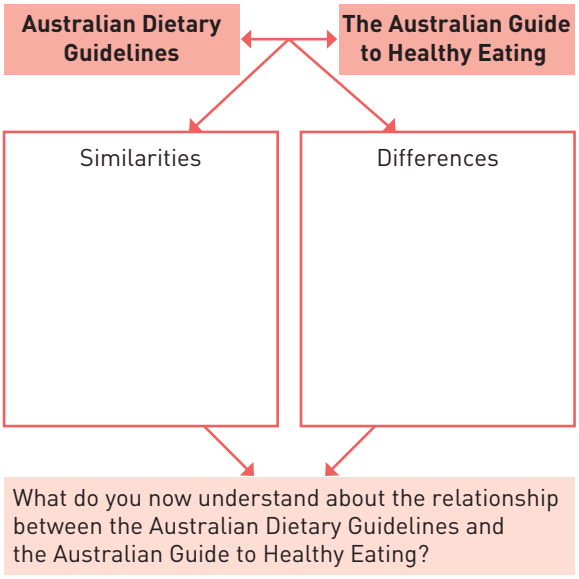
FIGURE 2.15 Proportion of adults who met the fruit and vegetable recommendations by sex, 2020–21

Source: Australian Bureau of Statistics, Dietary behaviour 2020–21 financial year

THINKING SKILLS

Analysing information

Identify the similarities and differences between the Australian Dietary Guidelines and the Australian Guide to Healthy Eating.



EXAMINATION-STYLE QUESTIONS

Answers
Examination-style questions

Resources
Preparing for exams support

Question 1 (7 marks)

The Australian Dietary Guidelines and the Australian Guide to Healthy Eating are designed to promote good nutrition and healthy eating for Australians of all ages.

a Outline the three principles of research used in the development of the Australian Dietary Guidelines. [3 marks]

b Explain how the Australian Guide to Healthy Eating could be used to assist a family in planning their daily food intake. [2 marks]

c One of the aims of the Australian Dietary Guidelines is to limit the intake of 'energy-dense' foods. Outline why energy-dense foods can be a health concern for individuals if eaten in excess. [2 marks]

Question 2 (6 marks)

Based on self-reported data from the Australian Bureau of Statistics (ABS) 2017–18 National Health Survey (NHS), 1 in 2 people aged 18 and over (49 per cent) did not eat the recommended 2 serves of fruit, while over 9 in 10 (92 per cent) did not eat the recommended 5–6 serves of vegetables (ABS 2018).

The proportion of adults with inadequate vegetable intake was similar across age groups. Fruit intake was worse among young people: more than half (54 per cent) of those aged 18–24 had inadequate fruit intake, compared to one-third (36 per cent) of people aged 75 and over.

Source: The Australian Institute of Health and Welfare, *Poor Diet*, July 2019

a Based on the nutritional rationale of the Australian Dietary Guidelines, discuss the importance of including plenty of vegetables and fruit in the diet. [4 marks]

b Explain the possible health implications of not eating the recommended number of serves of vegetables and fruit each day over an extended period of time. [2 marks]

Question 3 (5 marks)

Online food delivery increased in popularity during 2020 and 2021 as a consequence of the COVID-19 lockdowns in many Australian states. One of the most popular dishes ordered by Australian families was pad thai.

Following is a list of ingredients used to make a chicken pad thai:

> Rice noodles, lime juice, fish sauce, brown sugar, peanut oil, chicken fillet, spring onions, red chillies, eggs, bean sprouts, coriander leaves and roasted peanuts.

Assess the nutritional quality of the pad thai as a meal for Australian adults based on the nutritional rationale of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating.

Question 4 (23 marks)

Jane is a 12-year-old student. The table below sets out the food she has eaten in one day.

Analyse her food intake using the Australian Guide to Healthy Eating.

Breakfast: Weet-Bix with full-cream milk and sliced banana, freshly squeezed orange juice

Morning recess: a small packet of Tiny Teddy biscuits

Lunch: 1 ham and salad sandwich, 1 orange and mango fruit box, 1 apple

After school: 1 small packet of potato crisps, 1 chocolate frog

Dinner: Crumbed chicken and 1 cup of mixed vegetables, ice-cream with chocolate topping

a Use the table below to classify the number of serves of food eaten by Jane during the day according to the Australian Guide to Healthy Eating. [6 marks]

b List the total number of serves of food in each group. [3 marks]

c Compare the number of serves Jane has eaten in a day with the recommended number of serves for a child in her age group. Explain whether her intake meets the daily requirements for her age. [2 marks]

d Identify which food groups Jane exceeds the requirements for, and which food groups does she not adequately meet. [6 marks]

e After using the Australian Guide to Healthy Eating to analyse Jane's food intake for one day, explain how her diet could be improved to meet the recommendations of the food model. [6 marks]

SERVES IN EACH FOOD GROUP	VEGETABLES AND LEGUMES	BREAD AND CEREALS, PASTA AND NOODLES	FRUIT	MILK, CHEESE, YOGHURT	MEAT, FISH, POULTRY, NUTS AND LEGUMES	DISCRETIONARY FOODS
Breakfast						
Morning recess						
Lunch						
After school						
Dinner						
Total serves for the day						
Recommended serves for a 12-year-old child in a day	5	5	2	3 ½	2 ½	0–1

Chicken noodle salad

This Asian-style salad makes a delicious, healthy summer meal. The salad includes a wide range of vegetables including red capsicum and carrot, which provide a source of vitamins C, A and B_6, and dietary fibre. The chicken fillet is also an excellent source of protein; however, it does contain a small amount of saturated fat. The noodles provide carbohydrate.

SALAD

1 small chicken fillet

vegetable oil spray

¼ red capsicum, thinly sliced

50 grams snow peas, julienned

½ carrot, thinly sliced diagonally

2 spring onions, sliced

½ cup fresh bean shoots, brown tails removed

125 grams fresh Hokkien noodles

2 teaspoons fresh mint, chopped

2 teaspoons fresh coriander, chopped

DRESSING

¾ teaspoon sesame oil

1 teaspoon vegetable oil

juice of ½ lemon or lime

1 tablespoon kecap manis (Malaysian-style soy sauce)

2 tablespoons sweet chilli sauce

1 teaspoon toasted sesame seeds, to serve

METHOD

1 Remove the skin from the chicken fillet. Place the chicken between two sheets of cling wrap and roll with a rolling pin until even thickness. Spray or brush lightly with vegetable oil.

2 Preheat the chargrill pan or frying pan and cook fillet until just cooked.

3 Remove chicken from heat, wrap in foil and allow to rest for at least 10 minutes before slicing thinly across the grain.

4 Prepare the vegetables. Blanch and refresh the capsicum, snow peas and carrot individually in fresh water.

5 Separate the noodles and place in a large bowl. Cover with boiling water and stand for 5 minutes. Drain and rinse under cold water, then drain well.

6 Mix all the dressing ingredients in a screw-top jar and shake, or whisk in a small bowl until combined.

7 In a large bowl, combine all the vegetables, chopped chicken, noodles, spring onions, bean shoots, mint and coriander with dressing. Toss gently so the dressing coats all the ingredients.

8 Sprinkle with sesame seeds and serve immediately in a bowl or takeaway noodle box.

SERVES 1

EVALUATION

1 Describe the sensory properties of the chicken noodle salad – appearance, aroma, flavour and texture.
2 Suggest an alternative vegetable for spring onions, red capsicum and snow peas. Your suggestions should contribute similar sensory properties to the end product.
3 The vegetables and noodles in this recipe are blanched. Explain why this cooking method is considered healthy.
4 Discuss why including a protein ingredient is a valuable strategy in a main meal. List one animal-based protein and one plant-based protein that could be used instead of chicken in this recipe.
5 Analyse the chicken noodle salad using the Australian Guide to Healthy Eating. Decide whether this recipe is suitable to serve as a healthy meal for children and families. Justify your decision.



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Teriyaki salmon with zucchini noodles and steamed rice topped with crispy ginger, garlic and peanuts

Teriyaki is a glaze used for many savoury foods that originated in Japan in the 17th century. The original recipe included soy sauce, mirin (a sweet Japanese rice wine), sugar and sake. Sometimes other ingredients such as ginger and garlic were added to deepen the flavour. In this recipe, the fish is marinated in a light teriyaki sauce so that it does not overwhelm the flavour of the fish. It is served on a bed of lightly stir-fried vegetables to make a nutritious meal. The steamed rice is topped with crispy fried ginger, garlic and peanuts to give a great textural contrast to the delicate fish.

STEAMED RICE TOPPED WITH CRISPY GINGER, GARLIC AND PEANUTS

½ cup sushi rice
20 grams ginger
½ long red chilli, deseeded
2 cloves garlic, peeled
15 grams coriander
2 tablespoons salted and roasted peanuts
1 tablespoon olive oil
2 teaspoons sesame seeds

TERIYAKI SALMON WITH ZUCCHINI NOODLES

1 tablespoon soy sauce
1 tablespoon mirin
1 teaspoon brown sugar
1 × 150-gram salmon fillet
½ red capsicum, deseeded
½ bunch broccolini
1 zucchini
1 tablespoon kecap manis
2 teaspoons honey
1 tablespoon soy sauce
1 teaspoon sesame oil
1 tablespoon olive oil
2 cloves garlic, crushed
1 tablespoon coriander sprigs

METHOD

Steamed rice topped with crispy ginger, garlic and peanuts

1 Place the rice and 1 cup water in a small saucepan. Bring to the boil, reduce the heat to very low, cover with a tight-fitting lid and simmer for 10 minutes. Remove from the heat. DO NOT remove the lid. Rest, covered, for a further 10 minutes.
2 Slice the ginger and chilli into fine julienne. Slice the garlic very finely. Cut the coriander into 4-centimetre lengths. Chop the peanuts roughly.
3 Heat the oil in a small frying pan over a medium heat. Add the ginger, garlic and chilli and stir-fry for 2–3 minutes or until beginning to brown.
4 Add the coriander, peanuts and sesame seeds and fry for a further 2 minutes, until golden brown.
5 Place the rice in a serving bowl and garnish with the crispy garlic, ginger and chilli topping.
6 Set aside while you prepare the teriyaki salmon with zucchini noodles.

Teriyaki salmon with zucchini noodles

1 To prepare the marinade for the salmon, place the soy sauce, mirin and brown sugar in a bowl and stir to combine. Add salmon fillet and coat with the marinade.
2 Slice the red capsicum finely. Trim the ends from the broccolini. Set aside.
3 Cut the zucchini into 3-millimetre slices and then cut into noodles. Set aside.
4 Drain the excess marinade from salmon. Reserve the remaining marinade.

5 Place the reserved marinade in a small saucepan. Simmer for 2 minutes or until the mixture thickens and forms a glaze. Remove from the heat and set aside.
6 Mix the kecap manis, honey, soy sauce and sesame oil in a bowl.
7 Preheat a non-stick frying pan over a medium heat. Cook the salmon for 2–3 minutes each side or until slightly crispy and the fish flakes when tested with a fork. Flake the salmon and set aside.
8 Heat the olive oil in a wok over high heat. Add the garlic, capsicum and broccolini and stir-fry for 2 minutes.
9 Add zucchini noodles and soy sauce mixture. Stir-fry for 2 minutes, until the zucchini is tender crisp.
10 Place the zucchini noodle mixture on a serving plate, then top with the salmon. Drizzle with the warm marinade, and garnish with sprigs of coriander.

SERVES 1

To serve

Serve with the steamed rice topped with crispy ginger, garlic and peanuts as part of a shared table.

EVALUATION

1 Describe the sensory properties of the teriyaki salmon with zucchini noodles and steamed rice topped with crispy ginger, garlic and peanuts – appearance, aroma, flavour and texture – and comment on the overall appeal.
2 The salmon and vegetables are both fried. Explain why pan-frying and stir-frying are considered healthy forms of frying.
3 Classify the ingredients for teriyaki salmon with zucchini noodles and steamed rice topped with crispy ginger, garlic and peanuts onto a diagram of the Australian Guide to Healthy Eating. Explain how well the variety of ingredients in this meal meets the guidelines of this food selection model.
4 Are the number of ingredients in the discretionary group a concern? Justify your answer.
5 Analyse the portion sizes of the rice, fish and vegetables in the final meal, then determine if the meal would be suitable for a person who is overweight and trying to reduce the size of their meals according to the Australian Guide to Healthy Eating.



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Vegetable frittata

Frittata is an Italian-style omelette that can be eaten hot or served at room temperature. It is ideal served in the pan in which it is cooked and cut into wedges at the table. The variety of vegetables can be altered, although most need to be cooked to tenderise and remove some of the moisture content. The vegetable frittata contains a wide range of vegetables that provide a good source of dietary fibre, vitamins and minerals. There is a small amount of saturated fat in the bacon, eggs and cheeses.

½ zucchini (150 grams)

salt

3 chat potatoes, steamed

2 tablespoons olive oil – one for sautéing and one for cooking the frittata

½ medium brown onion, finely diced

½ leek (100 grams), diced

2 rashers bacon, finely diced

¼ cup frozen peas, defrosted

2 eggs

50 millilitres milk

freshly ground black pepper

50 grams tasty cheese, cubed

1 tablespoon grated parmesan cheese

crusty bread and salad, to serve

METHOD

1 Wash and coarsely grate the zucchini onto a plate and sprinkle with a little salt. Allow to stand for 10–15 minutes.
2 Cut each of the cooked potatoes into four pieces.
3 Squeeze excess water from the zucchini.
4 Heat 1 tablespoon of oil in a frying pan and sauté the onion, leek and bacon. When onion is transparent, add the zucchini and peas and cook gently until the mixture is slightly wilted. Do not brown. Remove from pan and allow to cool. Wipe the pan clean.
5 In a separate bowl, whisk the eggs, milk and black pepper. Then combine all the ingredients, except the oil.
6 Preheat the grill on high.
7 Heat 1 tablespoon of oil in the cleaned pan and, when very hot, pour in the egg and vegetable mixture. Reduce to low heat.
8 When the frittata is almost set, cook under the grill until the mixture is set and light brown on top. Remove the pan from the heat and rest for 5 minutes before cutting to serve.
9 Serve with crusty bread and a salad.

SERVES 1–2

EVALUATION

1 Describe the sensory properties of the vegetable frittata – appearance, aroma, flavour and texture.
2 Classify the ingredients for the vegetable frittata on a diagram of the Australian Guide to Healthy Eating.
3 Use the data from question 2 and explain how well the frittata meets the guidelines of the Australian Guide to Healthy Eating food selection model for a main meal.
4 Explain why, according to the nutritional rationale of the Australian Dietary Guidelines, processed and cured meats such as bacon should only be eaten sometimes, and in small amounts.
5 Suggest other foods that could be added to the menu with the frittata to ensure the meal meets the recommendations of the Australian Guide to Healthy Eating.



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FOOD ALLERGIES

Abnormal immunological reaction to food caused by a foreign substance (usually protein)

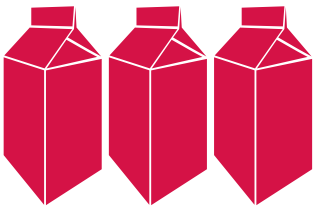
Peanuts



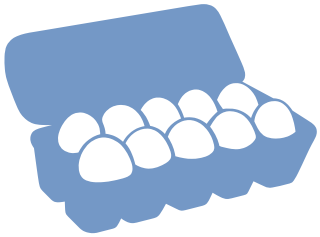
Tree nuts



Milk



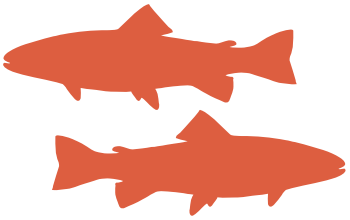
Eggs



Sesame seeds



Fish



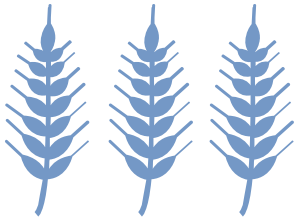
Shellfish



Soy



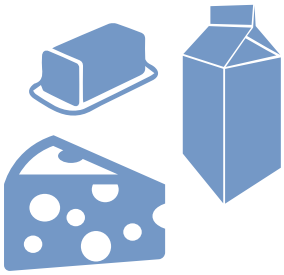
Wheat



FOOD INTOLERANCE

Chemical reaction to particular foods; not a true allergy

Lactose intolerance



Gluten intolerance



FODMAP



3

DIETARY REQUIREMENTS, ALLERGIES AND INTOLERANCES

REASONS FOR DIFFERENCES IN DIETARY REQUIREMENTS



Age



Pregnancy & lactation



Gender



Activity levels

ENERGY REQUIREMENTS

Age	Male	Female
12–15 years	9900 kJ	8200 kJ
16–18 years	10900 kJ	8500 kJ
19–30 years	10300 kJ	8400 kJ
31–50 years	9900 kJ	8000 kJ
51–70 years	9100 kJ	7600 kJ
Adults over 70 years	8300 kJ	7200 kJ

KEY TERMS

energy used in the body for metabolic processes, physiological functions, muscular activity, heat production, and growth and synthesis of new tissue

FODMAP an acronym that stands for fermentable oligosaccharides, disaccharides, monosaccharides and polyols

food allergy an abnormal immunological reaction to food caused by a foreign substance, usually protein; can be life-threatening

food intolerance a chemical reaction to particular foods; an intolerance is not an immune response, so is not a true allergy

lifestyle diseases diseases that are associated with an individual's diet or level of physical activity, such as obesity, type 2 diabetes and cardiovascular disease

obesity carrying excess body weight in the form of fat

physical activity body movements (light, moderate or vigorous) that cause the muscles to work and use more energy than the person would use if resting



Resources
Study Design links
Infographics
Flashcards

Differences in dietary requirements across the life span

Collaborative Activity

Although it would seem logical that two people who participate in the same type of physical activities and/or exercise program each day will have the same **energy** requirements, it really is most unlikely, as each person's energy requirement is unique to them. There are, however, a number of factors that influence the amount of energy each person requires.

The basal metabolic rate (BMR), which is the amount of energy the body requires to function, will vary according to a person's build. The greater their size and the more muscle rather than fat a person has, the higher their BMR will be.

Generally, the younger a person is, the more energy they require. Gender also determines energy needs – males have a higher BMR than females.

Children and adolescents who are growing rapidly have a higher BMR. Pregnant women, too, have an increased need for energy.

People involved in heavy manual labour or athletes with intense training schedules also have greater energy requirements.

FOOD NEEDS AT VARIOUS STAGES OF THE LIFE SPAN

Regardless of our age, we all need the same nutrients to fulfil three main functions in the body:

- the growth and repair of body tissue
- the production of energy
- the maintenance of body processes and the prevention of disease.

As we grow and develop, we require these nutrients in different proportions, depending on a number of factors, such as our age, gender, pregnancy and lactation, state of health, and degree of physical activity and physical stature. Each life stage has specific dietary considerations.

Infancy and early childhood

The first two years of a baby's life is the most rapid period of growth that occurs in the lifespan after birth. Consequently, the nutritional requirements during this period are higher than at any other time during the lifespan. During the first six months of life, infants double their weight. Based on Guideline 4 of the Australian Dietary Guidelines, health professionals recommend that babies should be exclusively breastfed for the first six months of their life. Breastmilk is considered to be best for young babies as it contains all of the nutrients, fluids and energy in the correct proportions for the growing child. If breastfeeding is not possible, mothers are advised to use an infant formula that is correctly prepared.

By the time they reach 12 months, babies have tripled their birth weight and doubled in length. One of the most important features of this period of life is that, although infants' nutritional needs are extremely high, their small body size means that they can only consume a small amount of food at any one time. Because they grow so rapidly at this stage, infants require a diet high in energy, protein and calcium to sustain the growth of bones and soft tissue.



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Infancy is a period of very rapid growth.

Childhood

From approximately two to 11 years of age, children continue to increase in weight and height, but do so less rapidly than during their first two years. Sometimes a child might seem to experience a 'mini' growth spurt, while at other times their growth might seem to be slightly slower but during this period, growth generally occurs at a steady rate. As children do not grow at the same rapid and continuous rate they experienced as babies and infants, only a gradual increase in nutrients is required during this stage. However, it is essential that children eat a nutrient-dense diet to provide the protein, carbohydrate, fat and energy needed to sustain this prolonged period of growth.

Research studies have shown that intellectual development and academic performance are also

linked to a well-balanced diet during these early years. In addition, children are very active and energetic, and often participate in a wide range of physical activities such as swimming lessons, dance classes, gymnastics, weekend sport or simply playing with their friends at preschool or in the school playground. It is therefore essential for them to consume a diet that will provide the energy needed to enjoy the active play that is a key feature of their childhood years.



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Children need a nutrient-dense diet to provide the energy they need for their active lifestyle.

Adolescence

From approximately 13 to 18 years of age, another period of rapid growth occurs, and young people grow quite significantly until they reach their adult height. Girls will reach their adult height by the time they reach their mid to late teenage years. Boys, however, don't reach their full height until a year or two later. Major changes to the brain also occur during this period.

Adolescence is also often a period of intense physical activity, so their diet needs to provide a wide variety of nutrient-dense foods that will supply the energy, protein, vitamins and minerals needed to sustain the rapid growth and active lifestyle typical of this age group. It is also important for adolescents to consume a diet high in calcium and to exercise regularly, to enable peak bone mass to form, reducing the likelihood of osteoporosis in later life.



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Young people grow rapidly during adolescence until they reach their adult height.

Adulthood

For adults, a well-balanced diet is needed to provide adequate nutrients for the maintenance and repair of all tissues in the body, as well as to repair damaged tissues and to provide energy for physical activity. It is important for adults to consume a well-balanced diet that contains adequate amounts of protein, vitamins and minerals and dietary fibre. Younger adults are generally quite active and often enjoy going to the gym or participating in organised sport. They therefore need to consume sufficient kilojoules to provide for their energy needs. As people age, however, their metabolic rate slows down and their lifestyle may become more sedentary. Therefore, energy-dense foods should be limited so that the energy being consumed does not exceed the energy expended, helping maintain a healthy weight. Women continue to need a diet high in calcium, particularly as they reach menopause.



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Growth slows during adulthood, but a well-balanced diet is still required.

Pregnancy

During pregnancy, there is an increased need for a number of nutrients, particularly protein, vitamin C, B-group vitamins, folate, calcium and iron. These nutrients are necessary to build new foetal tissue and maternal tissues, including the growth of the placenta, as well as increasing tissue in the mother, such as breast tissue. A diet high in folate is particularly important in the month before conception and in the first three months of pregnancy to reduce the likelihood of spina bifida and other neural tube defects in the baby. An increase in iron, vitamin C and B-group vitamins is necessary to meet the needs for the increased blood supply. Additional calcium is required during pregnancy

to provide for maximum bone growth and formation of tooth buds in the developing foetus. Extra energy supplies should come from nutrient-dense foods, and pregnant women should increase their serves of cereal foods, mostly wholegrain, from six serves to 8½ serves per day. They also need to increase their protein foods by one serve a day, from 2½ serves a day to 3½.



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A number of additional nutrients are required during pregnancy.

Lactation

During breastfeeding, mothers need a significant amount of nutrients and energy to cope with the demands of milk production. Mothers need to eat and drink regularly and increase fluid intake by 750–1000 millilitres a day above their basic needs.

Although energy is not a nutrient, it is required for metabolic processes and the physiological process of milk production. This extra energy should come from nutrient-dense foods. Additional amounts of calcium, folate, iodine and zinc are required during lactation, and should also be supplied by nutrient-dense foods. Breastfeeding women should add extra serves of cereal foods, particularly wholegrain, increasing their intake from six serves to nine serves.



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Breastfeeding mothers need to increase their nutrient and energy intake to provide milk for their baby.

Late adulthood

As individuals reach older or late adulthood, their energy needs reduce by 15–20 per cent. As a result, one of the most serious health concerns among older Australians is that of becoming overweight or obese. According to data released in November 2020 by the Australian Institute of Health and Welfare, 73 per cent of women aged between 65–74 were overweight or obese. The rates of overweight or **obesity** among men in this age group were even higher, at 83 per cent. Being overweight or obese at any age increases the risk of developing **lifestyle diseases** such as type 2 diabetes and cardiovascular disease.

Therefore, during the later years of adulthood it is important to make sure that the diet is nutrient dense rather than energy dense, and that older people continue to be active.

People in late adulthood still need to consume a well-balanced diet containing protein, vitamins, minerals and low-GI carbohydrates to enable the growth and repair of tissues and maintenance of all body systems. However, these nutrients are required in smaller amounts than at other stages of life, and therefore smaller, regular meals are important.

Research has shown that calcium absorption decreases with age for both women and men. The Australian Guide to Healthy Eating recommends that women increase the amount of dairy foods consumed daily to four serves per day, and men to 3½ serves per day to compensate for any malabsorption.



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Late adulthood

Gender

When puberty begins, there is a difference in the growth and development of males and females. Males generally tend to have a larger body size, broader shoulders, greater muscle mass and height, and therefore weigh more than females. This difference in body structure results in

different energy requirements. Energy is required in the body for metabolic processes, physiological functions, muscular activity, heat production, and growth and synthesis of new tissue. The figures in the following table represent average energy requirements for the Australian population. Individuals' energy needs vary depending on activity levels, body composition, state of health, age, weight and height.

The average amount of kilojoules required daily

THE AVERAGE AMOUNT OF KILOJOULES REQUIRED DAILY**		
Age	Male	Female
12–15 years	8200–9900 kJ	7400–8200 kJ
16–18 years	10 300–10 900 kJ	8400–8500 kJ
19–30 years	10 300* kJ	8400^ kJ
31–50 years	9900* kJ	8000^ kJ
51–70 years	9100* kJ	7600^ kJ
Adults over 70 years	8300* kJ	7200^ kJ

** based on a sedentary person

* estimated energy intake for male 180 cm tall, 71.3 kg

^ estimated energy intake for female 170 cm, 63.6kg

Based on material provided by the National Health and Medical Research Council. Used with permission from Nutrition Australia

Source: National Health and Medical Research Council and Nutrition Australia

Physical activity

Physical activity is defined as body movements (light, moderate or vigorous) that cause the muscles to work and that use more energy than the person would use if resting.

Low levels of physical activity are a major risk factor for a number of lifestyle diseases. People who have insufficient physical activity are at greater risk of becoming obese and therefore developing cardiovascular disease and type 2 diabetes.

Australia's Physical Activity and Sedentary Behaviour Guidelines recommend that Australians be active on most days of the week. For extra fitness, Australians should undertake some vigorous activities such as muscle strengthening at least twice a week, and they should minimise sedentary activities.

Activity levels can be ranked according to the amount of energy expended. The greater the amount of energy expended and the greater the number of physical activities a person engages in, the higher the activity level. Lower ranked sedentary activities use less energy than the more highly ranked strenuous activities. A healthy diet and physical activity are important to balance energy input and output according to the body's needs, and to avoid weight gain.



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Sedentary activities include sitting and watching TV, playing video games or lying down. These activities use very little energy.



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Light activities include walking to school, walking to the shops or a leisurely walk in the park.



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Moderate activities require some effort, such as gentle swimming, a social game of tennis or walking briskly.



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Vigorous activities make you puff, such as jogging, aerobics, fitness classes, football or running to catch the train.

Understanding the Text

1 Outline three factors that will influence a person's basal metabolic rate (BMR).

2 Identify the three main uses of food in the human body.

3 Why are the nutritional requirements higher in infancy than for any other stage of the life span? Identify the key nutrients infants need at this stage of the life span.

4 How do the energy needs during childhood differ from those during adolescence?

5 Explain how the sedentary lifestyle of some adults can influence their energy needs.

6 Draw up a mind map to demonstrate the nutritional needs during pregnancy and breastfeeding.

7 Why is it important during later adulthood to consume a well-balanced diet, but with smaller amounts of food than at other stages of the lifespan?

8 Explain how gender has an impact on energy requirements.

9 Outline how the body uses its supply of energy and explain how being physically inactive can impact on health.

10 Give an example of a vigorous activity and explain why it requires more energy than a more moderate activity.

Answers
Understanding the Text

Food allergies and intolerances

Recent data from the Australian Bureau of Statistics indicates that more than 4 million Australians are allergic or intolerant to some type of food. The most common form of **food allergy** reported was to peanuts, while the most common **food intolerance** was to gluten and dairy.

Food Standards Australia New Zealand has identified 10 foods or ingredients that must be declared on food labels, as they can cause severe allergic reactions including anaphylaxis. These foods or ingredients are peanuts, tree nuts, milk, eggs, sesame seeds, fish, shellfish, soy, lupin and wheat.

FOOD ALLERGIES

Research shows that Australia has among the highest rates of food allergy in the world. Data reported by Allergy and Anaphylaxis Australia indicates that approximately one in 20 children and two in 100 adults have a diagnosed food allergy. As this data shows, many food allergies diagnosed in young children abate as they grow older.

Causes

A food allergy is an abnormal immunological reaction to food caused by a foreign substance, usually protein. Foods that can cause allergies in some people include peanuts, tree nuts, milk, eggs, sesame seeds, fish, shellfish, soy, lupin and wheat. Food allergies can cause an anaphylactic reaction and therefore can be life-threatening.

Symptoms

A food allergy usually causes a physical reaction, which occurs within an hour of exposure to the food. In most cases a food allergy is evident due to symptoms such as hives, rashes, asthma, stomach pain or diarrhoea. In mild cases, a headache or swelling of the face or eyelids may occur. Extreme cases can be life-threatening. The person may have difficulty breathing or their breathing may be very noisy, their tongue may swell, their throat or airways may become constricted, and they may lose consciousness.



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Peanuts and prawns can cause allergies.

Management

The only safe approach for people with a food allergy is to avoid any contact with that food. A diet that is free of the allergen must be strictly maintained. People who suffer from food allergies must ensure their food is not contaminated with even a hint of the food they are allergic to. For example, a person who has an allergy to peanuts may suffer a reaction after using an implement or storage container that has touched or held peanuts or peanut butter and has not been thoroughly cleaned. People with a severe food allergy must read the ingredient list on all processed foods and even restaurant menus extremely carefully.

If contact with an allergen occurs, this can result in a severe allergic reaction known as anaphylactic shock. Anaphylactic shock requires urgent medical attention. Within minutes of exposure to the allergen, the person can have potentially life-threatening symptoms. Sufferers need to carry an EpiPen or auto-injector containing life-saving adrenaline, and have an Anaphylaxis Action Plan. Family, friends, carers and work colleagues need to know how to use these aids in case of emergency.

FOOD INTOLERANCES

A food intolerance is a chemical reaction in the body to particular foods; it is not an immune response and so is not a true allergy. Food intolerances are much more common than food allergies. A person with a food intolerance experiences a reaction after eating or drinking certain foods. The reactions are similar to a food allergy, but are generally not life-threatening.

The reaction to a particular food may occur soon after eating or may be delayed for up to 48 hours after exposure to the food. As the person reduces their consumption of the food to which they are intolerant, the severity of the symptoms usually decreases.

Some people are born with a condition that makes it impossible for them to metabolise a particular food or nutrient. They may lack the necessary enzyme to digest certain foods or nutrients, or be unable to produce the enzyme in sufficient amounts. Food intolerance can also occur when someone does not have the biochemical mechanisms required to transport the enzyme or the nutrient involved around the body.

There are various food intolerances that are relatively common in our society. They include gluten, lactose and fermentable oligosaccharides, disaccharides, monosaccharides and polyols (**FODMAP**) intolerance.

Gluten intolerance or coeliac disease

According to Coeliac Australia, approximately one in 70 Australians are affected by gluten intolerance or coeliac disease. However, research has shown that this figure is much higher, and that most people (about 80 per cent) are undiagnosed.

Symptoms

The symptoms of gluten intolerance can vary considerably but are generally related to the gastrointestinal tract. While many people with coeliac disease suffer from diarrhoea after eating gluten, others may experience constipation. Other symptoms such as cramping, flatulence or vomiting can occur. Many people experience bloating or distention of the abdomen caused by gas and undigested food. Others may feel extremely tired and weak. Damage to the villi prevents the absorption of other nutrients and may lead to weight loss. One of the main symptoms of coeliac disease or gluten intolerance in young children is the failure to gain weight as normal.

Causes

Gluten intolerance or coeliac disease is a disease of the small intestine – the part of the digestive system responsible for absorbing nutrients. People who suffer from gluten intolerance are unable to absorb the protein gluten, which is found in cereals such as wheat, rye, barley and oats.

Gluten intolerance is caused when the villi that line the walls of the small intestine become inflamed and damaged – this is called villous atrophy. The villi are the finger-like folds that project into the small intestine and increase the surface area to a size equivalent to the area of a tennis court. In untreated coeliac disease, these villi are damaged by gluten, and the lining mucosa of the small intestine becomes flat and inflamed, reducing the area available for absorption of nutrients to an area the size of a card table. As a result, unabsorbed food passes down the large intestine and out through bowel motions.

Management

The removal of gluten from the diet allows the lining of the intestine to return to normal. However, the diet must be gluten-free rather than just low in gluten, and a strict gluten-free diet must be maintained throughout life. Gluten occurs in wheat, rye, oats, triticale and barley. These cereals are widely used in food processing, and therefore gluten is found in a range of commonly eaten foods, such as breads, pizza, cereals, cakes, biscuits and pies. It is also a common thickener in processed foods.

ALTERNATIVE FOODS FOR PEOPLE WITH COELIAC DISEASE

Sources	Food products
Corn (maize)	Cornflour Polenta Pure corn chips Taco shells
Rice	Rice Rice pasta Rice cakes Rice crackers Puffed rice Rice noodles Rice bran Baby rice cereal
Buckwheat	Buckwheat flour Buckwheat kibble Buckwheat crispbread Buckwheat pasta Buckwheat soba noodles
Soy	Soy bran
Lentils	Lentil flour
Sago	Sago flour
Tapioca	Tapioca flour
Arrowroot	Arrowroot flour
Potato	Potato flour

Practical Activity 3.1

Comparing gluten-free and wheat-based chocolate biscuits

Aim: To compare the physical, sensory and chemical properties of gluten-free chocolate biscuits with similar chocolate biscuits made from wheat.

Method

1. Have samples of the following types of chocolate biscuits available for comparison: Woolworths Free From Gluten Double Choc Biscuits and similar wheat-based chocolate wafer biscuits, such as Tim Tams.
2. Taste-test each type of biscuit and record your results in a table similar to the one on the following page.
3. List the ingredients used to make each biscuit.
4. Note the cost of each biscuit.

Results

	WOOLWORTHS FREE FROM GLUTEN DOUBLE CHOC BISCUITS	WHEAT-BASED CHOCOLATE WAFER BISCUITS
Appearance		
Aroma		
Flavour		
Texture		
Chocolate coating		
Ingredients		
Number of biscuits per packet		
Cost		

Analysis

1. Which biscuit do you think had the most appealing sensory properties? Explain your decision, considering the chocolate coating and the biscuit.
2. Compare the ingredients used to produce each biscuit. Which ingredients have been used in place of wheat-based flour in the gluten-free biscuits?
3. Which biscuit represented the best value for money? Explain your answer.

Conclusion

Would the Woolworths Free From Gluten Double Choc Biscuits be a suitable substitute for someone suffering from a gluten intolerance? Justify your decision.



Woolworths Free From Gluten Double Choc Biscuits

Mark Fergus Photography

Lactose intolerance

Milk and other dairy products contain a sugar called lactose. For lactose to be digested by the body, it must first be broken down in the small intestine by an enzyme called lactase. The level of lactase in the body declines after an infant is weaned off an all-milk diet. This happens in all people, but some are left with insufficient levels of lactase, meaning lactose cannot be absorbed by the body and passes through to the colon unchanged.

This condition is called lactose intolerance or lactose malabsorption. It is rare for Caucasians to develop lactose intolerance; however, it is quite common among people from Asia, Africa, the Middle East, Mediterranean countries and among Indigenous Australians.

Symptoms

The symptoms of lactose intolerance usually begin soon after consuming food containing lactose, and can cause significant abdominal discomfort including excessive flatulence or wind, diarrhoea, bloating, stomach cramps, indigestion and nausea.

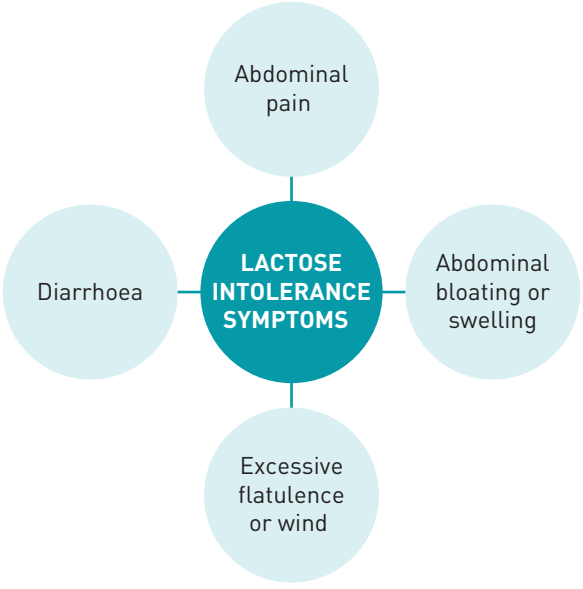


FIGURE 3.1 There are a range of symptoms of lactose intolerance.

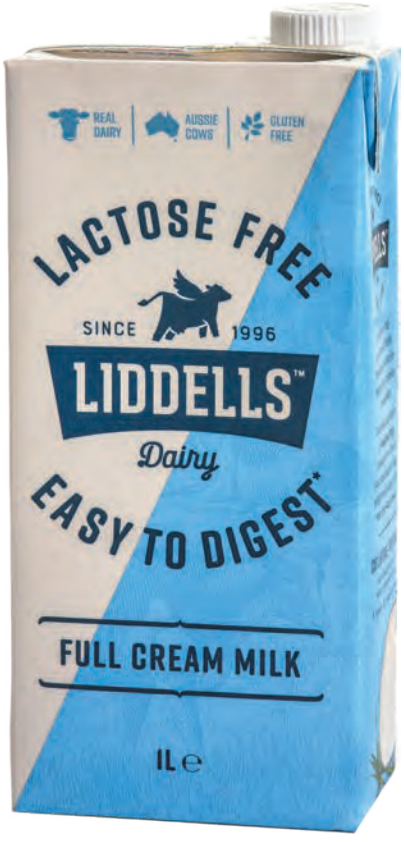
Causes

In people who are lactose intolerant, the body produces insufficient lactase to break down and absorb the lactose in the small intestine. Instead, the lactose moves along the large intestine, where the bacteria within the colon cause the lactose to ferment and produce carbon dioxide. This may cause the bowel to retain water and produce the symptoms associated with lactose intolerance.

Management

The most effective way to manage lactose intolerance is to reduce the amount of lactose in the diet. However, it is important to determine the amount of lactose that an individual can tolerate to avoid any unpleasant symptoms, rather than eliminating dairy foods entirely. Dairy foods are an excellent source of calcium, and are essential for the development of healthy bones.

Today, food manufacturers have developed a range of dairy products with a reduced level of lactose for people who suffer from lactose intolerance. It is important for sufferers to check the labels of processed products carefully for ingredients such as milk solids, whey and milk sugar.



Mark Fergus Photography

Lactose-free milk has been developed for people who are lactose intolerant.

Most hard cheeses such as cheddar, Edam, brie and feta do not contain lactose and can be tolerated in small quantities.

Fresh cheese such as cottage cheese and ricotta have low levels of lactose.

Yoghurt is usually a good choice, as the bacteria in the yoghurt help ferment the lactose.

Dairy-free drinks such as almond, macadamia, soy and rice milks are good substitutes for cow's milk.

FIGURE 3.2 Tips for managing lactose intolerance

FODMAP intolerance

FODMAP is an acronym that stands for fermentable oligosaccharides, disaccharides, monosaccharides and polyols. It describes a group of short-chain carbohydrates including lactose, fructose, fructans, galactans and polyols that may be poorly absorbed in the small intestine.

Symptoms

Symptoms of FODMAP intolerance include severe abdominal pain, cramping, bloating, excess wind, distention or swelling of the intestines, constipation and/or diarrhoea. FODMAP intolerance often occurs in people who suffer from irritable bowel syndrome (IBS).

Causes

FODMAP foods draw water in as they move slowly through the small intestine. Once they reach the large intestine, the gut bacteria uses these short-chain carbohydrates (oligosaccharides, disaccharides, monosaccharides and polyols) as their source of food and rapidly ferment them, producing gases. These gases make the wall of the intestine expand, causing severe pain.

Management

Managing FODMAP intolerance involves understanding the foods that cannot be digested. This group of FODMAP carbohydrates are found in everyday foods.

- *Oligosaccharides* – carbohydrates that contain a small number of monosaccharides and are found in foods such as wheat, rye, onions, garlic, leeks, spring onion and legumes, such as baked beans and lentils.
- *Disaccharides* – sugars such as lactose that is found in cow's milk and dairy foods made from cow's milk, including yoghurt.
- *Monosaccharides* – fructose, the sugar found in fruit, is present in apples, pears, mango, cherries, watermelon, dried fruit and honey.
- *Polyols* – a carbohydrate found in some fruit and vegetables, such as apricots, cherries, nectarines, plums, broccoli, sweet corn, avocado, mushrooms, cauliflower and snow peas. It is also used as an artificial sweetener.

Research by Monash University has shown that following a low-FODMAP diet can help some people to live with the condition. However, following such a diet does not work for everyone. Each person has an individual threshold for tolerating FODMAP foods, and some foods may pose more of a problem than others.

A person following a low-FODMAP diet is advised to replace high-FODMAP foods with foods that have a lower FODMAP content.

Practical Activity 3.2

Taste testing different types of lactose-free milks

Aim: To compare the physical, sensory and chemical properties of a range of lactose-free milks.

Method

1. Your teacher will provide samples of the following types of lactose-free milk for comparison: lactose-free cow's milk, soy milk, rice milk, almond milk and oat milk.
2. Taste test each type of milk and record your results of the sensory analysis in a table similar to the one below.

Analysis

1. Using the data you have collected, explain which milk had the most appealing sensory properties.
2. Milk provides many essential nutrients, such as protein and calcium. Using the nutritional panels on each product container, determine which product has the highest level of calcium and which is the highest in protein. Explain why these are important nutrients to include in the diet of an adolescent.
3. Lactose intolerance is a common food intolerance. How does lactose intolerance affect a person?

	LACTOSE-FREE COW'S MILK	SOY MILK	RICE MILK	ALMOND MILK	OAT MILK
Appearance					
Aroma					
Flavour					
Texture					
Preference each milk 1 = dislikes very much – 5 = likes very much					

Conclusion

If you needed to provide a milk substitute for a person with a lactose intolerance, which milk would you choose? Justify your decision.

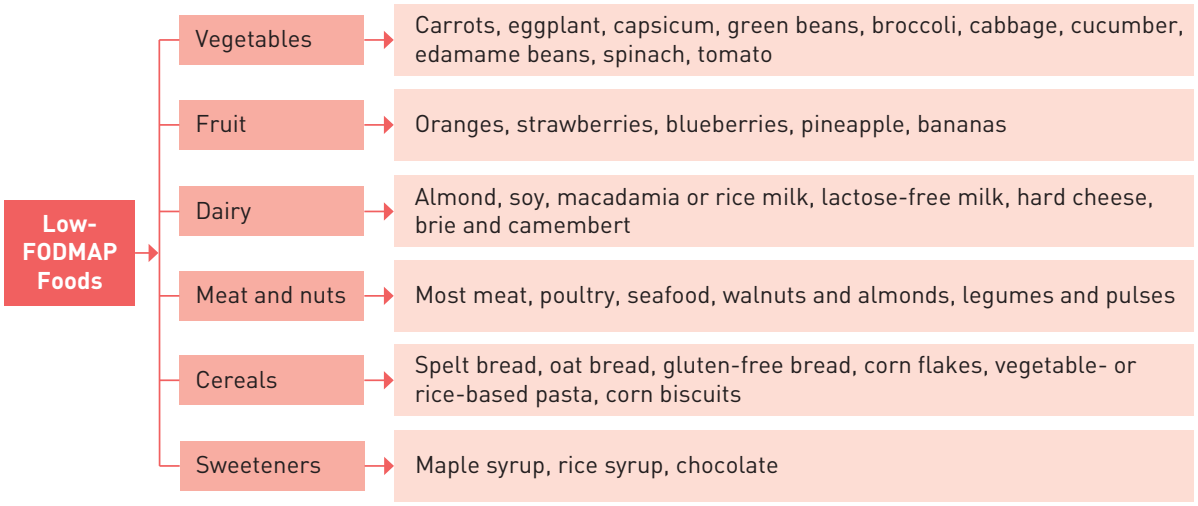


FIGURE 3.3 Low-FODMAP foods.



Monash University has developed an app to help people following a low-FODMAP diet.

Source: Department of Gastroenterology, Monash University. Image supplied with permission from Monash University (monashfodmap.com).

Understanding the Text

11 What is a food allergy? List the most common types of food allergies.

12 Describe the symptoms you would look for if someone you knew was having an allergic reaction to a food. Why are food allergies such an important health issue?

13 Describe the best way for someone who suffers from a peanut allergy to manage their condition.

14 Explain how a food intolerance differs from a food allergy.

15 Draw up a mind map to highlight the symptoms a person suffering from a gluten intolerance may experience.

16 What is coeliac disease and why does it occur?

17 List four foods that someone with coeliac disease must avoid. For each food listed, suggest an alternative that would be suitable for them to eat.

18 What is lactose intolerance? How does this condition affect sufferers?

19 What is a FODMAP intolerance and why does it occur in some people?

20 Identify two foods that contain disaccharides and two foods that contain oligosaccharides. Recommend an alternative for each of these foods that someone who suffers from a FODMAP intolerance could eat.

Answers
Understanding the Text

Chapter Test
Chapter review

EXAMINATION-STYLE QUESTIONS

Answers
Examination-style questions

Resources
Preparing for exams support

Question 1 (8 marks)

a Discuss the biological reasons that energy needs during infancy differ from those required during childhood. [4 marks]

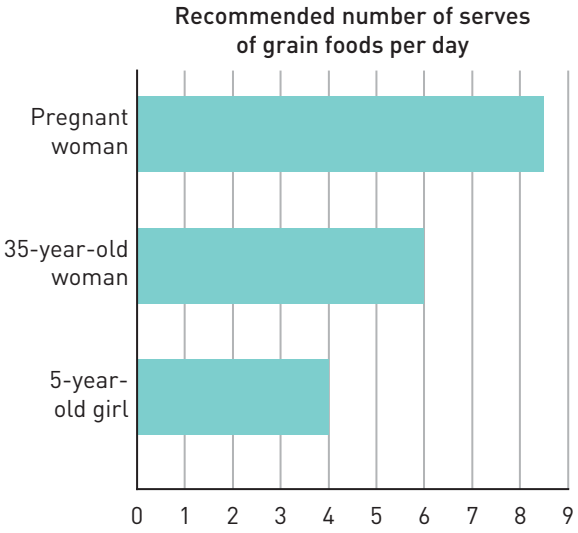
b The Australian Dietary Guidelines recommend that individuals consume a variety of lean meats and poultry, fish, eggs, tofu, nuts and seeds and legumes each day. According to ADG recommendations, women should consume the following number of serves of these foods each day:

- Women aged 55 years = 2 serves
- Pregnant women = 3½ serves

Discuss the reasons for these differing requirements. [4 marks]

Question 2 (4 marks)

The following graph identifies the number of serves of grain (cereal) foods, mostly wholegrain and/or high cereal fibre varieties, for five-year-old girls, 35-year-old women and pregnant women.



Explain the reasons for the differences in the number of serves of grain foods required by five-year-old girls, 35-year-old women and pregnant women.

Question 3 (15 marks)

Products such as microwavable brown rice and quinoa are considered to be an ideal snack for people who are gluten intolerant.

a Explain how a food intolerance differs from a food allergy. [4 marks]

b Justify why a product such as microwavable brown rice and quinoa would be suitable for someone who is gluten intolerant. [2 marks]

c You have been asked to write a post for a food blog aimed at people who suffer from coeliac disease. Your post is aimed at people who have been recently diagnosed as gluten intolerant, and should include the following information:

i. An explanation of the cause of gluten intolerance [3 marks]

ii. A list of three foods that someone suffering from coeliac disease should avoid, and a recommended alternative for each of these foods. [6 marks]

Question 4 (9 marks)

A friend has recently been diagnosed with an intolerance to foods containing fermentable oligosaccharides, disaccharides, monosaccharides and polyols (FODMAP). One of their favourite meals is a lasagne containing the following ingredients: wheat flour pasta sheets, minced beef, tomatoes, mushrooms, eggplant, milk and parmesan cheese.

a Explain the main cause of FODMAP intolerance. [3 marks]

b Complete the table below:

i Identify two foods high in FODMAPs from the lasagne ingredients listed above. [2 marks]

ii Identify and justify ingredients that could be used as substitutes for these ingredients. [4 marks]

INGREDIENTS HIGH IN FODMAPS	INGREDIENT SUBSTITUTION	JUSTIFICATION

Spinach and pork ramen

Ramen is a Japanese-style noodle soup that is flavoured with a small amount of meat and a variety of vegetables. It is based on a traditional Chinese recipe for Chinese wheat noodles that was taken to Japan in the early 1900s. Ramen noodles are a wheat-based noodle that have a slightly stronger flavour than traditional rice noodles. Miso paste is added to the soup base just before serving and adds a savoury element to the dish. The shitake mushrooms have a strong, earthy taste and add a depth of flavour to the soup base. Simply changing the ramen noodles for rice noodles would make this recipe suitable for someone who was gluten intolerant.

1 spring onion
1 small carrot
½ red onion
2 shitake mushrooms
2½ cups chicken stock
1 teaspoon fresh ginger, finely grated
1 tablespoon soy sauce
150 grams lean pork fillet
1 bundle ramen noodles
1 tablespoon white miso paste
1 cup fresh baby spinach
¼ long red chilli, deseeded and very finely sliced

METHOD

Spring onion curl garnish

1 Cut the spring onions into 15-centimetre lengths. Slice lengthwise into very thin slices.
2 Place in a bowl of iced water and set aside for 10 minutes, until the spring onions curl up.
3 Remove spring onions from the iced water and dry with paper towel. Set aside to use as a garnish.

Miso base

1 Slice the carrot diagonally into thin slices, cut the red onion into thick wedges and slice the shitake mushrooms thickly.
2 Combine the carrot, red onion, shitake mushrooms, chicken stock, fresh ginger and soy sauce in a medium saucepan. Bring to the boil, reduce the heat and simmer, covered, for 10 minutes.
3 Trim the pork fillet to remove any sinew and cut into 1-centimetre-thick slices.
4 Add the ramen noodles to the saucepan and simmer for 2 minutes. Add the sliced pork fillet and simmer for a further 2 minutes or until the pork is just cooked.
5 Place the white miso paste in a small bowl and add ½ cup of ramen stock. Stir to a smooth paste.
6 Add the miso mixture to the prepared ramen stock and stir thoroughly to combine. Gently heat through.
7 Place the spinach in the base of a deep serving bowl. Ladle the hot ramen over the top of the spinach.
8 Garnish with spring onion curls and finely sliced red chilli.

SERVES 1

Alternative ingredients

For a gluten-free alternative, substitute the ramen noodles with rice or sweet potato noodles.

EVALUATION

1 Describe the sensory properties – appearance, aroma, flavour and texture – of the spinach and pork ramen.
2 Explain why substituting the ramen noodles with rice or sweet potato noodles would make this recipe suitable for a person on a gluten-free diet.
3 Identify other food intolerances that this recipe would cater to and explain why.
4 Classify the ingredients of the spinach and pork ramen using the Australian Guide to Healthy Eating food model.
5 Use the data collected in question 4 to analyse the nutritional properties of this recipe and decide whether it is suitable to serve as a healthy meal for adolescents aged 13–18 years. Justify your answer.



Mark Fergus Photography

Zucchini koftas with red capsicum pesto

Koftas are found throughout the Middle East and South Asia and are traditionally made with minced beef, lamb or chicken. This recipe uses zucchini and mashed potato to make a delicious vegetarian alternative to the traditional meat-based koftas. Using rice flour, rather than a wheat-based flour, makes this recipe suitable for someone who is gluten intolerant. Rice bran oil has a mild, nutty flavour and is ideal for shallow frying. Serve these zucchini koftas as a nutritious snack or a light lunch.

CAPSICUM PESTO

1 red capsicum

olive oil spray

¼ cup pine nuts

½ clove garlic, crushed

2 tablespoons parmesan cheese

½ teaspoon smoked paprika

ZUCCHINI KOFTAS

150 grams floury potato, peeled and quartered

250 grams zucchini, coarsely grated

½ green chilli, deseeded and finely diced

2 spring onions, finely sliced

¼ cup rice flour

1 egg, beaten

½ teaspoon salt

black pepper

sunflower oil or rice bran oil for frying

TO SERVE

1 small ripe tomato, finely diced

½ Lebanese cucumber, deseeded and finely diced

¼ red onion, finely diced

salt and pepper

pita pockets or taco shells

METHOD

Making the red capsicum pesto

1. Preheat the oven to 200 °C. Line a baking tray with baking paper.
2. Cut the capsicum in half lengthwise and remove the seeds. Place the capsicum on the tray skin-side down, then spray lightly with olive oil spray. Roast in the oven for approximately 20 minutes, until the skin is blistered and starting to brown. Remove from the oven and allow to cool.
3. Toast the pine nuts in a small frying pan for 4–5 minutes, until lightly toasted. Remove from the heat.
4. Peel the skin from the capsicum. Chop roughly.
5. Place the capsicum, toasted pine nuts, garlic, parmesan and smoked paprika in a small food processor and blitz to a smooth paste. Set aside to serve with the zucchini koftas.

Making the zucchini koftas

1. Place the potato in a small saucepan and cover with water. Bring to the boil, cover with a lid and simmer for 20 minutes, until tender. Drain and mash with a fork.
2. Wrap the zucchini in a clean tea towel or paper towel and squeeze over a sink to remove as much moisture as possible.
3. Place the zucchini, mashed potato, finely diced green chilli, spring onions, rice flour, egg, salt and black pepper in a mixing bowl. Mix well until combined.
4. Heat 2 centimetres of oil in a large frying pan over a moderately high heat.
5. Form ¼ cup measures of the zucchini mixture (approximately 50 grams) into an oval shape. The mixture will make 10 koftas.

6 Using a slotted spoon, carefully place half of the koftas into the hot oil. Shallow fry for approximately 6–8 minutes, until golden brown and crisp, then remove from the oil using a slotted spoon. Drain on paper towel and set aside while you shallow fry the remaining koftas.

To serve

1 Make the salsa by combining the tomato, Lebanese cucumber, red onion and salt and pepper in a small bowl.
2 Warm the pita pockets or taco shells.
3 Place a small amount of the tomato, cucumber and red onion salsa in a pita pocket or taco shell and top with a zucchini kofta and a spoonful of red capsicum pesto.

SERVES 2

EVALUATION

1 Describe the sensory properties – appearance, aroma, flavour and texture – of the zucchini koftas with red capsicum pesto.
2 The zucchini koftas are shallow fried. Explain why this cooking method should only be used occasionally when aiming to follow a healthy diet.
3 Classify the ingredients of zucchini koftas with red capsicum pesto using the Australian Guide to Healthy Eating food model.
4 Use the data collected in question 3 to analyse the nutritional properties of this recipe and decide whether it is suitable to serve as a healthy snack for children aged 2–12 years. Justify your answer.
5 Vegemite and cheese sandwiches are a popular snack food for children. Would you rate them as healthier than the zucchini koftas with red capsicum pesto? Justify your answer.



Mark Fergus Photography

Lemon feather cake

This lemon feather cake is a light-as-a-feather sponge with a delicious lemony tang. Made with potato flour rather than a traditional wheat-based plain flour, it is gluten-free. The cake is aerated by the addition of egg white, so it is important to gently but firmly fold in the whites to preserve as much air as possible. The potato flour is made from surplus potatoes, or the waste stream of potato processing, making it a more environmentally sustainable product. The potato starch does not yellow on baking, enabling this cake to retain a bright white colour when cooked. The cake's delicate flavour and light-as-air texture makes it a delicious indulgence for someone who is gluten intolerant. If time is short, you can prepare the lemon curd in advance. It is essential to measure all of the ingredients accurately to ensure the success of the lemon feather cake.

LEMON FEATHER CAKE

1 tablespoon of caster sugar, for dusting the tin

1 tablespoon potato flour, for dusting the tin

3 eggs, separated

140 grams caster sugar

zest 1 lemon

2 tablespoons lemon juice

75 grams potato flour, sifted

FILLING

200 grams thickened cream

3 tablespoons lemon curd (page 130)

icing sugar for dusting

METHOD

1. Preheat the oven to 180 °C. Grease and line a 20-centimetre cake tin with baking paper, then dust the sides of the tin with the mixture of caster sugar and potato flour.
2. Place the egg yolks and caster sugar in a large bowl and whisk together with an electric beater until the mixture is very thick, creamy and pale, and resembles whipped cream.
3. Using a plastic spatula or metal spoon, carefully fold through the lemon zest and lemon juice.
4. Gently fold the potato flour through the egg yolk mixture. Make sure the flour is well combined.
5. Beat the egg whites in a separate bowl until stiff peaks form – the egg whites will stand up straight and be glossy in appearance.
6. Gently, fold ⅓ of the egg whites through the egg yolk and potato flour base to lighten the mixture.
7. Using a plastic spatula, fold through the remaining egg whites ⅓ at a time. Make sure there are no streaks or bubbles of egg white remaining in the mixture.
8. Pour the mixture into the prepared tin and smooth the top.
9. Bake in the preheated oven for 25–30 minutes, until the cake is well risen, lightly golden in colour and firm to touch.
10. Remove from the oven and allow to cool in the tin for 5 minutes. Carefully remove from the tin and allow to cool on a cake cooler. Split in two when cool.
11. To make the filling, beat the cream to firm peaks, then gently fold through three tablespoons of lemon curd.
12. Spoon the filling thickly over the base of the cake. Top with the second layer and dust with icing sugar.

EVALUATION

1 Describe the sensory properties – appearance, aroma, flavour and texture – of the lemon feather cake.
2 Suggest some alternative products that could be folded through the cream for the filling if lemon curd was not available.
3 Explain why this recipe is suitable for a person following a gluten-free diet.
4 Explain why this recipe is not suitable for a person following a low FODMAP diet.
5 According to the nutritional rationale of the Australian Dietary Guidelines, cakes such as the lemon feather cake should only be eaten occasionally and in small amounts. Discuss the reasons underpinning this recommendation.



Mark Fergus Photography

TRENDS IN FOOD PURCHASING AND CONSUMPTION IN AUSTRALIA



ESTABLISHING HEALTHY DIETS IN CHILDREN

Modelling healthy eating patterns

- Mealtimes – eating together at the table
- Talking to children about nutritious food
- Shopping and cooking with children

Exposing children to new foods

- Include a range of colours, textures and flavours
- Serve small amounts
- Encourage children to smell, touch, taste and look at new foods

The importance of repetition

- Offer new foods on many occasions
- Vary the way new foods are prepared and served

SOCIAL FACTORS THAT INFLUENCE HEALTHY EATING

Education:
- Food models
- Government programs
- Food and nutrition education in schools

Location:
- Rural and remote communities

Income:
- Private labels in supermarkets
- Low-cost supermarkets
- Small-format specialty supermarkets

Available time:
- Pre-prepared/ pre-cooked meals
- Online ordering and delivery of ingredients and meals
- All-in-one food preparation appliances

Cultural norms:
- Customs
- Religion

Accommodation
- Apartment-style living
- Homelessness

4

AUSTRALIAN EATING PATTERNS

KEY TERMS

clean eating the consumption of minimally processed whole foods such as fruits, vegetables, lean proteins, wholegrains and healthy fats

food citizenship individuals participating in, and making informed choices about, issues such as sustainability, ethics or health in any stage of the food system

food sovereignty challenges the control of the food system and food supply by large corporations, and returns the decision-making back to farmers and individuals who produce and consume food, in order to ensure it is produced ethically and sustainably

Resources
Study Design links
Infographics
Flashcards

functional foods foods that provide a health benefit beyond that of basic nutrition

food trends general changes or movements in food purchasing and consumption behaviours, towards a new result or pattern

kombucha a sweetened black or green tea drink, fermented with yeasts and bacteria

Patterns of eating in Australia

A report released by the Australian Institute of Health and Welfare (AIHW) in July 2019 revealed that a vast number of Australians are not following the recommendations of the Australian Dietary Guidelines in order to ensure a healthy diet. The introduction to the report made the damning finding that 'Australians of all ages generally have a poor diet – that is, they do not eat enough of the five food groups and eat too many discretionary foods high in salt, fat and sugar'. The report included the following findings, based on the latest data:

- in 2017–18 between 93–94 per cent of people aged over 18 did not meet the vegetable guidelines of five serves for women and 5–6 serves for men per day
- in 2017–18 between 49–52 per cent of people aged over 18 did not meet the fruit guidelines of two serves per day
- in 2017–18, 9.1 per cent of adults consumed sugar-sweetened drinks daily
- in 2017–18, fewer than 10 per cent of adults met the recommendations for daily vegetable consumption
- in the period 2011–12 children consumed 3–8 serves of discretionary foods per day
- in the period 2011–12 adults consumed 5–7 serves of discretionary foods per day.

Source: Australian Institute of Health and Welfare, *Poor Diet*

Recent developments in food purchasing and consumption

As an understanding of the concept of **food citizenship** grows, one positive eating pattern developing in Australia is the attention consumers are paying to the impact their food choices have on the environment. Many people are beginning to think of themselves not just as consumers, but as food citizens. As a result, many consumers are making informed choices and developing ethical food-purchasing patterns. This growing interest in issues such as climate change and an awareness of animal welfare is leading more people to consume meat-free meals and turn to plant-based products instead. More consumers are actively seeking ethical and sustainably produced food products, and are choosing brands that support social issues and locally produced food. While the data cited from the Australian Institute of Health and Welfare seems to indicate that Australians generally have a poor diet, many consumers have become more aware of the link between diet and health, and are seeking more nutritious foods to lead a healthy life.

PLANT-BASED EATING

There is a growing increase in the consumption of plant-based meals as people develop an awareness of their role as food citizens and become increasingly conscious of the impact their food choices have on both their health and the environment.

Vegetable dishes are no longer seen as only an accompaniment to a meat or fish main course. Home cooks and chefs everywhere are using them to make nutritious, delicious and flavoursome meals that can be enjoyed by everyone. Research undertaken by Australian research company Roy Morgan in 2019 found that 'nearly 2.5 million Australians (12.1 per cent of the population) now have diets of which the food is all, or almost all, vegetarian'.

This trend in consuming plant-based meals has been identified by HelloFresh, who reported that in 2021 'the number of vegetarian meals ordered by HelloFresh customers increased by 370 per cent in the last year, with this trend set to continue in 2022'. Further evidence of this trend was also recognised by Food Frontier (an independent think tank on alternative proteins in Australia and New Zealand). Their 2020 'State of the Industry Report' that found that '42 per cent of Aussies are eating less meat or none at all'.

The rise in the availability of alternative protein sources has occurred as a result of significant developments in innovation and food-processing technologies. Plant-based products have developed beyond the original meat-free burger and now include shellfish-style foods, plant-based poultry-style products, plant-based cheeses and ready-to-eat protein



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Beyond Meat burger made with plants

snacks. The number of plant-based meat substitute products available to Australian consumers doubled in 2020, and plant-based products can now be found in dedicated sections of the supermarket. There is no doubt that the range of plant-based products will continue to increase as more consumers recognise the health and environmental benefits of reducing their consumption of animal foods.

Activity 4.1

Hungry Jack's iconic Whopper goes plant-based, courtesy of v2food

Read the article about v2food and the development of the Hungry Jack's Rebel Whopper, and then answer these questions.

1. Evaluate the validity of the news article by assessing the source, purpose, context, presentation of evidence and language used. Alternatively use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this news article. See pages 193–94 for additional information on completing a CRAAP test.
2. What was the significance of the production of the Rebel Whopper for Hungry Jack's?
3. Explain how v2foods developed their first plant-based patty.
4. What was the main challenge v2foods faced in developing the plant-based patty for Hungry Jack's?
5. Discuss the aims of the television marketing strategy used by Hungry Jack's to launch the new Rebel Whopper.
6. What outcomes did v2foods hope to achieve from the launch of Hungry Jack's Rebel Whopper?

HUNGRY JACK'S ICONIC WHOPPER GOES PLANT-BASED, COURTESY OF V2FOOD

The Rebel Whopper, launched by Hungry Jack's in October 2019, was the first plant-based meat alternative on the menu at a major Quick Service Restaurant in Australia. Available at 400 Hungry Jack's nationwide, the meat-free version of the restaurant's iconic Whopper burger features a plant-based patty created by Australian start-up v2food.

v2food was born from a partnership between Australia's national science agency, CSIRO; Main Sequence Ventures, an investment fund backed by CSIRO and the Australian Government; and Australian fast-food executive, Jack Cowin of Competitive Foods Australia (the parent company of Burger King's Australian franchise, Hungry Jack's). CSIRO provided flavour science expertise and technical skill to v2food in a collaboration to create a product that would achieve a sensory experience akin to conventional meat, using plants. The challenge was to create a plant-based burger patty that would appeal to meat eaters by mimicking the 'flame grilled' flavour and juiciness associated with Hungry Jack's beef Whopper. The collaboration was deemed a success with Cowin's blind taste test.

'I couldn't tell the difference between real beef and the Rebel Whopper. And I've eaten more beef burgers than anyone in Australia.' – Jack Cowin, CEO, Competitive Foods Australia

Taste was central to marketing the launch of the Rebel Whopper, which carried a tagline of '100 per cent Whopper, 0 per cent Beef'. In the first-ever TV ad in Australia promoting a plant-based meat, Hungry Jack's spruiked the burger as having a meat-like taste, communicating confidence that consumers who tried the Rebel Whopper would find it similar to conventional beef.

v2food's initial launch of its product in Hungry Jack's provided the opportunity to reach a wide range of Australian consumers, many of whom may not have yet tried plant-based meat products or may not proactively seek them out in a supermarket. It was important to price the Rebel Whopper the same as the standard Whopper, to make it an attractive option for consumers seeking a plant-based alternative and an entry point into plant-based foods for flexitarian customers. The launch and pricing strategy worked: an overwhelmingly positive social media response from flexitarians eager to try the plant-based burger – as well as vegetarians grateful for another plant-based option – mirrored Hungry Jack's in-store sales success.

Source: '2020 State of the Industry: Australia's Plant-based Meat Sector', Food Frontier

Plant-based milk alternatives

There is a growing market for dairy-free milk alternatives and almond, soy and oat milks are fast becoming mainstream, both for consumption at home and as the 'milk' of choice for customers ordering a coffee at their local cafe. Sales of these plant-based milks have dramatically increased as consumers have become more environmentally aware and health conscious. Plant-based milks are an appealing option for people who are vegan, allergic to milk or lactose intolerant.

According to an article titled 'The rise and rise of oat milk in Australia', published in *Hospitality Magazine* in July 2020, 'around 95 per cent of all barista-made beverages sold in Australia are milk-based. Of these 30 per cent are made with plant-based milk.'



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Oat milk coffee is popular with many consumers.

ETHICALLY CONSCIOUS FOOD CITIZENS

Australian consumers are becoming more responsible food citizens, making more thoughtful and considered food choices. Many consumers are increasingly selective in their choices, eager to ensure that they improve both their own health and that of the planet. The Future of Food report found that 'Almost nine in 10 millennials would buy from companies that supported solutions to specific social issues. Social awareness of issues such as sustainable supply chains, living wages, animal welfare and food waste are impacting the brands consumers trust and what they choose to consume.'

Many of today's consumers are concerned about environmentally sustainable agriculture and are avoiding foods produced using inorganic, mass-produced fertilisers and pesticides, wasteful water use and mismanagement of effluent. They are also concerned about animal welfare, particularly high-density stock in egg and pork production.



FIGURE 4.1 Ethical areas of concern for consumers

Sourcing local ingredients

The COVID-19 pandemic exposed a strong desire for people to support their fellow citizens. This led many people to consider the importance of farmers, agriculture and local food suppliers to the Australian way of life.

Increasingly, consumers are looking to give control back to farmers so that they can produce food ethically and sustainably using regenerative farming practices. Many people achieve food sovereignty by supporting and developing relationships with stallholders at local farmers markets and community farms, and by shopping at independent butchers, grocers and greengrocers.

Australians are increasingly choosing local products and experiences, and adopting a local origin focus to their purchasing. GO LOCAL FIRST was formed in 2020 to support and promote small local businesses and to encourage local communities to buy locally, keeping Australians in jobs and money in local communities. In October 2020, GO LOCAL FIRST partnered with the Australian Made Campaign, and they now work together to encourage consumers to purchase Australian made and produced products.

As chef Adam Liaw explained in an article published in March 2021, 'We need to support our farmers in the best and only way we can – buy Australian and do it as if your life depends on it. The financial survival of many producers, especially the small ones, hangs in the balance.'

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Australian Made Campaign

GO LOCAL FIRST partnered with Australian Made to help build support for local businesses.

Case study 4.1

Bertie's Butcher

Read the case study on Bertie's Butcher and then answer these questions.

1. What is the history of Bertie's Butcher?
2. Describe the impact that the COVID-19 pandemic had on Bertie's Butcher.
3. Why is Bertie's Butcher so popular with locals?
4. What 'silver lining' came out of the pandemic for Jason?
5. Identify one local food business in your area and explain the importance of that business to the local community.



Jason, the owner of Bertie's Butcher, enjoys the support of his local community.

Jason has been the proud owner of Bertie's Butcher in Cremorne, Victoria, since 2012. But the store has served the local community since 1871, making it the oldest butcher shop in Australia.

The business got the name 'Bertie's' from Bertie Bertram, who ran it on his return to Australia after fighting in WWII. It was so successful it was the chosen supplier of meat for the Queen's visit to Australia for the 1956 Melbourne Olympics – making them 'Butchers to the Queen'.

Throughout COVID-19, Bertie's has received strong support from locals buying meat. This allowed the butchers to stay open, but they were forced to shut the café attached to the business.

Jason is deeply appreciative of the support from his customers during the pandemic, as now more than ever they are choosing to support local business instead of shopping at supermarkets.

Jason has also managed to find a silver lining – he thinks people will continue to cook at home more following the crisis, because it allows them to connect with family and friends safely.

It's an uncertain time but one thing is sure: he couldn't have stayed open without the support from his locals.

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Changes and trends in food purchasing and consumption

Our food choices are influenced by many different things, including **food trends**, which influence what, when, how and why we choose to eat. Food trends are complex and constantly changing. The way people purchase and consume food has changed significantly over the last few decades, and eating behaviours will continue to evolve as advances in food technology result in a greater range of food choices.

A survey undertaken by Hello Fresh in 2021 of over 1000 Australian customers revealed the following results:

- Over the past decade, people in Australia generally tend to cook more at home from scratch, paying attention to the food they eat and where it comes from.
- In 2022, Aussies will aim to change their eating habits to look after their family's health, prioritising nutritious recipes and seasonal ingredients.
- There is a desire to experiment in the kitchen by trying out more cuisines in the next 10 years.

Source: Australian Food Trends, 2021, HelloFresh

HEALTH AWARENESS

With increased access to information, consumers are becoming more informed about the relationship between diet and health. They are actively researching nutrition, and seeking healthier food options and ways of improving and maintaining their health.

Food patterns, both in Australia and globally, have changed, and many consumers are now looking to purchase food and beverages that will enhance their wellbeing. Mintel, an Australian research company, predicts that innovative food and drinks will help people learn how diet can impact on mental and emotional health. Multisensory products such as energising snacks to eat while gaming, or calming drinks for meditation, will be produced to complement or relieve stressful activities.

Clean eating

There is a developing trend towards 'clean eating' in order to meet consumer wellness goals. **Clean eating** is described as choosing minimally processed whole foods such as fruits, vegetables, lean proteins, wholegrains and healthy fats. There is increased attention to mental and emotional health, as a result of the COVID-19 pandemic, and **functional foods** and multisensory products are being developed to meet this need. In 2019, Deloitte prepared a report titled 'The future of food: How technology and global trends are transforming the food industry'. One of the key findings in relation to changing consumer preferences was that '40 per cent of young people aged 18 to 30 are consuming a diet consistent with clean eating. Consumers will increasingly demand foods that are raw and unprocessed, avoiding foods high in sugar, fat or additives.'



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Selecting minimally processed, whole foods is part of the trend towards clean eating.

Gut health

Consumers are now taking a more holistic approach to health, with a particular interest in functional foods. They are paying closer attention to the role that the gut microbiome has on a person's health and the relationship between gut health and mental health. This has led to a growing interest in fermented foods and products such as kimchi, yoghurt, **kombucha** and sourdough, and these foods are now readily available in supermarkets, cafes and on restaurant menus.

Fermented foods are produced by undergoing controlled microbial growth and fermentation. Fermentation is an anaerobic process in which microorganisms like yeast and bacteria break down food components such as glucose into other products, such as organic acids, gases and alcohol. Fermented foods have a unique flavour, aroma, texture and appearance. Through fermentation, many foods, although nutritious in their original from, carry additional health benefits, especially when they contain probiotics and prebiotics.

Probiotics such as *lactobacillus* and *bifidobacterium* are 'good' bacteria, and support gut health by creating a favourable gut environment and benefiting mood. There are many health benefits associated with the consumption of fermented foods, such as helping reduce the risk of high blood pressure, cardiovascular disease, type 2 diabetes and obesity. Fermented foods

have also been shown to improve the functioning of the digestive system, boosting the immune system and improving mental health.



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Fermented vegetables

HOME MADE

Research by Mintel, an Australian research company, has shown that the COVID-19 pandemic brought about a rethink and reset in human behaviour. During this time, food became a safe form of escapism.

People developed a greater understanding of the importance of food in their lives, and developed a mindfulness around food. Popular television cooking programs and more 'home grown' chefs also influenced this growing interest in meal preparation. Once considered mere 'housework', cooking and meal preparation is now becoming an interest and leisure activity for many people.

Today the kitchen has again become the most important and central room in the house. During the COVID-19 lockdowns of 2020 and 2021, many people found a new life in their kitchen. For some, this was an ideal time to learn new skills in food preparation. People began to realise how much pleasure they received from home cooking, and that they had the skills to cook an enjoyable healthy dinner.

Many people have improved their cooking skills and are cooking more than ever. As a result, they are taking control of the family's meals and relying less on pre-prepared products or food delivery apps. Expressing their food citizenship and taking control of their meal preparation allows individuals to understand exactly what ingredients are going into their meals, enabling them to optimise their own health.

Home cooking and baking was one of 2021's top food trends, with 21 per cent more people regularly cooking at home in 2020, according to a survey conducted by online food delivery company Deliveroo.

Being at home during lockdown meant many people had more time to cook. Cooking also provided an opportunity to take a break from the desk and start the preparations for dinner. This increased the enjoyment and satisfaction of preparing a delicious meal or baking a cake or a loaf of bread. Many people reported that mixing and kneading a sourdough loaf was cathartic or emotionally satisfying, and its fermented element also satisfied the growing interest in gut health.



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Homemade loaf of sourdough bread

Virtual cooking schools

During the COVID-19 lockdowns of 2020 and 2021, many people found a new life in their kitchen. Many embraced online opportunities to participate in virtual cooking events and learn new skills in food preparation. People began to derive greater pleasure from home cooking, and realised they could develop the skills to prepare and cook enjoyable, healthy dinners. Online video conferencing programs such as Zoom allowed celebrity chefs and established cooking schools to share their skills with a broader, and sometimes more remote community. These programs proved popular with individuals who took the opportunity to develop their food skills in such diverse areas as preparing Asian dumplings, pastry making, cooking a traditional Japanese okonomiyaki and making gnocchi. Cooking classes specifically tailored to children have also become very popular.

Kirsten Tibballs, a popular pastry chef and chocolatier, is one example of a chef who adapted her business during the COVID-19 lockdowns. Kirsten put her entrepreneurial skills to work and made her cooking classes available online at www.savourschool.com.au. She now has hundreds of online video tutorials available through Kirsten Tibballs' Savour School.



Kirsten Tibballs

Kirsten Tibballs' Savour Online Classes

In an article titled 'Top 10 2021 Australian Food Trends, Online Cooking Schools and Virtual Events', Kirsten Tibballs said, 'Online learning is the perfect device to connect to people who may be limited economically or geographically. It is why we take such pride in providing an accessible platform with online classes. Virtual learning can really be the greatest tool to educate and engage with people from a wide variety of locations and backgrounds. I can't wait to see it grow even further into the future.'

GROW YOUR OWN

Many people are developing a passion for gardening and are growing more of their food at home. They are discovering the delicious and flavoursome taste of a freshly picked tomato, or herbs, but taste is just one of the many benefits of growing your own food. Gardening provides a form of therapy and relaxation gained from working outside and getting your hands dirty, whether in the garden or on the balcony. Growing your own plants is also very rewarding. Many people new to gardening choose easy-to-grow crops that don't take long to mature, such as beans, radishes, tomatoes, broccoli and lettuce. If garden space is limited, herbs such as parsley, basil, sage and mint, and plants such as cherry tomatoes, can be grown in pots or in a raised garden bed. By growing their own food, consumers are asserting their **food sovereignty**, taking control away from large corporations, and exercising greater control over where their food comes from.



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Freshly picked homegrown vegetables are very nutritious.

A DESIRE FOR CONVENIENCE

Many consumers are looking for convenience as they try to juggle family and work. A report produced for Uber Eats by Deloitte, titled *Future of Food: How technology and global trends are transforming the food industry,* stated that 'over 50 per cent of consumers are eating out-of-home at least once a week. It's even affecting home cooking, with home delivery of ready-to-eat meals and meal boxes becoming increasingly common.'

For many consumers, however, preparing and eating meals at home is seen as valuable family time. The purchase of meal boxes eases the pressure of preparing a home-cooked meal while still providing the cooking experience, and leaving more time for leisure and family. Some families set aside the time to prepare several meals from scratch, and supplement those foods with meal boxes or other options during busy days.

Food box kits

A wide range of companies including Marley Spoon, HelloFresh, Dinnerly and Everyplate are now producing either a home-cooked meal delivery service or a box of fresh ingredients for time-poor consumers to prepare the meal themselves in their own kitchen. Each week, customers choose meals from an online menu. Most of

these companies provide consumers with a box of pre-portioned ingredients and a recipe for the preparation of an evening meal that serves 2–4 people. Chefs create recipes that are varied, simple, quick to prepare and healthy. These services are designed to meet the needs and time pressures of busy families, saving parents time in planning and shopping for ingredients. They enable families to enjoy a tasty and healthy home-cooked meal, with recipe guidance to ensure success. Most companies also promote the sustainability of their product, highlighting the reduction in food waste. The ingredients are measured for the quantities in the recipe, so out-of-date foods do not accumulate in the pantry and refrigerator.



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A food delivery box is a convenient way for families to enjoy a home-cooked meal.

Practical Activity 4.2

Product analysis: Meal-delivery kit

Aim: To investigate the value of a meal kit for a new consumer.

Method

1 Your teacher will supply two different brands of meal-delivery kits to analyse.

2 Examine the information provided with the meal-delivery kit, then respond to the criteria in the table below.

	QUALITY AND FRESHNESS OF INGREDIENTS	INSTRUCTIONS GIVEN	NUTRITIONAL BALANCE OF THE MEAL	COST PER MEAL	AMOUNT AND SUSTAINABILITY OF PACKAGING
Product 1					
Product 2					

3 Prepare the meal kit according to the instructions or recipe provided.

4 Prepare a sensory analysis of the two products.

	PRODUCT 1	PRODUCT 2
Appearance		
Aroma		
Flavour		
Texture		
Were the instructions easy to follow? Did the end product turn out as per the marketing information?		
Do you believe this recipe is nutritionally balanced? Explain how well it meets the recommendations of the Australian Guide to Healthy Eating.		
Would you recommend this meal to others?		

Analysis

Complete a PMI (plus, minus, interesting) chart of your analysis of the meal kits.

PLUS	MINUS	INTERESTING

Conclusion

Based on your meal-delivery kit product analysis, would you recommend the use of meal kits to a:

- professional single person who works late most days?
- family of four with two young children?
- couple who are health conscious and are confident cooks?

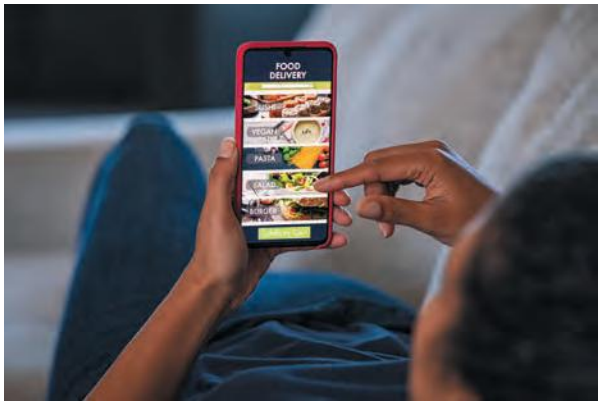
Complete a paragraph to justify your response.

Note: this activity could be completed by using the information provided on each company website rather than purchasing the meal kits.

Online ordering, delivery and takeaway

Ordering a takeaway meal online is a very convenient option for many consumers. An increasing number of restaurants and cafes have introduced contactless ordering so that customers can order takeaway food online to be delivered to their doorstep.

Companies such as Hungry Hungry, an online ordering and delivery platform, have produced customisable digital menus with special diet filters. These filters allow customers to search for specific dietary options, making ordering easy for vegan and gluten-free customers.



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Food delivery and takeaway apps make ordering meals online a convenient option.

Delivery-only kitchens, also known as 'dark kitchens' or 'ghost kitchens', are springing up in commercial buildings that are often tucked away in industrial areas. These dark kitchens have no tables, chairs or wait staff, meaning they have much lower overheads than traditional restaurants, and allow restauranteurs to quickly set up kitchens and sell their food on delivery platforms. These low-cost operations are expanding rapidly in every Australian city, and this was especially true during the COVID-19 pandemic.



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Chefs working in a dark kitchen

TECHNOLOGICAL INNOVATIONS

Technology is rapidly being integrated and used in every part of the food system. Mobile apps and health trackers are making people more aware of the food they consume, and are influencing their food choices and preferences.

Technologies such as the Internet of Things and blockchain are transforming supply systems, making it possible to track and trace the location and temperature of produce in real time and providing transparency over the entire food supply chain. Other technologies, such as QR codes, virtual or augmented reality, and near real-time video streaming, are creating new experiences for consumers and influencing their choice of food. Many cafes and restaurants have linked their menu to a QR code that customers can scan as soon as they arrive. This technology links them to a web-based menu that often includes a photograph of each dish. Many customers enjoy the convenience this technology provides, as there is no need to wait for a staff member to be free to serve them. The images on the menu also give the customer a greater understanding of the components of each dish, rather than having to rely on the written description.

Technological developments also provide a great opportunity for individuals and organisations to share knowledge. This gives consumers greater access to information about the food they are about to purchase.

Social media, too, is having an increasing impact on food choices and behaviours. Trends on food platforms are shaped by social media influencers. Influencers promote particular food products, and they have the ability to shift customer preferences and push particular brands. Many consumers now make choices about what to eat based on the visual appeal of food shared on Instagram or TikTok. Food bloggers can accelerate a food trend by writing and photographing certain food products or reviewing and promoting a particular restaurant.

As social media has become the key platform to promote food trends, data analytics is used by food manufacturers to monitor and respond to these trends. For example, as more consumers choose gluten-free or vegan products, monitoring these trends allows food manufacturers to create meals to cater for these particular dietary needs.



iStock.com/gorodenkoff

Food blog promoting restaurant meals

Understanding the Text

1 Outline the main findings of the 2019 AIHW report 'Poor diet'.

2 Explain how the rise in food citizenship is shaping the food choices made by many Australians.

Answers Understanding the Text

3 Explain how the growing trend in plant-based food supports the emerging movement of food citizenship.

4 Identify and describe two issues of concern to ethically conscious food citizens.

5 Outline the goals of the GO LOCAL FIRST and Australian Made organisations and state why these goals are so important for Australia and small business.

6 Describe what is meant by developing a 'clean eating' approach. Why are fermented foods such as yoghurt, which contain probiotics, valuable for health?

7 Home cooking and baking increased during the COVID-19 pandemic. Discuss the reasons many people began to prepare more home-cooked meals during this time, and the strategies they used to develop new food skills.

8 Outline the benefits of growing your own vegetables in a backyard garden or balcony.

9 Explain why meal-delivery kits and online food ordering have become an increasing trend in in food purchasing and consumption.

10 Explain how influencers and food bloggers can influence people's food choices and food behaviours.

Social factors that influence food choices

Food is fundamental to the health and wellbeing of all Australians; however, a number of social factors can have a positive or negative impact on healthy eating. Health and wellbeing are influenced by broad, but closely related, socioeconomic factors, such as education, location and income. These factors are important determinants of food choices, eating behaviours and general access to social resources, and they help explain many of the health inequalities in Australia today.

Food purchases are influenced by income, the price of food, and access to and availability of food supplies. They are also influenced by people's culture, knowledge, attitudes and beliefs. The food environment, marketing and food labelling also affect food choices.

EDUCATION

As income and education levels rise, consumers are increasingly concerned about the nutritional content and health benefits of the foods they consume. Consequently, they are becoming more vigilant and discerning buyers. The knowledge and demand for information is driven by access to the internet, lifestyle magazines, television and apps. There is also growing public awareness of the risks of an unhealthy diet as the number of people living with obesity, type 2 diabetes, cancer and cardiovascular disease increases.

Government programs such as the Eat Well Be Active campaign, the Australian Dietary Guidelines and the Australian Guide to Healthy Eating focus on providing information on healthy eating to the community. Non-government agencies such as Nutrition Australia also provide educational information to the community, such as the Healthy Eating Pyramid. This guide has also been adapted for Indigenous Australians.

Food and nutrition education in schools is an important way of increasing knowledge of healthy eating behaviours. In both primary and secondary curricula, schools foster an awareness of food and health through the areas of Health and Food Technology classes. In order to bring about behavioural change, teachers must connect with their



© Commonwealth of Australia

The *Healthy kids need healthy canteens!* brochure

The GREEN category – 'always on the canteen menu'

Foods and drinks categorised as GREEN are consistent with the 2013 Australian Dietary Guidelines and are based on the five food groups shown on The Australian Guide to Healthy Eating plate. Foods and drinks in this category offer a wide range of nutrients and are generally low in saturated fat and/or sugar and/or sodium (salt).

The AMBER category – 'select carefully'

Foods and drinks categorised as AMBER also contain some valuable nutrients, but may be too high in saturated fat and/or sugar and/or sodium (salt) to be categorised as GREEN. If these foods are eaten regularly or in large amounts, they may contribute to excess energy (kilojoules) being consumed.

The RED category – 'not recommended on the canteen menu'

Items in the RED category are not consistent with the 2013 Australian Dietary Guidelines and should not be sold in a healthy school canteen. They are low in nutritional value and may also be high in saturated fat and/or added sugar and/or added sodium (salt). They may also provide excess energy (kilojoules).

FIGURE 4.2 The National Healthy Canteens Project assists schools by providing guidelines for healthy food and drinks supplied in canteens.

students' world and the foods they choose in their lives, guiding them in their choice of nutritious foods. Food preparation classes are an ideal way to teach about food and nutrition, and for students to learn how to prepare meals that are cost and time effective, as well as nutritious and tasty.

Schools have a very important role in improving the health of students. The National Healthy Canteens Project assists schools by providing guidelines for healthy food and drinks to be supplied in canteens. These guidelines are based on the Australian Dietary Guidelines and include three categories of food: green, amber and red.

The Stephanie Alexander Kitchen Garden Foundation

By being inspired to grow and prepare food, children and young people can develop a greater understanding of the pleasure that food can play in life. One of the main aims of the Stephanie Alexander Kitchen Garden Foundation is to positively influence children's food choices, and this program is implemented in a growing number of schools throughout Australia. Many students are now reaping the benefits of being involved in a hands-on activity where they help to grow and harvest fresh food, and then use the produce to make simple but delicious meals to share with friends. Programs such as these can have a positive influence on understanding of food production, food security and sustainability, as well as family meal planning. Students involved in growing and preparing fresh produce are often introduced to new foods and their unique flavours, textures and aromas. As a result, they are more willing to prepare and cook these foods in their own home, encouraging other members of their family to try them too.



The Stephanie Alexander Kitchen Garden Foundation has a positive influence on children's food choices and knowledge.

Stephanie Alexander Kitchen Garden Foundation

Case study 4.2

Kitchen Garden Program at Murrumbeena Primary School

Read the following case study and then answer these questions.

1. Explain why you believe the program is taught to Grade 3 and 4 students and not to younger and older students.
2. Outline reasons for including the four-part philosophy of the program: planting, harvesting, preparing and sharing.
3. How does the program encourage children to modify their food habits?

The Murrumbeena Primary School in Melbourne has adopted the Stephanie Alexander Kitchen Garden Program for students in Grades 3 and 4.

The program is an important part of the school curriculum, and these classes in the garden and kitchen follow the philosophy of planting, harvesting, preparing, and sharing. This program provides a pleasurable food education that teaches Australian children positive food habits through fun, hands-on learning. Children spend 45 minutes in the garden each week, and half an hour in the kitchen.

The school states that, 'The aim of the Kitchen Garden Program is to introduce young children to the wonderful world of good food by means of developing a productive food garden, and an exciting kitchen that includes a nurturing place to share food, as an integral part of the school curriculum. We hope to engage the curiosity of the young students and to help them learn how to grow the very best food in the very best way, how to care for it in the garden, how to recognise when it is ripe and at its best, how to prepare it easily and enjoyably and how to develop an expanding culinary palate and be excited by all of these experiences. We want to convince children to modify their eating habits because the food they are experiencing tastes so good rather than because they are being told to eat some foods and not to eat others.'



Newspix/Andy Drewitt



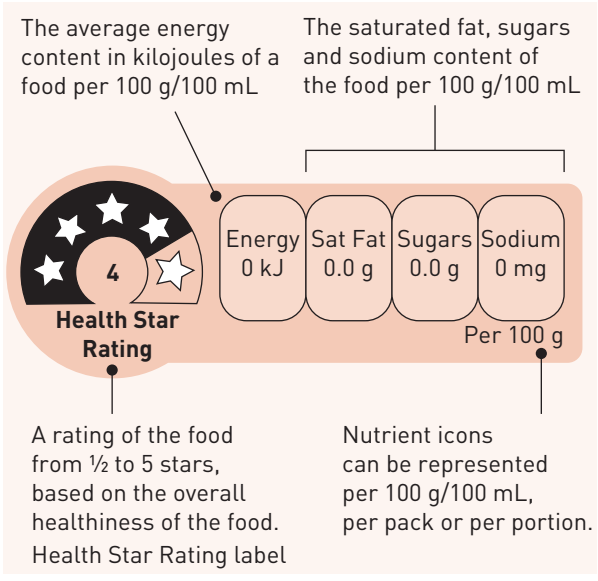
Fairfax Syndication/Melissa Adams

The Stephanie Alexander Kitchen Garden Program gives children the opportunity to grow and cook their own produce.

The Health Star Rating

The Australian Government has endorsed the use of the Australian Health Star Rating on food labels as an educational tool to assist people in making healthy food choices.

The Health Star Rating is a voluntary front-of-pack labelling system that rates the overall nutritional profile of packaged food and assigns it a rating out of five stars. It provides a quick, easy, standard way to compare similar packaged foods. The more stars, the healthier the choice. The rating system is designed to take the guesswork out of reading labels. It helps consumers to quickly and easily compare the nutritional profile of similar packaged foods and to make informed, healthier choices when shopping.



Health Star Rating label

INCOME

The cost of food shopping represents a large financial outlay for all families. However, in lower- and middle-income families, the weekly food shopping bill takes up a larger proportion of their budget. People who have a low income may be restricted in the choice of food they purchase. Households with limited financial resources often stretch their food budgets by purchasing cheap, energy-dense foods that are filling, rather than more expensive, nutrient-dense options. If diets are more energy-dense than nutrient-dense, this can lead to the development of overweight and obesity.

Supermarket private labels

Supermarkets have developed a range of everyday food products that represent value for money and are cheaper than similar branded products. The growth of these private labels is accelerating as the quality of these products improves to match category leaders. Many shoppers are demanding greater value for money as they stretch their food budget, particularly those under financial stress resulting from the COVID-19 pandemic. In 2019, Coles announced that it aims to have 40 per cent of its sales from its own labels by 2023, stating that 'the fact that Aldi is so popular with shoppers and they stock around 70 per cent private labels just shows the growing appetite that Australian consumers now have for private labels'.

Demand for private label products is primarily being driven by consumers in the 35–49-year age bracket. Supermarkets are now attracting customers, particularly those on a limited income, by providing a quality, affordable range of their own-brand products.



Shutterstock.com/TY Lim

Coles private label breakfast cereal

Low-cost supermarkets

In recent years, German supermarket giant Aldi has made significant inroads into the Australian supermarket scene. Many shoppers have changed their allegiance from Coles or Woolworths to Aldi, because they believe Aldi's offerings provide better value for money. A comparison of supermarket prices shows that Aldi is approximately 25 per cent cheaper than its competitors, which appeals to consumers looking for affordability. Aldi stores stock a selected range of 900 products, many of which are packaged to look very similar to well-known brands. These products are chosen based on the perceived weekly shopping requirements of consumers. By comparison, the major chain supermarkets stock more than 20 000 products.

Because Aldi stores stock a reduced number of brands, offer no bagging service and operate from smaller premises, their running costs are lower. The chain also reduces its overheads by running simple mail-drop campaigns and weekly specials delivered to customers via email. These savings help the business keep its prices lower.

Small-format specialty supermarkets

In 2018 Coles opened its first small-format local neighbourhood supermarket in Surrey Hills, Victoria. Coles CEO Steven Cain said 'the store had been designed to offer locals the most convenient end-to-end shopping. The smaller format is designed to inspire customers and provide quality food through an in-store experience especially tailored to the local community.' These stores are targeted at middle- to high-income earners.

Further stores have opened and offer product ranges that include specialty local growers, bakers, producers and cafes. The Coles Local store in Hawthorn Victoria, is close to Swinburne University and a cinema, and has expanded its convenience products to include an extensive range of vegan and vegetarian foods, Japanese mochi ice cream, self-serve barista coffee, a cinema-style candy bar and more than 350 lunch and dinner options that can be prepared in less than 30 minutes.

A new store in Camberwell will feature specialty cheeses and warm bread, bringing a gourmet touch to the store.

Coles says the local stores will sell '100 per cent Australian-grown fresh fruit, vegetables, meat and fresh seafood' and have a zero-food waste policy, with a 'food digester' that uses water and microbes to partly digest inedible food waste and send it to the local wastewater treatment plant where it is turned into renewable energy.' The concept of these stores will support the growing food citizenship movement.



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Bread section in a small-format specialty supermarket

LOCATION

Where people live is one of the most important factors in determining their access to quality ingredients when shopping.

Most people who live in metropolitan areas have a variety of supermarkets, wholesale fruit and vegetable markets and specialty food shops close by. For many people living in urban areas, it might only be a five-minute drive to the nearest shopping centre, which means they have little trouble purchasing fresh, good-quality ingredients regularly. Consumers can

stop by the supermarket on their way home from work or after school pick-up to buy fresh meat, vegetables, fruit, milk or bread. Food prices in these areas are generally competitive, because there is usually more than one supermarket or fresh food market in the vicinity.

Families who live in more remote rural areas may have greater difficulty in accessing fresh ingredients. The range of products available might also be limited, and the nearest shops could be many kilometres away – in some cases, hundreds of kilometres. Calling into the local supermarket to pick up some fresh food for dinner may simply not be possible. Fresh fruit and vegetables might not be available on a regular basis, so the family may need to rely more on frozen or canned produce.

People who live in more remote areas also often find that food is more expensive. Transportation, distribution costs and lack of market competition all inflate food prices, particularly the prices of fresh produce. The cost of basic nutritious foods in remote regions is often at least 30 per cent higher than in metropolitan areas, and there is limited choice available. The higher prices charged in these regions limit consumers' ability to purchase good-quality fresh foods, and consequently affect their nutritional and health status. Lack of access to healthy food often means that people who live in remote areas experience greater health concerns and have a lower life expectancy.

Suburbs with high levels of social disadvantage may become the target of fast-food restaurants. These suburbs often feature several fast-food outlets that serve energy-dense, nutrient-poor meals at relatively low prices. Healthy food, and especially fresh food, is often of a lower quality in these areas, and is therefore less appealing to consumers.

ACCOMMODATION

Just as whether we live in a metropolitan, regional or remote area can have a significant impact on our access to fresh food, the type of accommodation in which we live can also impact on our ability to prepare healthy meals.

Poor-quality housing has been associated with poor health and nutrition, particularly in Aboriginal and Torres Strait Islander communities. Resources for preparing healthy meals in remote communities are often extremely limited, with issues such as the absence of a working stove or oven. This further encourages a reliance on ready-made and often nutritionally poor foods, and can have a negative impact on the overall health of people living in these areas.

For many decades, most Australian families have lived in detached or semi-detached houses. These houses typically contain a well-equipped kitchen with cooking facilities such as a stove and microwave oven, and even barbecue facilities for cooking outdoors. Refrigerators and freezers are also considered to be essential appliances to keep food safe and fresh. These facilities mean that consumers can store, prepare and cook a wide variety of nutritious meals to maintain good health.

Apartment-style living

In recent years, there has been a dramatic change in the Australian housing landscape, and many people now live in apartment-style accommodation.

Most apartments are constructed in major cities and regional areas that have access to a wide range of fresh foods in nearby fresh food markets and supermarkets. However, sometimes the kitchen facilities in apartments can be restricted, because space is limited. Many apartments are now designed with limited food storage, preparation and cooking facilities. A microwave oven may be the only cooking facility, and refrigerator storage may be limited to a small bar-style fridge. As a result, consumers may be unable to store food for the week and instead have to shop on a daily basis. This can limit the ability to prepare nutritious meals. Reliance on pre-prepared



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Apartment kitchens may have limited space for food storage, preparation and cooking.

and packaged meals, fast food or eating out is often the easiest option for people living in apartments. Many of these foods are high in kilojoules because they contain a high proportion of saturated fats, sugar and salt, and this can impact on overall health and wellbeing.

Homelessness

Homelessness has a devastating impact on diet. Australian Bureau of Statistics 2016 Census data estimates that there were 116 427 people in Australia classified as being homeless or marginally housed on the night of the census. This figure has risen from 102 439 people in the 2011 Census. Many of these people often find temporary accommodation in a shelter or hostel, or may end up sleeping rough on the street.

These temporary living conditions are extremely difficult, and mean that obtaining a healthy meal is sometimes impossible. Shelters and hostels may not provide meals or cooking facilities, and homeless people are therefore reliant on the provision of food vouchers, food parcels or meals from welfare agencies. People who lack money or who lack access to a home in which to store and prepare food have a limited ability to access healthy food and therefore struggle to maintain good health.

AVAILABLE TIME

A lack of time often makes it very difficult for families to prepare a healthy home-cooked meal from scratch. Arriving home after a busy day at work or juggling children's sporting commitments and school activities can leave little time for meal preparation. The food industry has been quick to provide a wide range of products to address this challenge.

Pre-prepared, ready-to-cook vegetables

The need for quick meal solutions has been met with a shift in the fruit and vegetables market, from loose produce to pre-packed, prepared and ready-to-cook products. These products are more expensive, but many people are willing to pay for the convenience they bring.

Developing a greater range of tasty, convenient, healthy foods offers a way to improve the diet of those who are time-poor. However, consumers should be careful in their choice of convenient products, because some can be deceptively high in saturated fat, salt and/or sugar, which can increase the kilojoules consumed. For example, while oven-baked chips appear to be a healthy food option because they are baked rather than fried, they are actually very high in fat.

In 2020 Coles launched 100 ready-to-eat meals under their own brand, Coles Kitchen. These meals feature a range of cuisines from around the globe and include Italian, Indian, Asian and Australian foods.

For example, Coles Kitchen Bolognese Bake serves one person. The rigatoni is layered with three-cheese sauce and beef bolognese, which contains beef mince, diced tomato, onion, carrot and celery. This dish simply needs reheating, and could be accompanied with a salad prepared from a salad mix. This restaurant-style meal has been designed for time-poor consumers and provides a convenient alternative to fast food.

An article about Coles Kitchen published in June 2020 stated that 'one in three customers didn't have enough time in their busy lives to cook a meal from scratch, with 52 per cent not keen on cooking more at home. It revealed chopping and cutting were the biggest meal prep turn offs'.



Mark Fergus Photography

Coles Kitchen Bolognese Bake

Practical Activity 4.3

Product analysis: Commercial pre-packaged salads

Aim: To compare different types of pre-prepared Caesar salad products.

Method

1. Your teacher will provide you with two different brands of pre-prepared Caesar salad kits, using two different forms of packaging.
2. Prepare each kit according to the directions.
3. Taste test the two Caesar salad kits and record your results of the sensory analysis in a table similar to the one below.

Analysis

1. Which product had the most appealing sensory properties? Justify your decision.
2. Explain any differences in ingredients you found between the two products.
3. Identify and describe two social factors that may influence a consumer to purchase a pre-prepared salad mix.
4. How might the packaging influence a consumer's choice to buy either product?
5. Describe one advantage to consumers of purchasing this style of pre-prepared salad.
6. Describe one disadvantage to consumers of purchasing this style of pre-prepared salad.
7. How might products like these help consumers meet the recommendations of the Australian Dietary Guidelines?

Conclusion

Based on your analysis, which product would you purchase? Justify your decision.

	INGREDIENTS	APPEARANCE	AROMA	FLAVOUR	TEXTURE
Product 1					
Product 2					

The all-in-one kitchen machine

Many people in today's busy households have less time to prepare healthy home-cooked meals. Appliance manufacturers have developed a wide variety of small appliances such as an all-in-one kitchen machine, food processors, 'nutribullets' and stick mixers that help families prepare healthy meals.

Many households purchase an all-in-one kitchen machine to make food preparation simpler and easier. This cooking appliance combines over ten appliances in one compact unit, making food preparation simple and efficient. All-in-one kitchen appliances have the ability to chop, beat, mix, whip, grind, knead, mince, juice, blend, heat, stir and steam. The machine can weigh ingredients during the preparation of recipes and cleans itself after food preparation. An all-in-one kitchen machine allows consumers to prepare a meal using fresh ingredients quite quickly, and its steaming function supports healthy cooking methods. Although these machines are expensive, they replace a large number of kitchen appliances.



Alamy Stock Photo/dpa picture alliance

All-in-one kitchen appliances make food preparation simpler and easier

CULTURAL NORMS

A person's culture, their family and beliefs all influence the foods they eat. Australia is an ethnically diverse nation, with many different cultures, languages, religions and cuisines. Food is a very important part of socialisation and recreation, and many eating behaviours are shaped by family and social gatherings.

Food is also an important part of religious and spiritual observance. Some cultural and religious practices restrict certain foods; for example, many Seventh Day Adventists do not eat meat or dairy products. Followers of other religions deny themselves food, or fast, as a way of improving spiritual discipline. Some of these practices can limit food choice and may impact on health, even if only at particular times of the year.

Families from some parts of Greece and southern Italy have been shown to have a particularly healthy diet that is often referred to as the 'Mediterranean diet'. Their diet contains plenty of fresh vegetables and fruit, whole grains and fish. They also use olive oil in much of their cooking. This type of diet has been shown to reduce the risk heart disease and some forms of cancer.

Mediterranean Wholesalers is an example of a culturally specific supermarket established to provide foods for migrants from the Mediterranean. It began when Giuseppe and Carmela Madafferi opened a small delicatessen on Sydney Road, Brunswick in 1961, and has grown to become Australia's largest continental food store. It is now serving third-generation customers from all over Victoria with staples and specialty foods sourced from countries throughout Europe. Tinned tomatoes, bottled pasta sauces, olive oils, balsamic vinegars, porcini mushrooms and over 250 varieties of pasta line the shelves. In the delicatessen, Italian specialty cheeses such as Parmigiano Reggiano and sheep's milk Pecorino from Sicily are available, as well as aged Italian prosciutto and salami. This store has become a meeting place for many people as they share an espresso coffee and freshly baked cannoli while they shop.



Fairfax Syndication/Gary Medlicott

Mediterranean Wholesalers provides a wide range culturally important foods for migrants from across Europe.

Families who have an Asian heritage also have a long history of consuming a healthy diet. Meals in Asian cuisines typically contain a high proportion of fresh vegetables, particularly leafy greens, and meat is only used as a flavouring ingredient. These meals are often cooked by stir-frying, which uses minimal fat and is considered to be a healthy cooking technique.

Rice is also served at most meals and provides a healthy, low-fat food. Fish is also a favourite food for many Asian families, providing a good source of protein and omega-3 fatty acids.



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Fish and rice feature heavily in Asian cuisines.

Hinoki is a Japanese grocery store in Collingwood that stocks essential Japanese ingredients and foods. The store also has an authentic sushi and sashimi bar in-store. It is often difficult to find the right ingredients to achieve true Japanese flavours. Stores like Hinoki sell authentic Japanese products that can be difficult to purchase in Australia.

New refugees settling in Australia are often faced with many additional challenges as they adapt to living in a new country while also maintaining their traditional cultural practices. These challenges and adjustments can be significant, particularly if the refugees are not able to fully understand the language of their adopted country. In addition, they are often faced with a low income and limited access to the traditional foods they are accustomed to eating.

Refugees are often housed in outer suburban areas where there are many fast-food outlets. With little money to spend, inadequate cooking facilities and equipment and a lack of nearby public transport, they may be forced to rely on fast foods.

Many newly arrived people need greater access to education about the healthy food choices available to them in the absence of their traditional ingredients. Support in accessing information about the nutritional value of foods available in the supermarkets can assist them to make healthy food choices.

Understanding the Text



Answers
Understanding the Text

11 Create a mind map to demonstrate the factors that influence food choice and food purchases.

12 Explain how education has become a major factor in the types of foods that consumers purchase.

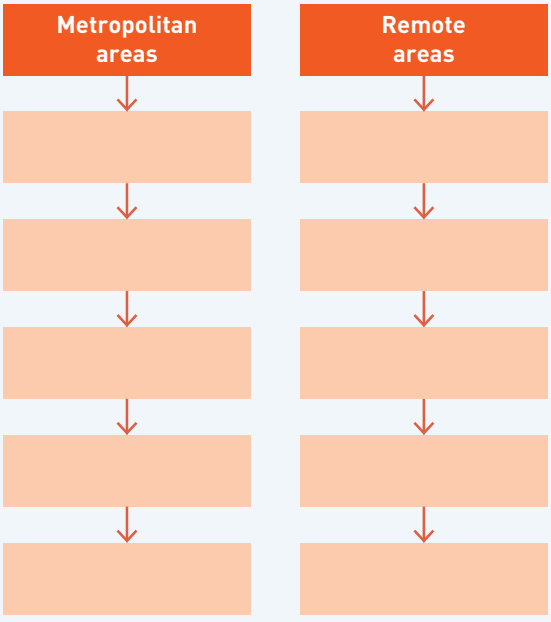
13 Outline two strategies that schools use to improve students' knowledge about making healthy food choices.

14 Why is the Kitchen Garden Program an effective tool in increasing children's knowledge about good health?

15 Explain how the use of the Health Star Rating system helps consumers make healthy food choices.

16 Outline two advantages to consumers of the increase in the availability of private label products.

17 Draw up a diagram like the one below to compare the availability and choice of fresh food for families living in metropolitan and remote regions of Australia.



18 Describe the limitations that people living in apartments may face in trying to prepare healthy meals.

19 Explain how the food industry is assisting time-poor consumers to prepare healthy meals.

20 Explain how a person's culture may act as an enabler or a barrier to consuming a healthy diet.

Establishing healthy diets in children

All children need to establish healthy diets – that is, diets that reflect the Australian Dietary Guidelines and the Australian Guide to Healthy Eating – and patterns of healthy eating in order to reach their full potential and to lead a healthy life. The latest data released by the Australian Institute of Health and Welfare indicates that the percentage of children classified as overweight or obese has risen from 20 per cent in 1995 to almost 25 per cent in 2018. This increase is directly linked to changes in children's food habits and physical activities.

Children today often eat more discretionary foods such as soft drinks, and also consume more high-fat, high-sugar and high-salt foods, and more fast-food meals than those in past generations. Results of a National Health and Medical Research Survey undertaken in 2017–18 showed that 4.4 per cent of children aged 5–14 ate enough vegetables – only a slight increase from the figure of 2.9 per cent in 2014–15. Potatoes in the form of chips or crisps were often the only vegetables eaten by some children.

The 2020 Australian Institute of Health and Welfare report *Australia's children* stated that, on average, children aged 5–14 spent more than two hours (123 minutes) each day sitting or lying down for screen-based activities, while children aged 2–4 spent an average of 83 minutes a day in front of screens. The screen time children are exposed to has increased with the growing use of tablets, computers and computer games, as well as television. During the COVID-19 pandemic, children increased their screen time as a consequence of both home schooling and the use of social media to stay in contact with their friends. As children were not at school for large periods of time, there was also a decrease in physical activity. Physical education lessons and school sporting activities did not take place, and community sporting teams and events were in recess. This increase in screen time has meant that children spend less time than in previous generations in active play, such as playing outside or riding their bikes or scooters. In addition, the majority of Australian primary-age school children do not use 'active' transport to get to school. Many children no longer ride or walk to get to school but instead are driven, because parents are concerned about their safety and security.

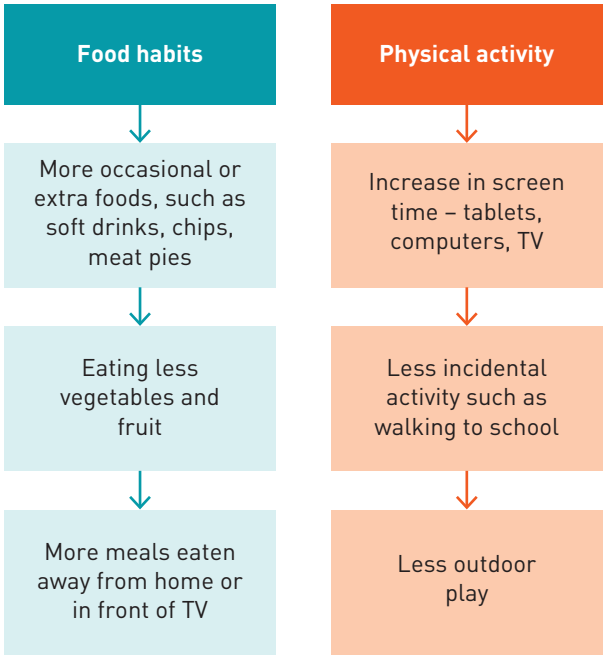


FIGURE 4.3 Changes in children's food habits and physical activities

MODELLING HEALTHY EATING PATTERNS FOR CHILDREN

Collaborative Activity

Modelling healthy eating patterns means demonstrating healthy ways of eating. Children learn by example, and watching how other people, such as parents, carers or other children eat is the best way to influence healthy eating behaviours.

Families are the most important and significant role models of eating behaviours in a child's life. Parents have a critical role in establishing a healthy relationship with food. Healthy eating habits are learned through modelling; that is, through observation and by imitating others. Positive modelling by parents and families will mean a child has an increased interest in food and will be less fussy and more adventurous. Poor role models create negative perceptions around food and mealtimes. If parents exclude certain foods from their diets or make negative comments about the taste or texture of food, the child will be less likely to try the food themselves. If a child sees parents and family members enjoying a food, they are more likely to try it too. It is important to establish good eating behaviours from an early age, as these habits become much harder to change as the child grows older. It is important, therefore, for parents to model the type of eating behaviour they want their children to have.

Mealtimes

Regardless of whether it is breakfast, lunch or dinner, mealtime experiences must be positive and enjoyable. It is important for parents to introduce conversations about hunger, helping children recognise when they feel satisfied or full. Before having another portion or piece of food themselves, parents could suggest that they already feel full, so they will wait until later. Parents can make dinner time a family time, and try to regularly eat dinner at the table to model good habits. The television and electronic devices should be turned off during meals. Food eaten in front of the television or computer encourages mindless eating, as it is easy to ignore the cues about when you feel full and satisfied if you are distracted. Children are good at recognising their hunger cues and will normally stop eating when they have had enough. Having a variety of healthy snacks on hand for when children are hungry is another good strategy parents could use to ensure that their children don't reach for the biscuit jar!

Mealtimes can be a positive experience for children, free from bribes and rewards for 'cleaning up' their plate, which can cause them to miss cues that tell them they are full. When a child is pressured to eat, they lose interest in food, especially if they are forced or threatened to eat a certain food.

The importance of breakfast

It is important to ensure that children have a nutritious breakfast. This may involve getting up a little earlier and sitting down for breakfast together to model this healthy eating behaviour. The Shape of Victoria survey estimated that one-third of children skip breakfast. Research has shown that eating breakfast helps to improve mental and physical performance, while skipping breakfast has a serious impact on a child's ability to learn. Nutritional studies have also shown that eating a healthy, balanced breakfast will help children start the school day in a less stressed way, and will better enable them to concentrate on classroom activities.



Shutterstock.com/Monkey Business Images

A healthy breakfast is a good start to the day.

Talking and learning about food

Parents and carers can also use language to model the principles of healthy meal patterns. When parents and carers talk to children about food, it is important not to focus on what they shouldn't eat, but instead to talk about what foods are good for them. Parents and carers should avoid using negative language when describing foods, such as words like 'bad' or 'fattening', and instead refer to these foods as foods that can only be eaten occasionally. It is also important that the family limits these foods to perhaps once a week, and that the whole family follows this rule.

Introducing children to the language used in food models is another successful strategy in developing good food habits. Young people can learn about foods that fall into the five food groups and understand what each of these groups does for our bodies. For example, when offering a snack such as a cheese stick, the parent or carer could say to the child 'these cheese sticks are delicious and they contain lots of calcium that will make your bones and teeth healthy and strong'.



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Many parents encourage young children to try new foods.

Nutritionist and blogger Catherine Saxelby prepared a Food Variety Game for young children, especially fussy eaters, to encourage them to count how many different foods they had tried in a meal. The game starts with asking 'let's see how many different foods you can eat at a certain (lunch/dinner) meal'. The children may like to draw a picture of the foods they have eaten, or write a list. Children can record their score and then try to beat their 'personal best'. The rules of the game say that salt, sugar and treats are not included, and foods cannot be duplicated! Different foods can be discussed during the preparation of a meal, particularly if children are helping. This game encourages children to try a little bit of lots of different foods, rather than simply eating lots of their favourite food.



© Foodwatch

Catherine Saxelby's website provides valuable nutrition tips for children.

Shopping

Parents should try to involve children in planning meals and shopping for the ingredients, as this is another means of modelling healthy food choices. Choosing and buying healthy food is a good foundation that will allow the child to make healthy choices throughout their life. Pushing the trolley through the supermarket is a perfect time to begin talking about the purchase of healthy foods and making healthy food choices. The discussion can include information about foods that are in season, the quality of foods and how to read a food label. This will encourage children to be more aware of what they eat and to develop greater 'ownership' of their own healthy eating behaviour.



iStock.com/FatCamera

Learning about food while shopping can help teach children to make healthy food choices.

Cooking and preparing family meals

Modelling healthy meal preparation is another way children can establish a healthy diet. As they see adults preparing foods that make up a healthy meal, children develop their own understanding of healthy food choices. Children should be encouraged to participate in the preparation of their school lunch, as they are more likely to make healthy choices and eat the lunch if they are involved in its preparation.

Catherine Saxelby's Foodwatch website offers important tips on how to entice children into the kitchen and teach them the essential life skill of cooking their own food. Her key message is that it is very important to foster a love of and interest in food in early childhood, and to start by making cooking fun. She suggests breaking recipes down into simple steps and giving the child a notebook to write the steps down. Catherine Saxelby also recommends teaching children the basic skills of stir-frying, roasting and barbecuing, and encouraging them to be adventurous by adding their own changes such as another herb or more vegetables. Teaching children to cook staples such as potatoes, rice and pasta, and to steam vegetables, will give them valuable life skills both for now and to use in the future.



iStock.com/OlyaSolodenko

A healthy school lunch

Even small children can be involved in the preparation of the family dinner. Giving children small jobs and acknowledging their efforts helps them to begin to learn food preparation skills and how to cook healthy food. This involvement will help children learn what different foods look, feel and taste like, and where foods come from. Even toddlers can be involved in simple tasks such as washing vegetables or tossing a salad.

As children grow, they can take on more complex food preparation and cooking tasks, such as preparing a stir-fry or chopping the vegetables and preparing a soup. Children who are involved in meal preparation are much more likely to want to try new foods and eat the food prepared together.



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Involve children in preparing a healthy lunch.

Practical Activity 4.4

Product analysis of vegetable rices

Vegetable rices have become a popular substitute for rice as an accompaniment to many meals. Vegetable rices are nutritious and quick to prepare, and can be made at home from fresh ingredients, or purchased fresh or frozen from the supermarket.

Work in small teams to complete this activity.

Aim: To compare the sensory properties and preparation time of a range of vegetable rices.

Method

1. Your teacher will provide you with a variety of different fresh or frozen vegetable rices.
2. One member of the team should prepare a quantity of vegetable rice from scratch; for example, cauliflower or broccoli rice. In the table below, record the time it takes to prepare vegetable rice from scratch.

To prepare the vegetable rice from scratch:

   a. Grate the vegetable using the largest holes on the grater, or blitz it in a food processor.
   b. Place 1–2 tablespoons of oil in a frying pan and sauté for approximately 6 minutes or until slightly softened.

3. The other team member/s should prepare the purchased vegetable rice products by following the instructions on the packet. Record the time it takes to prepare the vegetable rice.
4. Complete a taste test of each vegetable rice and record the results of your sensory analysis in a table similar to the one below.

Analysis

1. Which vegetable rice was the quickest to prepare?
2. Was there a difference in the texture between the two vegetable rices? Discuss your results.
3. Did the flavour of the vegetable rices differ? Discuss your results.
4. Compare your results with those of others in the class. Did different vegetables produce different results? Explain your answer.
5. Discuss the reasons consumers purchase vegetable rices as a substitute for rice.
6. Discuss whether getting a child to assist in preparing a vegetable rice would be a successful strategy for introducing them to a new vegetable.

Conclusion

Based on the results of your product analysis, which product would you use in the future? Justify your decision.

	TIME TO PREPARE	APPEARANCE	AROMA	FLAVOUR	TEXTURE
Homemade vegetable rice					
Pre-packaged vegetable rice					

Drinking water

It is important to offer water as a drink because it is the best way to satisfy thirst and, importantly, it does not contain sugar. Children who regularly consume sugary drinks are more likely to be overweight. Sweetened drinks such as fruit drinks, cordials, soft drinks and flavoured mineral waters are high in sugars and, consequently, high in kilojoules. A can of soft drink can contain up to 12 teaspoons of sugar.

Drinking water also prevents tooth decay, and fluoridated water helps strengthen teeth. Children should take a water bottle with them wherever they go, and in summer a frozen water bottle can be placed in their lunch box. Parents could place a jug of cold water on the kitchen bench or dining table during meals, and keep the sweetened drink supply to a minimum.

Practical Activity 4.5

Vegetable lunchbox muffins

Aim: To provide an opportunity to increase children's exposure to a variety of vegetables in their daily food intake.

Method: Work with a partner to prepare one quantity of vegetable lunch box muffins using the recipe that follows.

Results: Record the sensory properties of the vegetable lunchbox muffins.

SENSORY PROPERTY	DESCRIPTION
Appearance	
Aroma	
Flavour	
Texture	

Analysis

1. Many children are fussy eaters, especially when it comes to eating vegetables. Discuss how incorporating vegetables in these lunchbox muffins may improve their vegetable eating habits.
2. Explain why repetition is an important factor when encouraging a child to try a new food such as vegetables.
3. How could parents or carers use these muffins to practise the principle of 'modelling' to establish healthy eating in children?
4. After preparing the muffins, suggest two ways you could adapt this recipe to appeal to a young child and expose them to a wider variety of vegetables.

Conclusion

Do you think that including a vegetable lunchbox muffin in a child's packed lunch is a viable strategy to increase their daily vegetable intake? Justify your answer.

VEGETABLE LUNCHBOX MUFFINS

¼ cup polenta
¼ cup milk
2 short-cut bacon rashers, diced
2 spring onions, finely chopped
1 egg
30 grams butter, melted
⅓ cup corn kernels
⅓ cup creamed corn
½ cup broccoli and cauliflower rice
¼ cup red capsicum, finely diced
¾ cup self-raising flour
1 tablespoon chives, chopped
salt and pepper, to taste
50 grams cheddar cheese, cut into 9 small cubes
¼ cup finely grated cheddar cheese
chutney, salsa or sour cream, for serving

METHOD

1. Preheat the oven to 190 °C.
2. Grease a 12-hole muffin pan with oil or butter.
3. Combine the polenta and milk in a large bowl. Stand for 2 minutes
4. Cook the bacon in a small frying pan until crisp. Add the spring onion and cook for a further 1 minute. Add to the polenta mixture.
5. Add all of the vegetables, flour and chives and season with salt and pepper. Mix lightly until just combined.
6. Spoon 1 heaped tablespoon of the mixture into nine of the muffin pan holes, and top each with a cube of cheddar cheese. Cover with the remaining muffin mixture and sprinkle each muffin with the grated cheese.
7. Bake in the oven for 20 minutes, until risen and golden brown.
8. Allow the muffins to cool for 5 minutes before turning out.
9. Serve warm with tomato chutney or salsa and sour cream.

Makes 9 muffins

Note: Any variety of home-made or commercial fresh or frozen vegetable rice can be used in this recipe. Students could use their own vegetable rice from Practical activity 4.4.

EXPOSING CHILDREN TO NEW FOODS AND FLAVOURS

Many children are fussy eaters. They may be reluctant to try new tastes and prefer to simply eat the foods that are familiar to them. However, it is important for children to be exposed to new foods and flavours so that they develop a liking for a broad range of foods. This will give them a greater chance of establishing a healthy diet as they grow.

Children's food preferences and willingness to try new foods are greatly influenced by those around them, especially their family, friends and teachers. Positive exposure to multiple foods, such as wholegrains and different varieties of fruits and vegetables, will help children develop a taste for a wide range of foods and will enable them to develop greater dietary variety. This will make them more likely to choose these foods as regular mealtime selections. Sitting with children during mealtimes or snack times and discussing the sensory properties of appearance, aroma, flavour and texture of new foods will encourage children's acceptance of the new foods.

Tips for exposing children to new foods and flavours

- Offer a wide variety of food to increase children's exposure to different foods.
- Include a range of colours, textures and flavours in the child's lunch or dinner to increase their exposure to a range of foods.
- Serve a small amount of vegetables and encourage children to take at least one small bite.
- Encourage children to look, smell, touch and taste the new food.
- Encourage rather than demand that a child eat a new food.

Meals in childcare and early learning centres

Children continue to learn new ideas about food when eating outside the home. Carers and staff in childcare and early learning centres have a very important role in fostering and modelling healthy eating behaviours for young children. They have the opportunity to expose children to a variety of foods in a social setting. Many childcare centres use family-style dining, where students and staff sit down together to eat the same food. They can also help the carers make and assemble the healthy lunches and assist in planning healthy snack ideas such as fruit platters.



iStock.com/alvarez

Sharing food in a childcare centre

Meals at school

When children start school, they are exposed to the foods that their classmates bring in their lunch box, and this may give them greater courage to try new foods. School kitchen garden programs also encourage children to try foods, particularly vegetables, that they may have never tasted before, especially if they have helped grow them. This in turn may also encourage them to request these foods at home.

THE IMPORTANCE OF REPETITION IN DEVELOPING HEALTHY FOOD HABITS IN CHILDREN

Most toddlers and children under the age of three refuse to eat some foods at various stages of their development. Food refusal is a demonstration of the child's fear of trying new or unfamiliar foods, and is a normal developmental phase called 'neophobia'. However, the problem for children who demonstrate neophobia or food refusal is that they consume fewer fruits, vegetables and protein foods, which can have an impact on their growth and development.

Repetition is important in encouraging a child to try a new food. Research has shown that it may take up to 15 exposures to a new food before a child

is willing to try and then accept the new food. In practice, this means that it is necessary to offer a child the same food many times over several weeks before they will try it.

Being persistent and providing repeated exposure to new foods is essential because it provides children with the opportunity to learn about, and become familiar with, those foods. While it is a slow process, this strategy will eventually pay off, and the repetition will increase the likelihood of acceptance. The more opportunities children have to try a new food, the more likely they are to accept it and to eventually enjoy the new flavours and textures. It is equally important for parents to be patient and relaxed with children at mealtimes, and to continue to offer new foods without pressuring them to eat. Parents should not give up or say 'they just don't like it' after only a few tries.

Parents could try varying the way new foods are prepared; some children prefer cold, crunchy vegetables, while others enjoy their vegetables cooked. Introducing new foods into the diet should be a fun experience. For example, parents could cut vegetables into different shapes, such as making little celery fans or using a spiral grater to slice carrots or cucumbers. Serving tiny carrot or capsicum sticks with a vegetable or cream cheese dip can also tempt the child to try some new vegetables alongside those they are familiar with. Threading a variety of vegetables such as cherry tomatoes, capsicum and carrot into mini vegetable kebab sticks can also be a colourful and fun way to repeat an offering of a vegetable that has previously been refused. Another strategy parents could try is grating vegetables such as zucchini into a spaghetti sauce, mini hamburgers or a soup.

Activity 4.6

News flash: boy's favourite food capsicum after joining garden group

Read the article that follows, then answer these questions:

1. Outline how involving Clancy and his brother in the market garden helps to expose them to nutritious foods.
2. Explain why the market garden is an excellent example of modelling healthy food consumption.
3. Describe how the gardening experience is transferred to family meals and healthy meal patterns in the Caldwell household.
4. Explain how growing food in a market garden is an example of sustainable agriculture and food sovereignty.

NEWS FLASH: BOY'S FAVOURITE FOOD CAPSICUM AFTER JOINING GARDEN GROUP

A few weeks ago, a dentist asked four-year-old Clancy Caldwell what his favourite food was. While many kids would have named ice-cream or chips, Clancy said, "I do like capsicum", adding that he liked to sprinkle basil and chives on his poached egg at breakfast.

Clancy's mother, Kelly, was proud, but not surprised. Clancy grows capsicum and herbs at home and also at a super-sized vegetable



Fairfax Sydnication/Paul Jeffers

garden run by a group of local families near Ocean Grove on the Bellarine Peninsula.

Ms Caldwell, of Queenscliff, said the market garden, which grows produce for members' consumption and not to be sold, was brilliant, and not just because it had taught Clancy and his two-year-old brother, Fergus, how tasty nutritious food could be.

'We haven't bought vegies from the supermarket in three months,' she said. 'I've been able to pick them here.'

During the group's working bees, the kids run around and pick, wash and eat everything from carrots to corn and cucumbers.

Co-founder Ben Shaw said the garden, called The Dairy because it's next to an old milking shed, had been a resounding success.

It will feature in the 2021 National Sustainable Living Festival's Great Local Lunch.

In past years, creators of backyard and community gardens converged on Federation Square to eat each other's sustainably sourced food.

But on Sunday, due to the pandemic, gardening identity Costa Georgiadis will host a 'digital banquet', interviewing groups at their sites via a live stream.

Festival partnerships manager Andrea Kimbrell said The Dairy was a replicable model that could be implemented by other families and communities across the country.

Mr Shaw, an edible garden designer whose wife, Kerryn, and children Maeve, 8, and Clara, 5, are also members of The Dairy, said the idea formed last autumn.

He and some clients discovered a mutual interest in growing nutritious food locally, reducing fossil fuel use for transport and packaging.

Cattle farmers (and Clancy and Fergus' grandparents) Jill and Simon Caldwell offered the use of 0.4 hectares, and seven households invested $300 each for equipment such as fencing and irrigation. The first plants went in last July.

'News flash: Boy's favourite food capsicum after joining garden group' by Carolyn Webb, *The Age*, 22 February 2021. The use of this work has been licensed by Copyright Agency except as permitted by the Copyright Act, you must not re-use this work without the permission of the copyright owner or Copyright Agency.

Chapter Test
Chapter review

Understanding the Text

21 Explain how screen-based entertainment has impacted on the physical activity of children and teenagers.

22 Describe how positive role models can influence healthy eating behaviours in children.

23 Outline two factors that can contribute to some children becoming obese.

24 Why is breakfast considered to be an important meal for children?

25 Write a short article to include on a blog for parents of young children explaining how they can model sound eating behaviours by talking to their children about food when shopping or preparing food.

26 Provide three examples of how young children can be involved in the preparation of family meals.

27 Suggest some ways parents can expose children to new foods and tastes.

28 Why is it important that childcare centres and early learning centres expose children to new food tastes and model sound eating habits?

29 Explain why repetition is an important principle in establishing healthy diets in children.

30 Outline the benefits of developing a backyard garden with children or involving children in a community garden.

Answers
Understanding the Text

THINKING SKILLS

Applying knowledge

Write a news item to highlight the short- and long-term goals of the School Kitchen Garden project.

Analysing information

There is a trend towards an increase in the use of online food delivery services. Outline three factors that have led to an increase in online food delivery services and discuss the impact this has had on the health of individuals.

Evaluating concepts

Rank the impact of each of the following factors on access to and choice of healthy food. Justify your decision.

- education
- income
- time pressures

Evaluate the effectiveness of family members modelling healthy eating habits and exposing children to a variety of foods as they grow.

EXAMINATION-STYLE QUESTIONS

Answers
Examination-style questions

Resources
Preparing for exams support

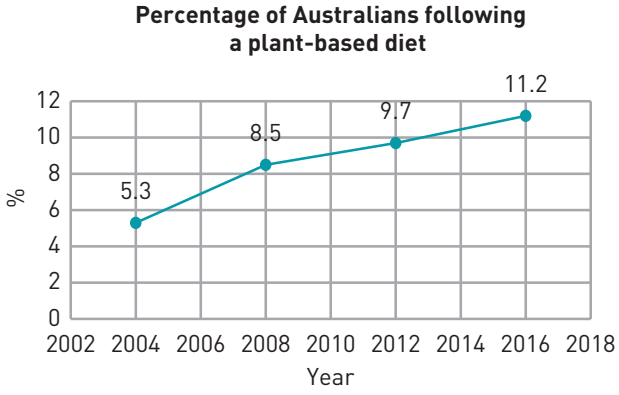
Question 1 (11 marks)

Meals in a Moment is an online food ordering system that has become a popular way to cook meals from scratch. It provides customers with a box of healthy, locally sourced ingredients and an easy step-by-step recipe to assist customers in creating healthy and delicious meals. The ingredients are pre-portioned, creating zero waste. Customers order and pay online, and the box of ingredients and step-by-recipe are then delivered to their home. Meals cost on average $8–$10 per serve.

a Explain how purchasing a box of ingredients to prepare healthy meals could impact on the social factors of available time and income. [6 marks]

b Discuss the impact of rural and remote living in relation to food accessibility, food choices and healthy eating. [5 marks]

Question 2 (10 marks)



The graph below indicates the percentage of Australians following a plant-based diet over the period 2004–2018.

a With reference to the data in the graph, explain the trend in plant-based eating. [2 marks]

b Discuss the factors that may have influenced the trend towards plant-based eating. [4 marks]

c Explain how people who follow a plant-based diet can meet the principles of the Australian Guide to Healthy Eating. [4 marks]

Question 3 (12 marks)

Two-year-old Ahmed is the youngest of three children. He has two older siblings: a five-year-old sister, Aisha and a seven-year-old brother, Hassan. The children are part of a wide extended family that includes their grandparents and a number of aunts, uncles and cousins. Ahmed will be going to childcare very soon and his parents want to encourage him to eat a wider variety of vegetables, fruit and dairy foods, rather than just eating his two favourite foods of bread and cherry tomatoes.

a Discuss how Ahmed's family can introduce him to a wide range of nutritious foods and establish healthy meal patterns within their home and their extended family. [8 marks]

b Based on the rationale of the Australian Dietary Guidelines, explain the importance of establishing a healthy diet in children. [4 marks]

Chicken, lemon and pea risotto

The chicken is gently poached in hot stock and water – the protein denatures and coagulates during cooking. The arborio rice is tossed through oil to keep the grains separate during the simmering process. The starch in the rice gelatinises during cooking, and care should be taken not to over-stir, because this breaks down the rice grains and negatively affects the final texture of the product. This recipe is low in fat with only a very small amount of saturated fat present in the poached chicken fillet. The olive oil provides a source of polyunsaturated fat. Protein is provided by the chicken fillet, and the vegetables are a good source of dietary fibre, vitamins C and B_6, and magnesium. The rice is an excellent source of carbohydrate and has a medium GI rating.

¾ cup chicken stock
¾ cup water
1 skinless chicken fillet
2 teaspoons olive oil
½ brown onion, finely diced
½ red capsicum, diced
½ cup arborio rice
¼ cup dry white wine
¼ cup frozen peas
2 tablespoons shredded parmesan cheese
½ lemon, zest and juice
salt and pepper

METHOD

1. Bring the stock and water to a gentle simmer in a small saucepan.
2. Place the chicken fillet in the simmering stock. Simmer for approximately 10 minutes, or until the chicken is cooked through.
3. Remove the chicken from the stock and cover with foil to keep warm. Cover the saucepan with a lid and keep the stock on a low heat.
4. While the chicken is cooking, heat the oil in a medium saucepan and add the finely diced brown onion. Sauté for approximately 2 minutes.
5. Add the diced capsicum and continue to cook for a further 3–4 minutes, or until soft but not brown.
6. Add the arborio rice and stir over the heat until the grains are well coated with the oil.
7. Pour the dry white wine over the rice and cook until evaporated.
8. Add half a cup of the simmering stock to the rice and stir well. Cover firmly with a lid and simmer over a very low heat until the rice grains have absorbed the stock.
9. Add a further half cup of simmering stock. Stir well, then cover with the lid. Again, allow to simmer until the stock has been absorbed.
10. Add the remaining stock and simmer gently until all of the stock has been absorbed and the rice is tender. Add more stock if necessary. The rice will take approximately 20–25 minutes to cook.
11. Add the frozen peas and simmer 3–4 minutes.
12. Cut the chicken into thin slices and add to the risotto. Stir through the parmesan cheese.
13. Stir in the lemon juice and zest and season with salt and pepper.
14. Cover the risotto and allow to rest for 5 minutes before serving.

SERVES 2

EVALUATION

1 Describe the sensory properties of the chicken, lemon and pea risotto – appearance, aroma, flavour and texture.
2 Based on the nutritional rationale of the Australian Dietary Guidelines, justify the importance of including grain foods such as rice in the diet.
3 Classify the ingredients of the chicken, lemon and pea risotto on a diagram of the Australian Guide to Healthy Eating.
4 Use the data in question 3 to assess whether the chicken, lemon and pea risotto would be suitable to serve as a healthy meal for children and families.
5 Starting with a basic risotto recipe and then varying the flavouring and protein ingredients is a useful strategy for broadening the diets of small children. Suggest other combinations of ingredients that could be included in a risotto that would appeal to children and expose them to new flavours.



Mark Fergus Photography

Steamed coriander chicken balls

These steamed wontons and coriander chicken balls are delicious, healthy finger foods. The minced chicken, egg and nuts in the coriander chicken balls provide a good source of protein. Similarly, the pork used in the preparation of the steamed wontons is high in protein, while the wonton wrappers are a source of carbohydrate. The dipping sauce served with both recipes contains soy sauce, which is high in salt, so it is important to use this sparingly. Steaming the chicken balls and wontons is also a much healthier cooking method than frying them in fat or oil.

CORIANDER CHICKEN BALLS

200 grams minced chicken
2 tablespoons fresh breadcrumbs
½ small egg, beaten
1 tablespoon finely chopped macadamia nuts
4 spring onions, finely sliced
2 tablespoons coriander, finely chopped
1 tablespoon soy sauce
12 large coriander leaves, extra

STEAMED WON TONS

125 grams pork mince
½ cup Chinese cabbage, finely sliced
½ small fresh red chilli, finely chopped
1 clove garlic, crushed
2-centimetre piece of fresh ginger, grated
1 tablespoon coriander, chopped
1 tablespoon fish sauce
10 won ton wrappers
1 small egg, lightly beaten

DIPPING SAUCE

2 tablespoons sweet chilli sauce
1 tablespoon lime juice
1 tablespoon fish sauce

METHOD

Making the coriander chicken balls

1. Fill half of a saucepan or a wok with water.
2. Combine the chicken mince, breadcrumbs, egg, nuts, spring onions, coriander and soy sauce in a bowl and mix until well combined.
3. Line the top section of a bamboo steamer or perforated saucepan with baking paper. Use a skewer to make holes in the paper to allow the steam to penetrate the food.
4. Using wet hands, take two teaspoons of the mixture, roll into a ball and top with an extra coriander leaf. Repeat with remaining mixture, to make 12 balls.
5. Arrange the chicken balls in a single layer over the lined surface of the perforated saucepan or bamboo steamer and place over the saucepan or wok of simmering water.
6. Cover with a tightly fitting lid and steam for 10 minutes.

Making the steamed won tons

1. Place the mince, Chinese cabbage, chilli, garlic, ginger, coriander and fish sauce in a bowl and mix well.
2. Lay the won ton wrappers out on a clean bench and place a teaspoon of the pork mixture in the centre of each.
3. Brush the edges of each won ton with the beaten egg and bring the edges up together to tightly enclose the filling. Press to seal.
4. Half-fill a saucepan base or a wok with water. Bring to the boil, then reduce the heat to a simmer.
5. Line the top section of a bamboo steamer or perforated saucepan with baking paper. Use a skewer to make holes in the paper to allow the steam to penetrate the food. Arrange the won tons in a single layer over the paper.
6. Cover with a tightly fitting lid and steam for 10 minutes.

Making the dipping sauce

1. To make the dipping sauce, combine the sweet chilli sauce, lime juice and fish sauce and mix well. Place in a small bowl.
2. Serve the chicken balls and won tons with the dipping sauce.

MAKES 12 CHICKEN BALLS

EVALUATION

1 Describe the sensory properties of the steamed coriander chicken balls and won tons – appearance, aroma, flavour and texture.
2 Soy and fish sauce are two flavouring ingredients used in these foods. Using the nutritional rationale of the Australian Dietary Guidelines, explain why it is important to limit the consumption of these foods.
3 What are the nutritional benefits of cooking the finger foods by steaming compared to deep-frying?
4 Explain why eating some steamed coriander chicken balls and won tons as an after-school snack would be more healthy for secondary school students than a packet of potato crisps.
5 Wontons, dumplings and gyoza are similar products that can be purchased from the freezer section of the supermarket. Consider Australian eating patterns and outline reasons why families might regularly have them on their shopping list.



Mark Fergus Photography

Pide with two fillings

Pide is a Turkish-style bread roll with a savoury filling. Traditionally, the yeast dough was shaped like an open canoe, but smaller pides made in squares and triangles make great finger foods. Care should be taken to ensure the dough is not too moist, because this will prevent it from holding its shape after filling and shaping. The cheese and spinach pide contain both ricotta and feta cheese, which are high in calcium. The spicy meat pide provides a good source of protein found in the meat and pine nuts, as well as vitamins and minerals in the vegetables.

Prepare one quantity of dough per person. Work in pairs to prepare one quantity of each filling, then share the two types.

DOUGH

1½ cups bread flour (high gluten)

½ teaspoon dried yeast

½ teaspoon salt

½ teaspoon olive oil

125–150 millilitres hot water

CHEESE AND SPINACH FILLING

¼ box frozen spinach, defrosted

1 egg

70 grams ricotta cheese

70 grams feta cheese

pinch of nutmeg

pinch of pepper

SPICY MEAT FILLING

1 tablespoon olive oil

½ onion, finely diced

1 clove garlic, crushed

½ teaspoon ground fennel

¼ teaspoon chilli powder

150 grams minced beef

200 grams canned, diced tomatoes

2 tablespoons pine nuts, toasted

2 tablespoons flat-leaf parsley, finely chopped

30 grams mozzarella, grated

METHOD

Making the dough

1 Sift the dry ingredients together into a large bowl.
2 Stir in the olive oil and hot water to make a moist but firm dough.
3 Turn onto a floured bench and knead until smooth.
4 Return the dough to the bowl, brush lightly with oil, cover with cling wrap and leave in a warm place to prove until the dough has doubled in size.

Making the cheese and spinach filling

1 Squeeze excess moisture from the spinach.
2 Lightly beat the egg in a small bowl.
3 Combine all the filling ingredients and mix well.

Making the spicy meat filling

1 Heat oil in pan and sauté onion and garlic with the fennel and chilli.
2 Add the mince, stirring until it breaks up and changes colour.
3 Add tomatoes and simmer uncovered, stirring occasionally, until the liquid reduces by half.
4 Remove from heat, stir in toasted pine nuts and parsley. Cool before using as filling in the pide.
5 Sprinkle the mozzarella cheese on top of the filled pide before baking.

Assembling the pide

1 Preheat oven to 200 °C.
2 Lightly knead the dough and divide the mixture into four portions.
3 Roll each portion of dough into a thin oval, approximately 20 × 12 centimetres.

4 Place a quarter of the filling down the centre of the dough.
5 Pinch the ends of the dough together and leave the filling slightly exposed along the centre.
6 Place on an oiled tray and leave to prove for 10 minutes.
7 Bake for approximately 15 minutes, or until golden brown.

MAKES 4 PIDE

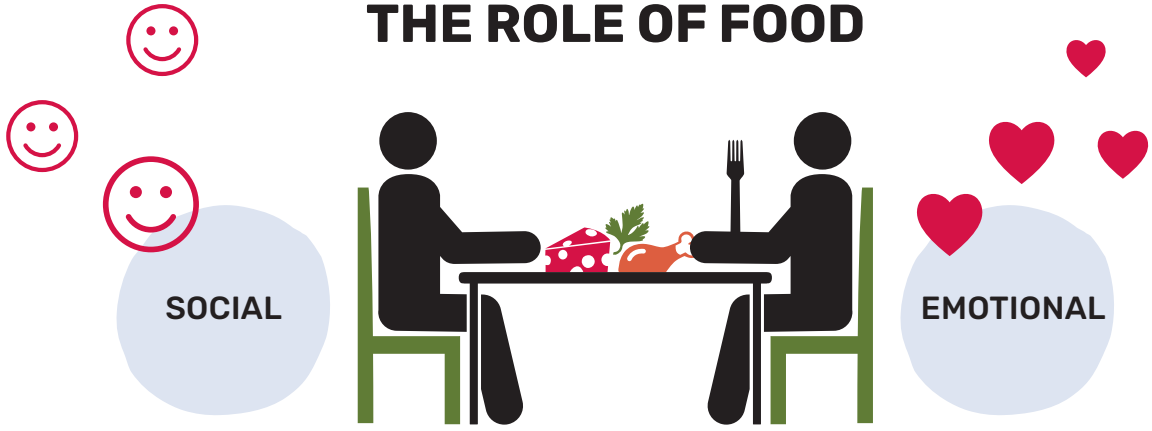
EVALUATION

1 Compare the sensory properties of the three elements of the pide – the dough and the two fillings. Your response could be presented as a Venn diagram or in a table.
2 Classify the ingredients for the pide on a diagram of the Australian Guide to Healthy Eating.
3 Using the data in question 2, recommend other foods that could be served with the pide to create a healthy meal for children and meet the guidelines of the food model. Justify your recommendations.
4 Explain why allowing children to help with the preparation of the pide would be a valuable experience and assist in encouraging them to consume a healthy diet.
5 Identify at least three preparation tasks/steps in the recipe that you think a 10-year-old child could do under the supervision of an older sibling or adult to make the pide. Explain your decisions.



Mark Fergus Photography

THE ROLE OF FOOD



SHARING AND CELEBRATING WITH FOOD



Sharing and celebrating with a peer group

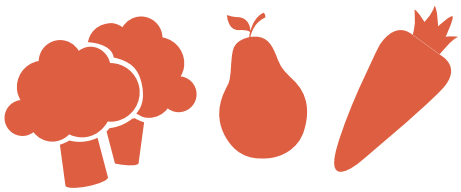


Sharing and celebrating with communities

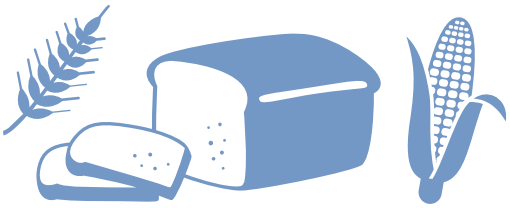


ROLE OF FOOD IN INFLUENCING MENTAL HEALTH

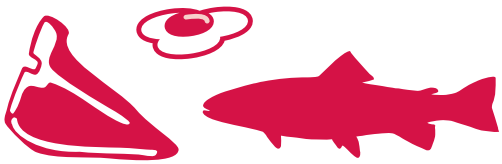
FOODS TO BOOST MOOD



Fruit and vegetables



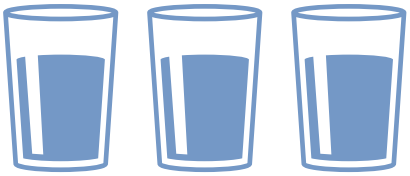
Wholegrains



Lean meats, fish and eggs



Dairy foods



Water

5

THE SOCIAL AND EMOTIONAL ROLES OF FOOD

KEY TERMS

connectedness linking a family together and creating a family bond

emotions relate to the mind and are often described as psychological factors or influences

individual identity refers to qualities, beliefs, likes and dislikes that make a particular person different from others

social roles the parts people play as members of a social group

values those things that we see as important to us and that motivate and guide our decisions in life

Resources
Study Design links
Infographics
Flashcards

The social and emotional roles of food

Food and food choice plays a major role in shaping and expressing a person's identity. A person's **individual identity** refers to the qualities, beliefs, likes and dislikes that make a particular person different from others. Food is central to every person's sense of identity, and is important in constructing and sustaining their individual sense of self.

Many people believe that food choices are a personal matter, and are controlled by **emotions**.

EMOTIONS AND FOOD

Emotions relate to the mind and are often described as psychological factors or influences. They are feelings such as joy, sorrow, fear, happiness, sadness, stress or boredom. These factors are often difficult to describe, and will depend on a person's experiences.

The foods an individual selects may vary from day to day as a result of emotions, self-concept and attitudes. Emotions such as depression and anxiety, boredom or stress often lead to unhealthy eating habits, in both adults and children. It may be necessary to manage emotions and stresses before unhealthy eating habits can be changed. When food takes on a psychological meaning, a person's emotional needs are sometimes satisfied by food. Food then becomes more than just a means of satisfying hunger and obtaining the nutrients the body requires to function.

Food is sometimes used to respond to certain emotional needs such as a reward or punishment, to show affection for someone, to show hospitality, to welcome someone or make them feel secure. Good food habits are shaped and learned when we are infants and children. For example, people who were rewarded with food for good behaviour when they were a child may, as adults, reward themselves in the same way.

VALUES AND FOOD

Our **values** are those things that we see as important to us and that motivate and guide our decisions in life. A person's values can also define and shape their food choices and express their personal identity. Our values reflect what type of person we are, what we care about and what we want to achieve. These values may reflect our family and the culture in which we were raised, or they may be a response to life experiences. For example, an individual may value their health and so choose a healthy diet. They may have respect for the rights of all living things and find the killing of animals cruel, and so value ethical food choices and therefore select a vegetarian or plant-based diet.

THE SOCIAL ROLE OF FOOD

Our food choices are also often influenced by social occasions. Throughout life, people tend to share eating experiences with others, forming an identity within social, family or cultural groups. **Social roles** are the parts people play as members of a social group, including families, peer groups and communities. The contact they have with people within the group will influence an individual's food choice. A person's lifestyle, education, family size and the importance of hospitality within the social group will all help to shape a person's food choices. Sharing food is an important way to get to know people, and to strengthen friendships and provide support for one another.

SHARING AND CELEBRATING WITH FOOD IN FAMILIES

Sharing meals as a family is a vital way of creating **connectedness** – that is, linking a family together and creating a family bond. Sharing a family dinner allows busy families to reconnect at the end of the day and spend quality time together. During this time they can relax, recharge, laugh and tell stories about the day's ups and downs. This allows family members to build an identity or their place in the family. In sharing meals, it is important to involve all members of the family in planning and preparation.

Many family gatherings often centre around food, especially when celebrating special occasions. Birthdays, for example, may be celebrated with foods that are considered special or family favourites, and almost always involve a special cake.

Activity 5.1

Celebrating with food

Read the case study and then answer the questions that follow based on the Shabbat or Eid al-Fitr meal.

1 Briefly describe the key features of a Shabbat or Eid al-Fitr meal.

2 How does the meal assist in creating connectedness within the family?

3 List some of the values that could be reflected in these celebrations.

4 How does the meal assist in passing on cultural and religious traditions?

THE SHABBAT MEAL – A RITUAL OF CONNECTEDNESS

The Shabbat is a traditional Jewish meal and celebration shared by families every Friday night, beginning at sundown. In many Orthodox families this observance continues until Saturday evening at sundown.

The preparation for the meal is completed just before sunset, and candles are lit – some families light a candle for each family member. Then it is time for all family members, often extended family members as well, to gather around the table. The table is set, the finest china is used and family members wear their best clothes.

The celebration commences with a blessing for life and children. The meal begins with wine or grape juice and challah, a plaited bread loaf, which is shared between family members. The food that follows can include a range of dishes that are special and festive. It usually includes several courses of fish, soup, a main meal and dessert. During the leisurely, uninterrupted meal, songs are sung, stories are told and all members of the family, including the children, engage in conversation.

This celebratory meal is a time to appreciate family, to be free of distractions such as mobile phones, and to talk to family members. It is a time to be immersed in Jewish culture and to share and pass on the significance of the religious observance, and for individuals to develop their Jewish identity. The Shabbat is a traditional place of family celebration, eating, learning, debating and socialising.



A family sharing a Shabbat meal

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EID AL-FITR – CELEBRATING THE END OF THE RAMADAN FAST

Muslims around the world observe the holy month of Ramadan, the ninth month in the Islamic calendar. During this month of fasting and prayer, Muslim's observers abstain from eating and drinking from sunrise to sunset and partake in nightly feasts.

A pre-dawn meal called 'suhoor' is the first meal eaten for the day. At this meal, large quantities of high-protein foods are eaten and as much water as possible is drunk. Muslims then enter an all-day fast until sunset. At sunset Muslims break their fast with a sip of water and some dates, then they gather in restaurants or at home with family and friends in a large feast called 'iftar'.

The end of Ramadan fasting is determined by the sighting of the moon on the 29th night of Ramadan. A three-day celebration called Eid al-Fitr follows. This is a special time, as it brings families and friends together for fun and celebration. The celebration begins with special early morning prayers and then a visit to the mosque. Homes are decorated, gifts are given, and special foods are prepared and eaten at picnics and family feasts. A range of traditional favourite foods are served, and special desserts such as baklava, honey cake and Turkish delight are often the focal point of the table. As this is such an important celebration for Muslim families, they dress up in their best clothes on the day of Eid.



Sharing an Eid al-Fitr family meal

iStock.com/Edwin Tan

Practical Activity 5.2

Demonstration of a favourite food linked to a culture or significant celebration

Aim: To determine if preparing and sharing a favourite celebration food with family and/or friends creates connectedness between people.

Method

1. Select a dish that you could share with others at a special celebration. This celebration may be a cultural or religious event, or a celebration shared with family, friends or the broader community.
2. Prepare the recipe you have selected and use your mobile device to film the preparation and sharing of the dish.
3. Respond to the following questions. These could be completed as annotations within the video or as a voice-over recording.

Results

The edited recording of the food preparation and sharing of the dish should be no longer than 1 minute 30 seconds.

Analysis

1. Explain how the dish you prepared relates to your chosen cultural or religious event or the celebration shared with friends, family or the broader community.
2. Describe the dish you have chosen to prepare. Focus on key ingredients and sensory properties of the final dish.
3. After getting feedback from the group who shared your celebration food, describe the emotions you, your family and/or friends experienced when eating this food.
4. Explain how preparing and sharing food for a special celebration is an opportunity for you to demonstrate your values related to food choice.

Conclusion

Discuss how preparing and sharing a favourite celebration food can enhance the connectedness between you, your family and/or friends.

Sharing and celebrating with a peer group

Regardless of our stage of life, our peers have an influence on our food choices. They are our friends and, apart from our family members, they are the people we most regularly celebrate and share food with.

FAST FOOD OUTLET 'MEET-UPS'

As children enter their teenage years, their peer group begins to have a significant influence on the types of food they consume. As young people start to develop their independence, they begin to look for opportunities to meet up with their friends. This might mean getting together at a fast-food outlet where they can socialise over an inexpensive snack or meal.

Fast-food outlets provide a social space to meet up after school. These outlets can be a convenient environment for young people to meet up because there is enough space for a group, and affordable food to purchase and share. Fast-food outlets have become part of youth culture and identity, and are used to express a youthful self and lifestyle image; one that is moving away from parental influences.



iStock.com/Sladic

Enjoying food at a fast-food restaurant

VIRTUAL DINNERS

Virtual dinner parties were a popular way to catch up during the many COVID-19 lockdowns. Peer groups and friends could share a meal and connect safely. Video-conferencing platforms such as Zoom, Skype or Houseparty allow groups to meet in a virtual room and share a meal.

Friends may arrange to order and have the same meal delivered at the same time, and then join a video-conferencing platform and eat together in a virtual environment. Eating the same meal makes

people feel more connected. Setting the table, using the best china and glassware and even placing flowers on the table, helps to set the scene. This is important, particularly if people have been working from home and eating at their desk during the day.

Virtual meals also meant that important events such as birthdays and anniversaries could be celebrated with friends and families despite the lockdown restrictions. These dinners helped to maintain social contact during lockdowns through the ritual of sharing a meal, even if the actual meal happened on a smartphone or laptop.



Getty Images/kohei_hara

Sharing a virtual meal

Sharing and celebrating with communities

Food can unite and strengthen community bonds, and help to maintain and support a shared identity among people. A socially connected community is a place where everyone feels that they belong. It's a place where people get to know their neighbours and feel motivated to become involved, build relationships and contribute to the creation of strong social networks. Sharing food encourages contact with others, personal relationships and engagement in the community.

Many groups within communities use food to celebrate occasions and support people within their community. Food is a great way of bringing people together to celebrate, share, connect, understand and support each other.

Activity 5.3

Sconetime – easing seniors' loneliness with delicious food, a cuppa and friendship

Read the news article and then answer the questions that follow.

1. Briefly describe Sconetime.
2. What health concerns is Sconetime helping to address in older people?
3. How does Sconetime help the individuals connect with one another?
4. Why do many older people look forward to Sconetime?



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Sconetime has helped many older Australians overcome isolation and loneliness.

SCONETIME – EASING SENIORS' LONELINESS WITH DELICIOUS FOOD, A CUPPA AND FRIENDSHIP

Hot scones loaded with freshly made strawberry jam and cream are the drawcard of a new social scene for seniors that's tackling the serious issue of isolation and loneliness.

Former restaurateur and chef Martin Duncan launched Sconetime three years ago in the Cooroy Memorial Hall in the Noosa hinterland.

'I love seeing what it does, it's quite amazing,' Mr Duncan said.

'That whole sharing food and loading up a scone with yummy jam and cream, we go straight back to Nanna's or our friends or whoever we've had scones with.'

A series of studies have linked loneliness to poor physical and mental health, finding it increases the risk of developing dementia, and of premature death.

Mr Duncan has generously shared the scone recipe that has been a big part of the event's success.

He wants to make it easy for other Australians to join the Sconetime movement and connect communities.

His secret ingredients include yoghurt and an egg for extra nutrition, to create a crusty scone that is beautifully moist inside.

In 2016, 2.3 million Australians lived alone.

By 2041 the Australian Bureau of Statistics projects that will increase to around 3.5 million.

The expected rise of up to 53 per cent in lone-person households is linked to the ageing population.

'Some of the people who attend Sconetime, that's the only outing that they have in a month. So they put it in their diary, and every month they're at Sconetime,' real estate agent Sirah Robb said.

Ms Robb serves on tables and pays for the hall hire.

'Seeing their faces light up and they're catching up with friends or they're making new friends as well and just to see that, that brings me joy.'

The volunteers come from all walks of life.

Eighty-four-year-old retired lawyer Helen Duncan prepares Martin's vintage tea sets and gifted her late mother's Royal Albert bone china to Sconetime.

'I just want to do something, I can't just sit around and do nothing. You meet people, gosh – so much fun.'

Pianist Adam Bishop has never let visual impairment hold him back and volunteers at Sconetime. He has played piano since he was nine.

'I've never thought about the fact that I can't see, I've just got on and done it basically,' Mr Bishop said.

'It was perfect timing. I had just moved to the area and noticed Martin's post on Facebook looking for volunteers and I just simply asked him whether he wanted some background music for the event. He said yes, and as they say, the rest is history.'

Mr Duncan recounted his favourite story of one gentleman who hadn't been out of the house for two years after his wife passed away.

'I said, "Come with me" and I went over to a table and I said, "Girls, this gentleman wants to sit with the best-looking table of ladies".

'Now, when I say "girls", the youngest is 82, the oldest might be 96, but it was just gorgeous because they went, "Come here, come here" and so then he started coming to Sconetime.'

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Activity 5.4

Social Spoons

Read the case study and then answer the questions that follow.

1. Explain the broad aims of the Social Spoons project.
2. Explain how the food purchases at the Social Spoons cafes are funded.
3. Discuss the way in which the project impacts on the health of the community.
4. What factors encourage cafes to join up with the project?
5. Identify four criteria identified for a Social Spoons cafe and explain how these criteria improve connectedness in the community.

Weblink
Social Spoons

SOCIAL SPOONS

Social Spoons is a cafe meals project run by Star Health in Melbourne, Victoria that aims to improve the social connectedness across the community. Members of the Social Spoons project are people living within the Inner South community who are hoping to increase their involvement in general community life.



Inner South Community Health

People who belong to Social Spoons can access subsidised cafe meals at supportive and welcoming cafes in the City of Port Phillip and the City of Stonnington. Through the meal subsidy funded by the two councils, and the help of a key worker, members have an incentive to dine with others. They can also be linked into existing programs and health services to promote better health and greater social connections among the broader community. Social Spoons cafes are businesses with a healthy social conscience and are interested in working towards a positive change in their neighbourhood.

In order to join the project the cafes must meet the following criteria:

- ensure a welcoming environment, friendly and interactive staff, with communal seating
- provide multiple healthy food options for $15 or less, and ensure foods on the menu are on display or include pictures of food
- provide easy access to public transport
- provide wheelchair access to the cafe, where possible.

The Welcome Dinner Project

Weblink
The Welcome Dinner Project

The Welcome Dinner Project was initiated by a non-profit organisation called 'joiningthedots' and aims to connect newly arrived people such as refugees, migrants, asylum seekers and international students with other Australians. People of all cultural backgrounds are encouraged to extend their dinner table by inviting people from these groups to share food and conversation in the comfort of their home. The 'pot-luck-style' of dinner is a gathering of people who all bring along food to share. This is a way of making a meaningful connection and sparking friendships and cultural understanding between people of diverse cultures.

The dinners provide an opportunity to connect within a supportive environment to form friendships and bridge some of the invisible divides that exist between people. This project encourages and increases social 'togetherness' and involves the broader community in building a welcoming Australian society that embraces and celebrates diversity.



The Welcome Dinner Project

The Welcome Dinner Project



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Sharing a meal can be a great way to spark new friendships.

The Albury/Wodonga community oven

In Albury/Wodonga, a wood-fired oven has been built in the shade of an old river gum in a park on the banks of the Murray River. The idea to build the community oven came from the local Community Development Office. The oven is fired up every second Sunday, and members of the community can use it free of charge. This oven has had a great effect on the local community as locals gather round the oven to share their pizzas, bread, roasts, lasagne, cakes and scones, all of which are cooked in the oven. The community members then eat the food together in the park. Cooking and eating shared food brings the community together. They are able to learn about their neighbours' favourite foods, to meet new people and to share friendship and develop a connection with their local community.



Getty Images/Lisa Romerein

Eating and sharing food cooked in a community wood-fired oven brings the community together.

Understanding the Text

Answers
Understanding the Text

1 Explain what is meant by the term 'individual identity'.
2 How does a person's identity affect their food choices?
3 Explain how emotions can influence the foods we choose to consume.
4 Explain how sharing food in a family helps to create connectedness.
5 Why is Eid al-Fitr such an important celebration for Muslim families?
6 Outline the reasons that fast-food outlets are a popular venue for teenagers to meet and share food with friends.
7 How does food help create a sense of connectedness within a community?
8 Discuss ways technology was used to help communities maintain a connection with one another during the COVID-19 lockdowns.
9 Discuss how Sconetime is a means of creating a sense of connection among elderly people.
10 Explain the role that the Welcome Dinner Project has in creating community connections.

SUPPORTING AND CONNECTING COMMUNITIES DURING LOCKDOWN

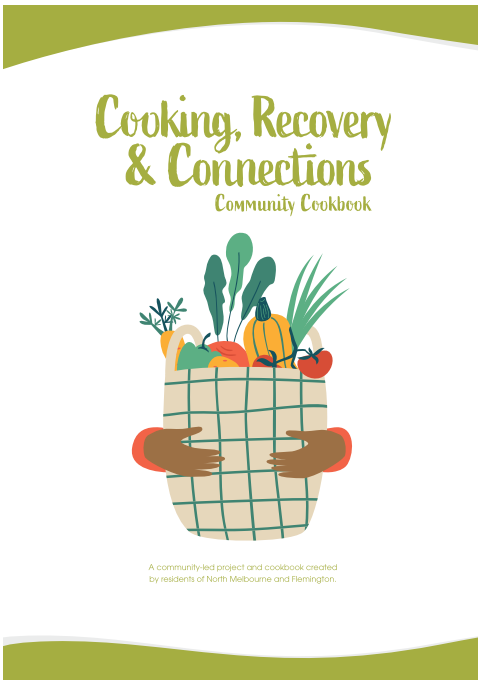
During the numerous COVID-19 lockdowns that occurred across Australia during 2020 and 2021, many people felt anxious, lonely and uncertain about the future.

Communities, such as neighbours in Chloris Crescent, Caulfield and public housing residents in North Melbourne and Flemington, provided opportunities for mutual connection and emotional support during the lockdown. These communities used food as an international language to support and share with their communities.

Cooking, recovery and connections

The hard COVID-19 lockdown that occurred in the North Melbourne and Flemington public housing communities in July 2020 caused significant trauma for the residents living in these high-rise apartment blocks.

A community health provider, *cohealth*, identified concerns within these communities. People were very anxious and scared during the lockdown, and needed connection and support during this difficult time. Food is a vital part of daily life, and sharing food and creating recipes with neighbours provided a community-driven response to support connection, wellbeing and community resilience.



Provided with courtesy of cohealth

The creation of a cookbook *Cooking, Recovery and Connections* helped connect community members during the COVID-19 pandemic.

The residents from diverse cultural backgrounds came together to create a not-for-profit cookbook – *Cooking, Recovery and Connections*. This provided an opportunity for the residents to demonstrate their resilience and celebrate the recovery of the community. The book contains 18 recipes, and artwork contributed by the residents from many cultural backgrounds, including Somalia, Ethiopia, Eritrea, India, Egypt and South Sudan. The cookbook was provided free to the public.

Source: https://www.cohealth.org.au/news/cooking-recovery-connections

Activity 5.5

In a Caulfield street on Saturdays, the smell of the same dish wafts from every house

Read the news article and then answer the questions that follow.

1. Explain how the Chloris Crescent cooking classes began.
2. Discuss how the cooking classes have encouraged community connectedness.
3. Explain how the cooking classes have had an impact on the mental health of some of the neighbours.
4. Discuss the way the cooking classes have enabled members of the neighbourhood to express their individual identity.



Fairfax Sydnication/Joe Armao

Neighbours from Chloris Crescent, Caulfield, holding dishes they've made during cooking class.

IN A CAULFIELD STREET ON SATURDAYS, THE SMELL OF THE SAME DISH WAFTS FROM EVERY HOUSE

Every Saturday afternoon in Caulfield, neighbours on Chloris Crescent cook the same dish, using the same ingredients to create the same aromas.

For 10 weeks, locals who may not have known each other's names are now eating dinner together every Saturday night – via Zoom.

The Chloris Crescent cooking classes came together one day in early August when Jennifer Hunt decided she'd had enough of missing her neighbours in lockdown.

Remembering a Christmas street party when her friend Bindya Bedi from down the road had brought along a delicious Indian dish, she asked if Ms Bedi would like to host an online cooking lesson.

Ms Hunt, a resident of Chloris Crescent for 30 years, sent an email to a few of her close neighbours containing Ms Bedi's recipe and a Zoom link for the Saturday afternoon cooking class.

Since then, the weekly class has grown from six people to 10, then 15, and is continuing to expand as more neighbours ask to get involved.

'Each week we seemed to add one, add another one, then add a couple more,' Ms Hunt says.

'So I think we've got about 20 people in the street now.'

Each week, a recipe from a community member is emailed to the group so they can buy the ingredients they need for their weekend class.

From Indian, to Greek, to Italian, to Moroccan and Indonesian, the Chloris Street cooking classes give the neighbourhood a taste of its multicultural community through cuisine.

Ms Hunt says sitting down together after they've cooked their meal is one of the most rewarding aspects of the initiative.

'The eating, the preparation, it's a ritual that we all have to do, and when we do it together it brings us together a bit more strongly,' she says.

Ms Bedi, who has hosted three times, says the classes help to ease the emotional stress of lockdown.

She has lived in Caulfield for 16 years and says it's been nice to connect with people again, especially since face masks prevent her from seeing her neighbours smile.

'Everybody is so nice, it's like a small family, rather than a community,' she says.

'Everybody looks after each other. It's nice to have a little family around you when you are away from family, especially because we are from India.'

Last Saturday, the class cooked one of Ms Bedi's most-loved dishes, palak paneer.

'It's one of my favourites too; I love cottage cheese and spinach,' she says.

'We are so culturally diverse and everybody loves to try out different food, so it's nice to learn things,' she says.

Ms Bedi says the cooking classes have made her even more grateful for her community.

'I really love this neighbourhood.'

'In a Caulfield street on Saturdays, the smell of the same dish wafts from every house', Elsie Lange, *The Age*, 16 October 2020. The use of this work has been licensed by Copyright Agency except as permitted by the Copyright Act, you must not re-use this work without the permission of the copyright owner or Copyright Agency.

FOOD AND SUPPORT FOR THE DISADVANTAGED

The Vinnies Soup Van program offers food, social connection and referrals to those people at risk of homelessness and disadvantage. The Vinnies soup van provides assistance for people in a number of locations across metropolitan and regional Victoria who are facing challenges or tough times in their life, such as people who are homeless or experiencing financial difficulties. The van is set up every night of the week in varying locations for disadvantaged people to access free food. This service not only provides a warm meal but also a friendly face that offers support and connects them with others in the community.



Newspix/Jason Edwards

The Vinnies Soup Van program provides food for people in need.

The role of food in influencing mental health

We need food to fuel every cell in our body, and also our mind. Approximately 20 per cent of our daily energy requirements are used to fuel the brain.

Healthy patterns of eating are linked to better mental wellbeing, including stress management, increased concentration and improved sleep quality.

There are no 'magic' super foods for positive mental health, but it is important to choose foods from the five food groups with variety and balance in order to ensure mental wellbeing.

FOODS TO BOOST MOOD

When people are feeling tired and stressed, their brains often crave quick sources of energy. Discretionary foods such as chocolate and sugary drinks might give an immediate boost of energy, but it is usually only short-lived, and the person may in fact feel worse when it wears off. It is important to choose snack foods from the five food groups, and those that provide a steady source of energy.

Good mood food – how food influences mental wellbeing, Queensland Health

Fruit and vegetables

- The fibre in fruit and vegetables supports a healthy gut environment
- Provide a wide range of vitamins and minerals, and antioxidants that support brain health
- Fermented foods including kimchi, kombucha and sauerkraut support gut health and therefore the production of serotonin, a natural mood enhancer.

Wholegrains

- An important source of fibre to feed good gut bacteria
- Provide low-GI carbohydrates for a steady source of brain fuel
- Healthy omega-3 fats support brain function

Lean meats, fish and eggs

- Provide the protein for many brain chemicals that can influence mood
- Oily fish, nuts, seeds and legumes are a good source of healthy fats including omega-3 fatty acids, and vitamins that support positive mental health and protect against dementia and depression.

Dairy foods

- Dairy foods such as yoghurt contain living beneficial bacteria (probiotics) that boost gut health and influence and improve mood and wellbeing.

Water

- Drinking plenty of water prevents dehydration, which often causes headaches, tiredness and 'brain fog' that can affect the ability to concentrate and think clearly.

FIGURE 5.1 Selecting food from the five food groups is essential for mental wellbeing.

Understanding the Text

11 Identify how the Albury/Wodonga community oven is helping to create strong community connections.

12 How does the Vinnies Soup Van program support food access for people in need?

13 Explain why food is important for the mind as well as the body.

14 Identify the connection between healthy eating patterns and mental wellbeing.

15 Why is it important to avoid discretionary foods when feeling tired and stressed?

16 Explain why eating fruit and vegetables is important for mental health.

17 Discuss the reasons that wholegrains are important for brain health.

18 Explain the role of lean meats, fish and eggs in supporting mental health.

19 Outline how dairy foods can boost gut health.

20 Identify the key reasons why drinking plenty of water is vital for mental and physical wellbeing.

Answers Understanding the Text

Chapter Test Chapter review

THINKING SKILLS

Applying knowledge

Describe the impact that diet has on mental health. Give examples to support your answer

Analysing information

Explain how connectedness can be increased by sharing food in families and communities.

Evaluating concepts

Evaluate the concept that the social and emotional roles of food shape an individual's identity and connectedness with their peer group.

EXAMINATION-STYLE QUESTIONS

Question 1 (7 marks)

During the COVID-19 lockdowns of 2021, a new company, Delicious Virtual Food Experiences, was born.

This company offered virtual cooking experiences for people in lockdown who wanted to connect with a group of their friends, or to make new friends, and learn new cooking skills.

After booking the class, participants received a list of ingredients for preparing the recipe they would make. They then purchased the ingredients and were able to ensure they had all the equipment necessary to prepare the recipe.

At the end of the session each participant displayed their food products before eating.

a Discuss the way in which joining an online cooking class could help the participants to shape and express their identity. [3 marks]

b Explain how this cooking class assisted individuals and groups to develop connectedness within their family and the broader community during lockdown. [4 marks]

Question 2 (4 marks)

Research shows that mental health disorders will affect nearly half of the Australian population in their lifetime. These studies have identified that there is a strong link between positive mental health and a good diet.

Explain how healthy patterns of eating can support positive mental health and boost mood.

Answers Examination-style questions

Resources Preparing for exams support

Fresh pasta

Pasta is a very versatile food that has a moderately low GI rating of between 30 and 60. Pasta made with wholemeal flour is also high in dietary fibre. When making pasta it is important to add just enough liquid to the dry ingredients to achieve the correct consistency so the dough can be rolled through the pasta machine without sticking. When fresh pasta is cooked in boiling water, the starch gelatinises. It is ready to eat when it is 'al dente' or soft to the bite. Fresh pasta can be stored for use later by dehydrating or freezing.

200 grams high-gluten flour
1 teaspoon salt
2 eggs, lightly beaten

METHOD

Making the pasta dough

1 Put the flour and salt in a food processor and pulse to combine.
2 With the motor running, add the eggs. Process for 1–2 minutes, until the dough clings together and feels springy.
3 Turn the dough onto a floured bench and knead until smooth.
4 Cover with cling wrap and allow to rest at room temperature for 20–30 minutes.
5 Roll into thin sheets using a pasta machine.

Cooking the pasta

1 Fill a large saucepan with water – there should be at least 1 litre of water per portion and one extra for the pot.
2 Add some salt to the water and bring to the boil.
3 Cook the pasta for 2–3 minutes only – until it is al dente. The pasta should be firm, not soft, and should not have a hard, chalky centre.
4 Drain and serve.

SERVES 2–3

FLAVOUR VARIATIONS FOR PASTA

Ingredients	Quantity suggestions for flavour variation
Poppy seeds	2–3 teaspoons
Spinach	Dried – 2 tablespoons Fresh – cooked and squeezed dry; pulse with flour, omit 1 egg white
Beetroot	Purée drained cooked beetroot and pulse with flour – reduce the amount of egg OR Dehydrate puréed cooked beetroot and grind into powder – 1 to 2 tablespoons
Black pepper	1 tablespoon coarsely ground black pepper
Fresh herbs	Add chopped herbs with flour Whole leaves can be rolled through in the last stage of rolling



Rolling pasta

Shutterstock.com/Tyler Olson

EVALUATION

1 Describe the sensory properties of the cooked pasta – appearance, aroma, flavour and texture.
2 Explain why it is recommended that consumers eat wholemeal pasta rather than refined pasta.
3 Pasta has a low GI rating. Explain why this is a health benefit to consumers.
4 Making pasta varieties such as orecchiette, ravioli and gnocchi together in family or neighbourhood groups was a tradition in many parts of Italy. In recent times some families and friendship groups have reinstated this practice. Discuss how preparing and cooking food together can build social connections.
5 Why is pasta regularly on the menu in many homes across Australia?



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Cooked fresh pasta

Spring vegetable pasta sauce

Green vegetables are the hero in this pasta sauce. Their different shapes, textures and tones of green indicate spring is coming. Blanching, boiling and sautéing are the cooking techniques used to produce this dish.

½ zucchini, sliced

1 piece (120 grams) broccoli, broken into florets and stem sliced

6 snow peas

2 tablespoons frozen peas

¼ teaspoon salt

½ quantity fresh pasta (see page 124) or 100 grams of dried pasta

2 teaspoon olive oil

1 clove garlic, crushed

3 mushrooms, sliced

4 cherry tomatoes

1 tablespoon parsley, chopped

¼ cup tomato passata

2 tablespoons chicken stock

20 grams grated parmesan cheese

1 tablespoon basil, chopped

salt and pepper

METHOD

1 Fill a large saucepan with water and bring to the boil. Add the sliced zucchini, broccoli florets and sliced broccoli stem and blanch for 1½ minutes, then add the snow peas and frozen peas and cook for a further 30 seconds.
2 Drain and refresh vegetables in cold water. Set aside.
3 Refill the saucepan with water, add ¼ teaspoon salt and bring to the boil. Cook the pasta until al dente. Drain.
4 Meanwhile, in a small frying pan add 2 teaspoons olive oil. Sauté the garlic and mushrooms. Add the cherry tomatoes and sauté for 1 minute, then stir in the chopped parsley. Set aside.
5 Heat a pan big enough to hold the pasta and vegetables over low heat. Add the tomato passata, stock, cheese and basil. Simmer gently until the cheese has melted.
6 Add the drained pasta and toss through the sauce to coat. Add the blanched vegetables and toss again.
7 Serve the pasta and vegetables into a broad, flat bowl. Finally, add the cooked mushrooms and cherry tomatoes.
8 Season with salt and pepper and serve.

SERVES 1

EVALUATION

1 Describe the sensory properties – appearance, aroma, flavour and texture – of the spring vegetable pasta sauce. Consider all elements of the recipe in your answer.
2 Why is consuming a wide range of green vegetables an important part of eating a healthy diet?
3 Classify the ingredients of the spring vegetable pasta sauce and the pasta on a diagram of the Australian Guide to Healthy Eating. After classifying the ingredients, comment on how well the dish meets the recommendations of the Australian Guide to Healthy Eating food selection model.
4 Explain two lifestyle factors that could influence a consumer's decision to use dried pasta instead of preparing the product from scratch.
5 Identify a different vegetable that could be successfully used in the spring vegetable pasta sauce in place of the following ingredients:
   - zucchini
   - broccoli
   - frozen peas
   - mushrooms.



Mark Fergus Photography

Paprika meatballs

Paprika is a main flavouring in Hungarian cuisine. There are many varieties of this aromatic spice – sweet, hot and smoked. Each adds to the depth of the flavour profile of the meatballs. Care needs to be taken when mixing the meatballs to ensure the proteins are not overdeveloped and the final meatballs hold their shape and are tender inside. Boiling and simmering are the two moist cooking methods used to produce the rich mushroom sauce. Full-fat sour cream is recommended so it doesn't separate in the sauce. The beef and pork in this recipe provide an excellent source of protein, while the vegetables provide a range of vitamins and minerals.

MEATBALLS

100 grams minced beef
100 grams minced pork
⅓ cup wholemeal breadcrumbs
¼ cup milk
½ egg, beaten
½ garlic clove, finely chopped
½ teaspoon sweet paprika
¼ teaspoon dried chilli
¼ teaspoon caraway seeds
¼ teaspoon smoked paprika
¼ cup parsley, finely chopped
salt and pepper to taste
2 tablespoons oil, for cooking the meatballs

MUSHROOM SAUCE

1 tablespoon olive oil
½ onion, finely diced
1 clove garlic, finely diced
½ red chilli, finely diced
4 mushrooms, sliced
3 teaspoons sweet paprika
½ teaspoon hot paprika
½ teaspoon smoked paprika
⅓ cup water
1 cup beef stock
1 cup chopped canned tomatoes
1 tablespoon parsley, finely chopped
1 teaspoon thyme, finely chopped
1 teaspoon rosemary, finely chopped
⅓ cup sour cream

TO SERVE

soft polenta, mashed potatoes or buttered egg noodles

METHOD

To make the meatballs

1. Combine all the ingredients (except the oil) for the meatballs and mix lightly by hand. Do not overwork the mixture.
2. Roll into walnut-size balls, cover and rest in the refrigerator for 30 minutes.
3. To cook the meatballs: heat 2 tablespoons of olive oil in a large frying pan over medium–high heat. Brown all over – this will take 3–4 minutes – then set aside until ready to finish cooking in the mushroom sauce.

To make the mushroom sauce

1. Heat the oil in a medium saucepan and sauté the onion, garlic and chilli until soft.
2. Add the sliced mushrooms and sauté for 2 minutes, until just tender,
3. Add the paprikas and sauté until fragrant, about 30–40 seconds, then deglaze the pan with the water.
4. Add the stock, chopped tomatoes and herbs. Bring to a boil, then reduce to a simmer.

5 Add the meatballs and simmer for 15–20 minutes, until the meatballs are just cooked through. Turn off the heat.
6 Remove the meatballs and set aside. If there is too much liquid remaining, evaporate over high heat before adding the sour cream.
7 Whisk the sour cream into the mushroom sauce, then return the meatballs to the sauce. Keep warm.
8 Serve with soft polenta, mashed potatoes or buttered egg noodles.

SERVES 2

For gluten-free meatballs, substitute the breadcrumbs with gluten-free crumbs.

EVALUATION

1 Describe the sensory properties of the two elements of the recipe – the meatballs and the mushroom sauce.
2 If you wanted to reduce the fat content of the mushroom sauce, suggest some ingredients that could be substituted for the full-fat sour cream.
3 Classify the ingredients in the paprika meatballs on a diagram of the Australian Guide to Healthy Eating.
4 Using the data from question 3, evaluate the nutritional value of the meal according to the guidelines of the Australian Guide to Healthy Eating food selection model.
5 List other foods that could be served with this recipe in a meal to ensure that the guidelines of this food model are met.



Mark Fergus Photography

Mini lemon tarts

Sweet treats such as these mini lemon tarts are often included as part of the menu when celebrating with families or friends. They have a delicious buttery shortbread-style pastry case, a tangy citrus filling and are topped with mini meringues to give them extra visual appeal. The meringues and lemon curd could be made before making the tarts, and stored. These mini lemon tarts should be considered a sweet treat and only eaten occasionally and in small amounts, because they contain significant amounts of butter, caster sugar and icing sugar, and are therefore high in fat and sugar.

MINI MERINGUES

1 egg white

¼ cup caster sugar

LEMON CURD

1 large lemon

2 eggs (size 55 grams), lightly beaten

60 grams butter

⅓ cup sugar

SHORTBREAD PASTRY

125 grams butter

½ cup icing sugar

1 cup plain flour, sifted

extra icing sugar for dusting

METHOD

Making the meringues

1 Preheat oven to 110 °C. Cover the base of an oven tray with baking paper.
2 In a small bowl, beat the egg white until stiff peaks form.
3 Gradually add the sugar, beating all the time, until the mixture is thick and glossy.
4 Fill a piping bag with the mixture and pipe 18–20 small twirls on the tray, using a teaspoon to press down any peaks on the meringues.
5 Bake for 20–30 minutes, until the meringues are dry and come away from the baking paper easily.
6 Store in an airtight container lined with greaseproof paper until required.

Making the lemon curd

1 Finely grate the zest of the lemon and squeeze the juice.
2 Strain the beaten eggs through a sieve to remove the chalaza.
3 In a double saucepan or a basin over a saucepan of simmering water, combine the butter, lemon juice, zest and sugar.
4 Stir over the heat until the ingredients are well mixed.
5 Remove the basin or top section of the double saucepan from the heat and stir in the beaten eggs, mixing well.
6 Place the basin or top section back over the boiling water and stir constantly with a wooden spoon until the mixture has thickened. Test the thickness of the curd – the mixture should coat the back of the spoon or separate when you run your finger down the back of the wooden spoon.
7 Pour into a bowl and allow to cool, or store in a sterilised jar in the refrigerator for 2–3 weeks.

Making the shortbread pastry

1 Grease a 12-hole mini muffin tray and preheat the oven to 180 °C.
2 Cream the butter and icing sugar until fluffy and creamy in colour.
3 Add the sifted flour and mix to a soft dough.

Assembling the tarts

1 Divide the dough into 12–16 portions and roll each portion into a ball.
2 Place a ball in each muffin tray hole and, with a floured finger, make an indent in the centre of each ball, large enough to take a teaspoon of lemon curd.
3 Spoon a teaspoon of lemon curd into each hole, taking care not to overfill it, then bake for 20 minutes.
4 When cooked, allow to cool slightly before removing the tarts from the tin. Add a little extra lemon curd if necessary. Dust with icing sugar and top with a baby meringue.

MAKES 12–16 MINI TARTS

EVALUATION

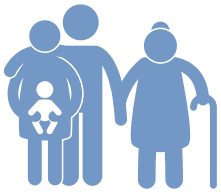
1 Describe the sensory properties of the three elements of the mini lemon tarts – the pastry, lemon curd and mini meringues.
2 Explain why mini lemon meringue tarts are classified as discretionary foods; that is, they would appear outside the circle of the Australian Guide to Healthy Eating food selection model.
3 Discuss why serving the lemon tarts in mini size is a useful strategy to manage the quantity of discretionary foods consumed.
4 Justify why a person would prepare the mini lemon tarts to be served at a celebration they were hosting.
5 What is your favourite discretionary food to share with friends? Explain why, in the context of considering the social and emotional roles of food.



Mark Fergus Photography

VALUES THAT INFLUENCE CONSUMERS' FOOD CHOICES

Family



Friendship



Health



Happiness



Fun



Environment



Ethics



Knowledge



Responsibility



Safety



TYPES OF MEDIA THAT INFLUENCE FOOD CHOICES

Digital – social media; TikTok, Instagram, Facebook



Broadcast - television and movies



Print - newspapers, magazines and billboards



Websites - commercial companies and consumer organisations



STRATEGIES THAT INFLUENCE FOOD INFORMATION

Data analytics



Social media influence



Use of colour



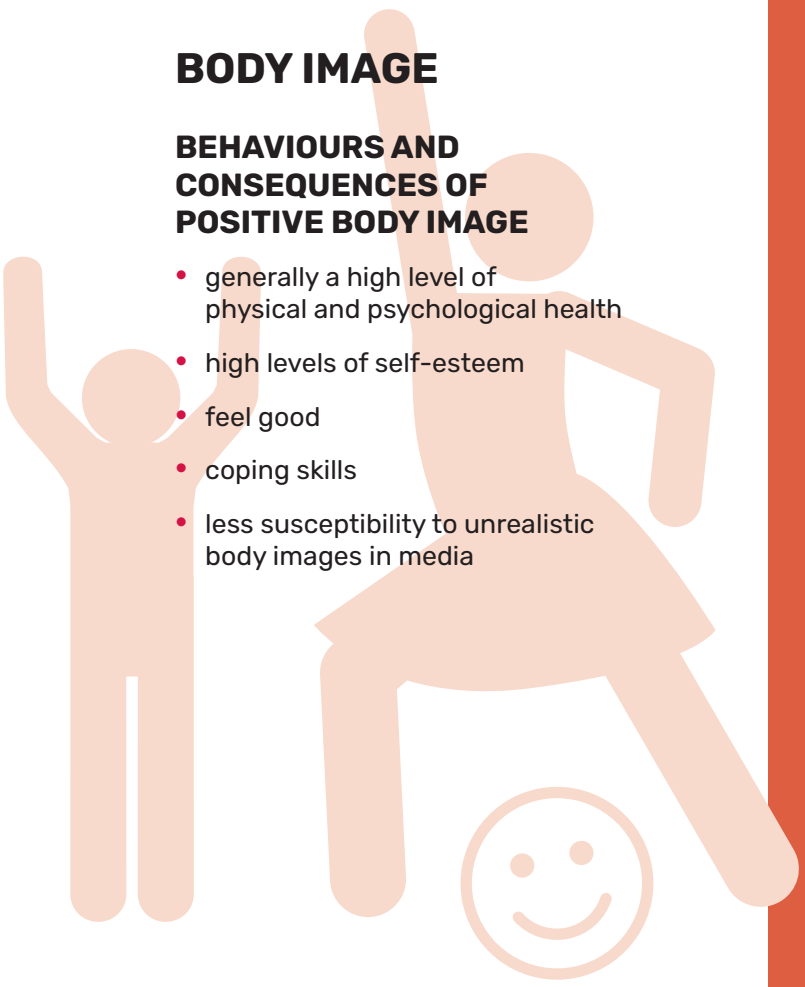
Use of images



BODY IMAGE

BEHAVIOURS AND CONSEQUENCES OF POSITIVE BODY IMAGE

- generally a high level of physical and psychological health
- high levels of self-esteem
- feel good
- coping skills
- less susceptibility to unrealistic body images in media



BEHAVIOURS AND CONSEQUENCES OF NEGATIVE BODY IMAGE

- can lead to restrictive diets
- susceptibility to comfort or emotional eating

6

FOOD AND THE MEDIA

KEY TERMS

body image the perception a person has about their physical self and the thoughts and feelings that result from that perception. These feelings can be positive, negative or both, and are influenced by individual and environmental factors.

comfort eating eating that is driven by the desire to make ourselves feel happy rather than to satisfy hunger

data analytics a process of examining raw data to draw conclusions about that information

media the technology used to communicate information to the public through avenues including social networks, television, radio, newspapers, magazines and billboards

restrictive dieting often referred to as fad dieting, restrictive dieting is a pattern of eating that bans certain foods or food groups, and promises quick, dramatic results

Resources
Study Design links
Infographics
Flashcards

Food information and the media

Australians spend a large proportion of their weekly income on food, and have access to a wide variety of food choices. As a result, food manufacturers and food retailers must go to great lengths to promote their products and influence consumers' food choices. Food promotion is everywhere, and each day we are exposed to a myriad of advertising through all forms of media.

Media is an umbrella term that is used to describe the technology used to communicate information to the public. The media uses a variety of channels to connect with consumers, including the internet, through social media, websites, online forums and podcasts. The broadcast media provides information through television, radio and movies. Print media, including newspapers, magazines and billboards also deliver a broad range of information to consumers. Regardless of the type of media, they are all able to shape the information consumers receive in order to influence their values and ultimately their food choices.

Collaborative Activity

Digital media	Broadcasting media	Print media
Social media	Television	Newspapers
Websites	Radio	Magazines
Podcasts	Movies	Billboards

FIGURE 6.1 Different types of media play a role in shaping food information.

SHAPING CONSUMER VALUES

One key strategy food manufacturers and advertisers use is to appeal to consumers' values and emotions. The key value many people hold when buying food for their family is that of good health. Consequently, they might carefully examine the food label of a product to determine whether it is high in fibre or low in fat, for example. For other consumers, the value of sustainability is a major concern when shopping, so they might only purchase products that are marketed as being clean and green, having a low carbon footprint, or that use environmentally friendly packaging.



FIGURE 6.2 The values consumers hold are important when shopping for food.

However, personal and family values can often overlap or conflict. For example, if friends or relatives are coming to visit, the family might purchase snack foods or takeaway foods that are energy dense and lower in nutritional value than foods the family might otherwise select, to satisfy values such as happiness, fun, generosity, friendship and cohesion.

Constant and repeated messaging through the media can 'normalise' particular foods, impacting on a person's values and influencing their food choices. For example, much of the food advertised is lower in nutritional value and may be higher in sugar, salt and fat and lower in fibre than alternative 'whole' foods. The high visibility and repetition of these products in the media is a strategy used to manipulate and desensitise consumers into believing that consuming these products, regardless of their nutritional value, is natural and desirable, and this can therefore influence their values and food choices.

According to the Obesity Policy Coalition, 'there is clear and robust evidence that children's exposure to unhealthy food advertising influences their food choices, influences their diets, and can contribute to poor diets, overweight and obesity.'

Weblink
Obesity Policy Coalition

Digital media

Most Australians have a reliable and fast internet connection that enables them to access information from a variety of sources. According to the National Broadband Network (NBN), it is estimated that the average Australian household has more than 30 devices connected to the internet. Mobile phones, tablets, televisions and smart watches all enable consumers to access the latest information from wherever they are.

Through digital marketing, brands engage with customers across all channels of communication, enabling them to interact with consumers via their iPhone, iPad or smart watch in real-time, using data intelligence to target messages and increase engagement.

Personal devices, particularly the iPhone, have become a driver in food marketing strategies. The smartphone has had a major impact on food marketing, as it has become an integral part of the shopping experience, both in-store and at home. More families have moved to shopping online and use their mobile device to browse and order groceries. Mobile devices enable consumers to connect with food marketers by using personalised shopping apps to guide supermarket choices based on what they like to eat, or what fits their lifestyle or health requirements. A mobile device is the place many consumers go first for guidance and to explore, discover, connect and share, and most importantly, it is always within arm's reach. Mobile content advertising is growing, and food advertising is driving this growth.

SOCIAL MEDIA

Social media platforms such as TikTok, Facebook, Twitter and Instagram are important communication tools that enable individuals to connect with friends and family, and also with commercial organisations. Food producers and food manufacturers use social media platforms to advertise their products and, in doing so, shape consumer food choices. Advertising on social media has increased significantly and now accounts for almost 50 per cent of every dollar spent on advertising in Australia.

Social media is effective for marketing food products as it influences buying behaviour, creates 'brand advocates' and encourages people to share information about a product and therefore influence others' food choices. It helps businesses engage with customers, generate conversation and find out what people are saying about their products. This increasing engagement on social media is changing the way food is experienced and shared, and consumers are increasingly relying on social networks to shape their food choices.

Social media advertisers on TikTok, Facebook, Instagram and Twitter all use similar strategies to market products to consumers. These social media platforms use algorithms based on information such as friends' likes or previous purchases to personalise messages and target advertising. By promoting alternative products or reminding consumers of previous purchases, they aim to influence consumer choices. Another strategy social media advertisers use is to encourage users to 'share' their post with friends and family in order to broaden their market and network of users.

TikTok

TikTok is a popular social media platform that enables users to view videos and share food ideas and recipes in a fun and engaging manner. Other users upload food hacks or ideas for solving simple food preparation problems.

In 2021 the TikTok #foodchallenge, 'Coolest Tik Tok Food Tricks and Hacks', had more than 17 million views. Food marketers have identified food challenges as one of the biggest trends on TikTok, and this fun marketing strategy can reach millions of consumers. The aim of this strategy is to appeal to young users and can prompt them to make purchases so they can join in the fun.



Shutterstock.com/Timolina

This baked feta pasta is a simple pasta recipe that went viral on TikTok.

Instagram

Instagram is one of the most popular photo-sharing, video-sharing and social networking services. Instagram's engagement rate is one of the best of all social networks when used to showcase and sell products.

Hashtags are a way to group ideas, concepts and conversations. They make it easier to find others who are posting about the same topics. Chobani yoghurt use the hashtag #madewithchobani to focus their marketing campaign, highlighting the versatility of their yoghurt. They encourage consumers to use this hashtag when uploading photos showing how they use Chobani products, not only as a breakfast or snack option, but in sweet and savoury baked products, too. This provides ideas and inspiration, encouraging other consumers to purchase Chobani products.

Another marketing strategy used by Chobani in 2021 involved the hashtag #bechobaniactive. This campaign offered consumers the chance to win a $100 Adidas voucher when purchasing particular Chobani yoghurt products. This strategy successfully encouraged consumers to purchase particular Chobani products by targeting their values of fitness and good health.



iStock.com/bauhaus1000

The #bechobaniactive campaign targeted consumer values of fitness and good health in order to encourage consumers to purchase Chobani products.

Practical Activity 6.1

Create your own Instagram post

Aim: To create an Instagram post to showcase your food skills in the preparation of a broccolini and snow pea salad with sticky chicken wings.

Materials

- 1 quantity of the broccolini and snow pea salad (page 154)
- 1 quantity of sticky chicken wings (page 156)
- 1 × Instagram Template Maker Program. A range of free programs are available to use, such as Crello, Canva and Picmaker.

Method

1. Begin by researching some food styling ideas by looking up similar recipes on food websites or in magazines.
2. Plan your props to enhance your final photographs.
3. Prepare both recipes. You may want to capture some of the process stages to include in your post. It can be a static or a video post.
4. Find a light place to photograph the completed dishes. Natural light is often better than overhead lights or the flash from your phone camera. You may move outside your kitchen area.
5. Plate up the recipes. Keep the plating as natural as possible in order to showcase the sensory properties of the food. Less is more; don't over clutter your shot. Try taking the same shot from different angles, and adjusting the depth of field.
6. Check that you are happy with the food styling and lighting of your photos before creating your post.

Results

Using an Instagram template maker, create your post. Don't forget your #hashtags.

Conclusion

Was your Instagram post a true reflection of your food preparation skills? Would it have encouraged others to taste and/or cook the broccolini and snow pea salad with sticky chicken wings? Discuss.

Facebook

Facebook too, makes it easy for people to connect and share information with friends, family, businesses and customers. Major food companies include their brand logo, product images and links to their website on their Facebook pages. This communication technique encourages consumers to 'like' a food company's Facebook page, giving them access to information about new product promotions, competitions and customer surveys. As followers of the product's Facebook page, their friends are immediately notified and encouraged to become followers too.

Regular posts by the food manufacturer help ensure that marketing messages spread quickly, with the aim of becoming widespread or 'viral'. These strategies mean that Facebook users become willing participants in spreading marketing messages on behalf of food manufacturers, with little incentive or reward required.

Latina Fresh Australia encourages its more than 26 000 Facebook followers to post comments and upload images to their page. A 2021 campaign, #WeGotTheWeeknight, gave followers tips and video demonstrations on how to prepare simple and delicious weeknight dinners using their preprepared pasta and sauces.



Alamy Stock Photo/Alisha Arif

Latina Fresh uses Facebook to connect with consumers and to encourage them to use its products in their cooking.

One image posted by a Latina Fresh follower showed smiling preschool children ready to eat a bowl of freshly cooked Latina pasta. The company commented on the image, highlighting the children's happy faces and suggesting that others could be a 'super mum' too by preparing a similar meal for their children. In doing so, they were appealing to consumer values such as concern for family, happiness, contentment, health and pride, encouraging other parents to purchase this product so they can feel that their children are equally happy and well cared for.

The types of images friends post on social media can also influence consumer food choice. Research by Aston University's School of Life and Health Sciences in the United Kingdom found that 'college students ate more fruit and vegetables if they believed their social media peers did the same. The same was true of negative dietary habits. College students indulged in more junk food if they perceived that their social media contacts did.'

WEBSITES

A comprehensive website that is easy for users to navigate is essential for every business. It is common practice today for consumers to search for a product or service online before making a purchase. Improving brand awareness is the key to increasing product sales, so websites are an important feature of any business.

Commercial companies

Websites are used by food retailers and food manufacturers to provide customers with information about their products. Major supermarkets such as Coles and Woolworths have extensive websites that help customers purchase their weekly shopping without having to step into a physical store. Online food purchasing became even more important to households during the COVID-19 lockdowns in 2020 and 2021. As well as providing product information, supermarket websites provide recipe ideas, healthier living tips, and information about sustainability and what's happening in the community. These features all aim to influence food choice and encourage consumers to purchase products.

Kellogg's is the manufacturer of some of Australia's favourite breakfast cereals, including Corn Flakes, Nutri-Grain, Rice Bubbles and Sultana Bran. Their website

includes not only information about their products, but also an extensive array of information about issues relating to health and wellbeing. By providing consumers with important health information, Kellogg's is helping to shape food information and food choice. For example, under the 'Health & Wellbeing' tab on their website, Kellogg's include a wide range of information important for good health. In 2021 some of the key features included were:

- *The Gut Bacteria Reef Report* highlighting the importance of our gut microbiome for good health
- *Facts About Fibre* providing consumers with important information about the relationship between fibre and gut health
- *Ditch the extreme diet,* which recommended developing long-term healthy eating and exercise habits rather than starting a fad diet that is restrictive and unrealistic.

The images used on the Kellogg's website depict happy, healthy children and families, and fresh and healthy breakfast foods. These images connect with consumer values of good health, happiness, family, fun, nutritious foods, ethical eating and sustainability.



Shutterstock.com/Slow Walker

The Kellogg's website provides a wide range of valuable health information to consumers about the fibre contained in its cereals.

Consumer organisations

Like commercial companies, consumer organisations have well-established websites that provide consumers with information and aim to influence and shape their food choices.

Nutrition Australia is a well-respected national organisation that aims to provide nutrition education to all Australians. Their website provides a wide range of resources for consumers in an effort to promote good health and reduce the incidence of lifestyle diseases among Australians. They provide fact sheets on nutrition and healthy eating, as well as delicious and healthy recipes to prepare at home. This form of media is easily accessible and helps shape consumers' knowledge by providing factual information from a trusted source.

Another strategy Nutrition Australia uses to influence food choice is their annual 'Try for 5' campaign. This campaign, held each October, encourages Australians to increase their consumption of fruit and vegetables to the recommended five serves per day.

Nutrition Australia

Reproduced with the permission of The Australian Nutrition Foundation Inc.

Nutrition Australia aims to shape consumers' food knowledge by providing fact sheets on nutrition and healthy eating.

BROADCAST MEDIA

News reports about current issues or events on television or radio are a key source of information for consumers. They are a powerful tool in shaping food knowledge by highlighting issues of nutritional importance. This information assists people to become more aware and knowledgeable about nutrition and food issues. However, it is critically important that news reports present a balanced view of these issues. News and current affairs programs may draw attention to issues such as fad diets or overweight and obesity, and present ways to help overcome these conditions, or they may question the validity of food fads and diets.

Television

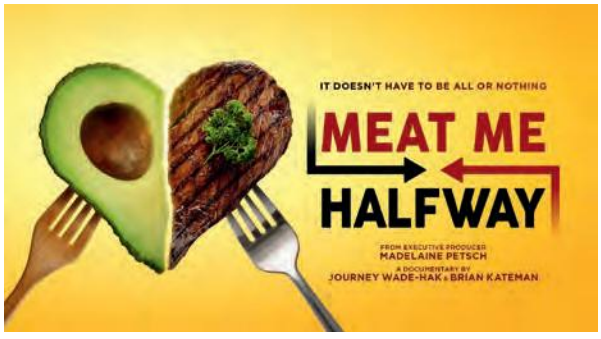
Recent research has shown that more than 50 per cent of Australians have access to an online streaming service to view a wide range of television programs, including current affairs programs, documentaries, programs about food or sport and movies.

MasterChef is one of the most popular reality programs on Australian television. The food industry and food businesses such as Coles and Nandos are key sponsors of *MasterChef Australia*. The program uses its cooking and culinary theme to advertise and promote particular food products and ingredients, such as Coles products. *MasterChef* contestants use fruit and vegetables supplied by Coles, and the Coles website features the recipes cooked by contestants. This marketing technique influences the food knowledge and choices of consumers who watch the series. The ingredients used in all the recipes prepared on the program are available at Coles supermarkets. For many viewers, watching *MasterChef* links with their values of healthy food, taking on a challenge, learning, knowledge and good fun. Others value the feeling of belonging to a community of like-minded people who enjoy good food.

Movies

Movies are another form of media that can provide information about food and shape food choices. Movies can present information in a dramatic and emotional way, and can impact on viewers' values. The 2017 documentary *What the Health* explores the impact of consuming a diet based on meat, fish, eggs and dairy products. The film encourages viewers to consider following a plant-based diet, and taps into viewers' values of good health and wellbeing.

The film *Meat Me Halfway*, released in July 2021, encourages individuals to reduce their consumption of meat. Brian Kateman, a co-founder of the Reducetarian movement, encourages viewers to consider the impact of meat eating on animal welfare and the environment, as well as the health impacts for consumers. This film too, endeavours to encourage viewers to adapt or change their food choices. The film highlights the values of ethics, environment, animal welfare and good health.



Reducetarian Productions, LLC

Meat Me Halfway is a US documentary that encourages viewers to eat less meat.

PRINT MEDIA

According to Roy Morgan, an Australian market research company, Australians are strong consumers of print media. Recent research shows that more than 16.8 million, or almost 80 per cent of all Australians read or accessed one of the main newspaper titles in the 12 months to March 2021. This research showed that magazine readership among Australians is also strong, with 15.6 million Australians (72.8 per cent) aged 14 or older having read or accessed a magazine or magazine content in the same period. This makes print media an ideal avenue to market food products to consumers.

Magazines

Magazines such as *Australian Healthy Food Guide* and *Body+Soul*, a section of the news.com.au weekend newspapers and website, feature articles that shape food choices by providing information about nutrition and healthy living.

Recent articles that have appeared in *Body+Soul* include 'Keep fighting fit this winter with our dietitian's top tips for a strong immune system', 'How sugar messes with our gut microbiome', and 'Does how you cook your veggies change how good they are for you?' These articles, and many more like them, provide important information to guide individuals and families in making sound food and lifestyle choices to maintain good health.

Australian Healthy Food Guide is a monthly magazine that provides consumers with information on healthy food choices. It has practical advice from expert dieticians and nutritionists, and tips on how to make sound food choices at the supermarket. It contains healthy recipes, including a nutritional analysis for each recipe, showing the energy the food contains, and listing nutrients such as fat, protein, carbohydrate and sodium.

Like other forms of media, supermarket magazines also play a role in shaping food knowledge, food choice and values. While the main focus of these magazines is to promote the sale of food products, they also include a wide range of information and articles, for example, on simple weeknight recipes, seasonal fruits and vegetables, and food preparation tips and tricks.



Australian Healthy Food Guide

Magazines can shape food choices by providing information about nutrition and healthy living.

Newspapers

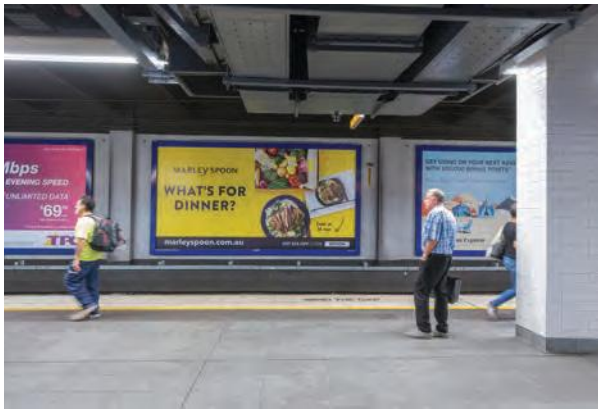
Full-page advertisements have become another way major supermarkets use the media to address consumer demands and demonstrate that they are responsible corporate citizens. In June 2021, Woolworths ran a series of advertisements in major newspapers to highlight the many strategies they are using to address consumers' environmental and ethical concerns. Over consecutive weekends, Woolworths promoted their environmental and ethical stewardship, highlighting strategies they are using to address issues such as animal welfare, reducing plastic packaging, reducing greenhouse gas emissions, fair trade and food waste. This strategy appeals to consumers' values of responsibility, trust, commitment, competence, honesty and respect.

Billboards

Billboards are another form of media that is widely used to shape food knowledge, choice and values. Billboards, particularly those used on bus shelters or at railway stations, have high visibility and a strong impact on consumers. Similarly, advertising banners on trains, trams, buses or in taxis surround the travelling public. Advertisers use a range of strategies to appeal to consumers' emotions, such as the use of colour and larger-than-life visual images to ensure their product is prominent and to get their message across.



Shutterstock.com/Jackson Stock Photography



Shutterstock.com/chinasong

Advertising billboards have high visibility and a strong impact on consumers.

Understanding the Text



Answers
Understanding the Text

1 Draw up a mind map to demonstrate the channels the media uses to connect with consumers.
2 Identify four values or emotions consumers may hold and explain how these values may influence food purchases.
3 Discuss the way in which the development of the smartphone has influenced food marketing.
4 Explain why social media is considered to be an effective marketing tool for food manufacturers.
5 Discuss the way in which Instagram #hashtags can be used as a promotional tool by food manufacturers. Give an example of a hashtag that has been trending recently to promote a particular food product or food trend.
6 Explain how food companies use Facebook as a means of promoting their products. Identify a company, other than that listed in the text, that uses Facebook to promote their products and describe the strategy they use.
7 Access the website of one of Australia's major supermarket chains and draw up a diagram to demonstrate the ways they attempt to shape consumer food choices and values.
8 Explain how programs such as *MasterChef* can impact on viewers' values and food choices.
9 Why are consumer advocacy organisations a valuable resource for consumers in guiding their food choices?
10 Draw a diagram similar to the one below to summarise the way the print media shapes the food knowledge, choices and values of consumers.

Magazines	Newspapers	Billboards

Strategies used to influence food information

Every person is exposed to food throughout their life. Via the internet, social media, print or broadcast media, food is advertised to appeal to our senses of sight, smell, taste and touch. Food marketers and food manufacturers use a range of strategies to elicit emotional and psychological responses to their products, including the use of data analytics, social media influencers, the colours used on food packaging and in advertisements, as well as images that appeal to consumer emotions and values.

DATA ANALYTICS

All forms of media collect data on their audiences. Once the research data has been collected, the research team uses **data analytics** – a process of examining raw data to draw conclusions about that information. This information enables the media and also the food industry to make better marketing decisions. Powerful, analytical software mines data from the internet and web and social media applications, identifying patterns of user behaviour. This information helps them prepare and refine their marketing techniques in order to influence and shape consumers' food choices.

Social media analytics uses metrics such as likes, follows, tweets and retweets, hashtags, previews and clicks to measure how well a brand is performing on a particular issue or topic.

Data collection and data targeting allow organisations and companies to track a customer's online journey and target the data they receive. Using this technique means that the company is targeting individuals, rather than broad age groups or demographics. Retailers such as Woolworths and Coles track shoppers' habits through their loyalty cards and then send targeted promotions to their customers, offering special prices on foods they regularly buy. This technique is called micro-targeting, and these personalised messages are based on the profiles collected based on past buying behaviours and online browsing habits. This has benefits for the consumer, as it gives them the opportunity to buy their preferred products at special prices.

The ability of a company to identify their audience or target market is increasingly important. Food companies need to be able to create personalised, relevant messages in the right medium and context in order to reach their desired market and influence consumers' food choices.

SOCIAL MEDIA INFLUENCERS

Influencer marketing is a key strategy used in all forms of media, but particularly on social media platforms. Many food manufacturers use popular personalities or influencers to motivate buyers to purchase a particular product. Influencers can have millions of enthusiastic followers, and therefore have the ability to communicate a message to a broader market, boosting the brand's visibility. Influencer marketing is often described as 'viral' marketing, as followers are encouraged to pass on the message to family and friends via #hashtags or 'likes'.

Supermarkets and food manufacturers often work with influencers such as celebrity chefs to promote the supermarket chain and market particular food products. These chefs are often authors of bestselling recipe books, and have a following of dedicated cooks. Their influence has a considerable impact on food knowledge and food choice.

Jamie Oliver is a celebrity chef and restaurateur who has become a media personality presenting food-focused television shows, cookbooks and a global campaign for better food education, particularly for young people. He has teamed with Woolworths supermarkets to promote fresh food and fresh food ideas, and has created a range of easy-to-cook dishes for time-poor consumers. Jamie's recipes and ideas feature in the *Woolworths Fresh* magazine, which is a free publication available in store. This magazine encourages consumers to use Jamie's recipes and ideas and 'get cooking' to prepare healthier food.

Other influencers such as Ayeh Far (@cookingwithayeh) have developed a loyal following among people who want to pursue a similar food or health journey. Through her website and social media accounts, Ayeh shares her passion for easy, everyday plant-based recipes such as 'pasta chips' with more than 670 000 followers.

Unlike many other influencers, Ayeh does not generally promote particular food products, but instead encourages the use of healthy ingredients and shares recipes with her followers. In doing so, she is shaping the food information available to consumers and encouraging them to choose healthy food options. Her promotion of plant-based eating elicits emotional responses to her food by demonstrating the fun and enjoyment her followers can gain by preparing their own meals. Ayeh also targets her followers' values of ethics, good health, family and environmental responsibility.



Shutterstock.com/Barbara Neveu

Influencer Ayeh Far's recipe for pasta chips was very popular with her thousands of followers.

USE OF COLOUR

Colour plays an important role in marketing food. Consumers take only moments to choose to pick up a product from the shelves, and colour registers much faster than the text written on the package.

Different colours are used for different purposes and for different consumer personality types. The use of colour is also intended to appeal to consumers' values and emotions. For example, gourmet items are designed for the sophisticated consumer, and so the packaging tends to be in tasty, earthy tones and colours rather than bright hues.



Shutterstock.com/olesea vetrila

Pukka packages its gourmet tea in colours that depict their key ingredients.

Packaging colour is also influenced by trends – a green colour is often used to depict foods that are considered healthy and environmentally friendly. Blue is not often used for food packaging, other than milk and water. Colour is also important to ensure that the product looks appealing. For example, packaging that includes an image of green potatoes

or brown bananas is unlikely to appeal to customers. Bright colours are also used to depict fun products that may lack nutritional appeal; for example, the confectionary aisle shows brightly coloured packaging on nearly every product.

Food brands have emotional dimensions, too, and these are used to appeal to customers. A brand's personality is communicated to customers by the packaging, the product's picture, and the words that are used to describe the product. Unusual names can encourage a consumer to purchase the product. For example, naming the colour of a jellybean 'razzamatazz' is more likely to create interest than calling it 'yellow'. Describing the colour of a product as 'mocha' will have more impact than calling it 'brown'. Certain colours represent certain aspects of a brand's personality, such as brown representing ruggedness, purple for sophistication and red for excitement.



FIGURE 6.3 The colours of emotions

USE OF IMAGES

Food manufacturers and marketers recognise that the images they use to promote their product have a significant impact on consumers. Images are a more powerful marketing tool than text – as the saying goes, a picture is worth a thousand words. Consumers 'read' an image, and this enables them to visualise the product and make a decision about whether to purchase it. Images promoting food products often show people who are smiling, laughing and having fun with family members. These images elicit emotional and psychological responses and link the product to values including good health, happiness and fun.



Getty Images/SDI Productions

Food-promotion images showing people smiling and laughing link to our emotions and values of good health, happiness and fun.

The use of cartoon characters is another strategy employed by food companies to market their products. In 2020, Pauls launched a range of yoghurt for children featuring the popular cartoon character Bluey and her family. These cheeky blue heelers are fun, easily recognised characters loved by young children – and by their parents, too! Bluey and her family have become much-loved characters because they highlight everyday experiences that many parents can relate to.

In the media release announcing the new product range, Pauls states that using Bluey and her family will 'bring fun to the exciting Australian children's brand'. While highlighting the nutritional value of their yoghurt, the company also taps into the issue of a busy family life and the challenge of getting children to eat well. These strategies appeal to parents' emotions and their values of caring and concern for good health and family.

The use of popular cartoon characters such as Bluey to promote products also encourages 'pester power'. Repetitive advertising through the media or placing products being marketed to children on lower shelves in the supermarket encourages them to 'pester' or 'nag' their parents to purchase those products.



AAP Image/Supplied by Australian Broadcasting Corporation

Images of Bluey and her family are widely used to promote products as they are fun, easily recognised characters loved by young children.

Emotional and psychological responses to food

When we eat food it can have an effect on our emotions and our psychological wellbeing. Eating creates a series of chemical responses that often bring pleasure, and can have a positive effect by making people feel calm. However, some people have a problematic relationship with food. A person's perception of their body image can prompt them to go on a restrictive diet in order to better conform to the ideal image depicted in the media. Others use food as a coping mechanism, resorting to comfort eating in times of stress and anxiety.



Collaborative Activity

BODY IMAGE

Body image is a person's perception of their physical self and the thoughts and feelings that result from that perception. According to the Butterfly Foundation, 'Our body image is formed by the thoughts, feelings, attitudes and beliefs we have about our bodies and how we look. This includes our shape, size, weight, gender identity, and the way our body functions for us.'

The feelings we have about our body differ at various times in our lives. Sometimes we can feel positive or satisfied with our body, while at other times we might have negative feelings and be dissatisfied. While our feelings about our body image might fluctuate at various times in our lives, we might also go through stages of neutrality or indifference about our body image.

Issues around body image can affect anyone, regardless of their age, gender or culture. However, research has shown that body image is a major concern for young Australians in particular. CEO of the Butterfly Foundation, Kevin Barrow, stated that 'body image is the third major personal concern of Australians aged 15–19, just behind stress and mental health and ahead of school or study problems and physical health. In fact, 33 per cent have serious concerns about body image'.

Many factors contribute to poor body image, such as being teased about appearance as a child and pressure to be thin, especially among teenage girls and young women. Research has shown that images portrayed in the media and advertising play a critical role in influencing body image. Often these images promote a particular appearance that is depicted as desirable and ideal. People of all ages are exposed to images of movie stars, models and high-profile sports people that are often unrealistic.

This influence plays a critical role in persuading young people to conform to this ideal, often at the risk of their health. If a person feels they are unable to 'measure up' to these images, feelings of body dissatisfaction can have a damaging effect on a person's psychological and physical wellbeing.

The 'ideal' female body as it is depicted in social media, magazines and on television, is characterised by thinness, which can create unrealistic expectations in many young women. Many females with a negative body image focus on attempting to lose weight, often attempting to achieve a body image that may be unobtainable. The ideal body for males is portrayed as lean and muscular, and adolescent males tend to focus on either weight loss or body building to develop a more muscular physique.

What is often forgotten is that images of celebrities are often digitally altered and highly edited to enhance particular characteristics, or to minimise less desirable features. Enhanced lighting, various filters, airbrushing and photoshop are all used to make models or influencers appear as though they have the 'perfect' body.

Behaviours and consequences of poor body image

People with a positive body image have been shown to generally have a high level of physical and psychological health. They normally have high levels of self-esteem, and consequently feel good about themselves and are comfortable with how they look. As a result, they find it easier to cope with their daily life, and the unrealistic body images portrayed in the media have less impact on them. Research also shows that a positive body image will lead to a healthier, more balanced lifestyle, and healthier attitudes and practices around food and exercise.

However, the development of a negative body image can be problematic. Body image problems often occur at stressful stages during the lifespan, especially during adolescence, but research shows that negative body image is more frequently becoming an issue during childhood. The desire to lose weight and make physical changes to the body

encourages people to adopt disordered eating habits such as restrictive diets, or comfort or emotional eating. According to the Butterfly Foundation CEO Kevin Barrow, 'body image issues are a serious problem in Australia and can lead to depression, social anxiety and eating disorders.'

RESTRICTIVE DIETING

Restrictive dieting is associated with fad diets that ban certain foods or food groups, and promise quick, dramatic results. The use of restrictive dieting is closely linked to our emotional and psychological responses to food. Many people go on a restrictive diet in order to lose weight or body fat and to improve their self-esteem. However, while losing weight may have a positive impact on their emotions, if they cannot maintain the rigid eating routine imposed by the diet the person is likely to gain weight, causing them to become unhappy or even depressed. Some popular restrictive diets are low-carb, high-fat diets, intermittent fasting diets and vegan or plant-based eating.

5:2 intermittent fasting diet

The 5:2 diet has become a very popular form of restrictive diet. People who follow this diet eat normally for five days of the week and restrict their food intake to no more than approximately 2500 kilojoules for the other two days. Followers can eat 2–3 very small meals on their fasting days. While there are restrictions on the types of foods that can be eaten, followers should try to eat healthy whole foods and avoid junk food.

16:8 intermittent fasting diet

The 16:8 intermittent fasting diet is another form of restrictive dieting that only allows the person to consume food for an eight-hour period each day. They fast, or avoid food, for the remaining 16 hours. Most people who follow the 16:8 diet refrain from food during the night and most of the morning, and then consume food between 12.00–8.00 p.m., for example. There are no restrictions to the types of food that can be eaten under a 16:8 restrictive diet.

Keto diet

The keto (or ketogenic) diet is based on consuming foods that are high in fat but low in carbohydrates. This means most meals should consist of foods high in protein and fat, such as meat, fish, eggs, nuts and monounsaturated or polyunsaturated fats and oils. This diet also limits the consumption of carbohydrate foods to no more than approximately a quarter of a cup per day. Carbohydrate foods that should be avoided on a keto diet include rice, pasta, breakfast cereal, most fruit, root vegetables, beans and legumes and most processed foods.

Vegan or plant-based diet

People who follow a vegan diet eat only foods from plants, including wholegrain cereals, vegetables, fruit, nuts and seeds. A vegan diet is a restrictive diet as it excludes any animal products such as meat, poultry, fish, dairy, eggs and honey. People who choose to follow a vegan or plant-based diet often do so for the perceived health benefits, while for others, their decision is based on ethical or environmental concerns.

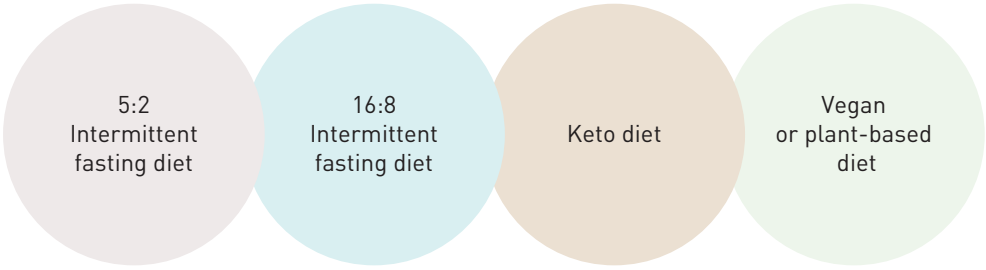


FIGURE 6.4 Types of restrictive diets

Behaviours and consequences of restrictive dieting

Severely restricting the amount of food you eat can have a significant effect on health. Evidence shows that one of the most significant physical consequences of restrictive dieting is that most people inevitably end up gaining weight once they resume their normal eating patterns.

If the body does not receive sufficient food it goes into 'survival' mode, and reduces the rate at which it burns energy; that is, it reduces the body's metabolic rate. When a person loses weight, they lose muscle tissue as well as fat. This is problematic because it is the muscle that burns kilojoules. As a consequence, when the person resumes eating normally, they will gain weight because they have less muscle, meaning their metabolic rate will be slower and the body will burn even fewer kilojoules.

There is strong medical research to show that restrictive dieting can also have a significant impact on a person's emotional and psychological wellbeing. Some people develop emotional stress and may become anxious and depressed if their attempt to follow a restrictive diet is unsuccessful. Often, people who undertake a restrictive diet isolate themselves from friends and family because it is very difficult to catch up over a meal if they are severely limiting their food intake. As well as limiting their social interactions, some people may also avoid participating in sports they have enjoyed in the past, or limit their interactions at work. This emotional and psychological response to dieting can often lead to lower self-esteem, and as a result, the cycle may be perpetuated.

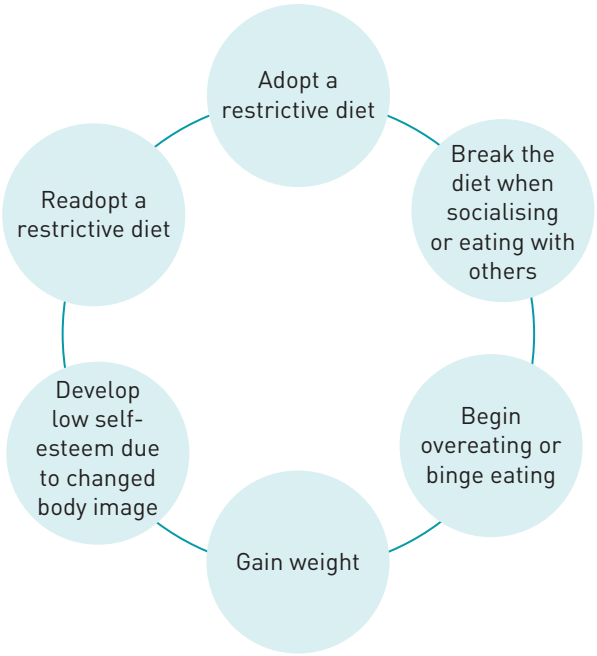


FIGURE 6.5 The cycle of restrictive dieting

Activity 6.2

Worksheet

Analysing restrictive diets

1 Select two restrictive diets and analyse the consequences of each diet using a PMI (plus, minus, interesting) chart like the one below.

2 Analyse each diet for weight loss and health using the following headings:
- Exclusion of certain foods or food groups
- Promises of quick dramatic results
- Sound scientific evidence backing the diet
- Health risks associated with the diet
- Long-term maintenance after returning to a normal diet

3 Make recommendations about the diets to ensure weight loss and health of people who follow these diets.

PLUS	MINUS	INTERESTING
Restrictive diet 1:		
Restrictive diet 2:		

COMFORT EATING

Comfort eating refers to food consumption that is driven by the desire to make ourselves feel happy, rather than to satisfy hunger.

We all have a range of emotions and sometimes our emotions can swing – we might feel happy and excited one day and unhappy, sad or frightened the next. Stress, loneliness, anger and boredom are all emotions we experience at times. Grief, for example,

can be a very difficult emotion to manage. However, while most of us cope with our emotions without too much difficulty, some people turn to food and use it to numb their emotions in times of stress – that is, they comfort eat. This eating behaviour is an unconscious response to coping with challenging emotions. People who are comfort eaters are often those who are depressed or extremely self-critical of their body image.

Comfort eating is commonly a behaviour we have learned as children – parents or carers often comfort children by giving them a favourite food to stop them from crying or to overcome some hurt. And food can be a comfort, at least for a few minutes!

When we turn to food to relieve feelings of boredom, stress or anxiety or to reward ourselves, we generally turn to unhealthy or junk foods.



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Foods high in fat and sugar often provide comfort in times of stress.

There are sound biological reasons why fatty and sugary foods provide comfort. Fat and sugar trigger the release of endorphins and dopamine – the body's feelgood chemicals. These chemicals induce a natural high, but when this recedes, guilt and depression may set in. Opening a packet of biscuits or chocolate is often used as a quick fix, and can help some people avoid difficult feelings. It is often said that these people manage their emotions and moods with food.

Consequences of comfort eating

There are a number of health risks associated with comfort eating. Many people who are comfort eaters are overweight because they cannot self-regulate their eating, and so consume far more kilojoules than they need. Comfort or emotional eaters who become overweight may consequently develop type 2 diabetes and heart disease. They are also likely to develop high blood pressure and high cholesterol, leading to stroke or chronic kidney disease. Becoming overweight or obese can also lead to osteoarthritis, or a degeneration of the joints leading to cartilage loss.

It has been shown that comfort eating does not necessarily help overcome emotional issues, and can in fact make them worse. Often people who are comfort eaters do not resolve their original feelings of anxiety or stress, and are also left with additional feelings of guilt for overeating.

Practical Activity 6.3

Product analysis: Homemade Monte Carlo vs Arnott's Monte Carlo biscuits

Aim

To determine whether a commercial Arnott's Monte Carlo biscuit or a homemade Monte Carlo biscuit is the most appealing to eat as a comfort food.

Method

1. With a partner, prepare the recipe for Monte Carlo biscuits on page 158.
2. As a class, calculate the ingredient cost of preparing the homemade biscuits.
3. Your teacher will provide you with a sample of the commercial biscuit.
4. Once you have cooked the Monte Carlo biscuits, assess the sensory properties of both the homemade and commercial varieties.
5. Taste test each biscuit and complete the sensory analysis in a table like the one on page 148.
6. Complete the analysis questions.

	HOMEMADE MONTE CARLO	ARNOTT'S MONTE CARLO
Cost per biscuit		
Appearance		
Aroma		
Flavour		
Texture		
Nine-point scale 1 = dislikes a lot 5 = neutral 9 = likes very much		

Analysis

1 Which biscuit had the most appealing sensory properties? Justify your decision.

2 Identify one social factor that may influence a consumer to purchase the commercial version of the biscuit rather than bake their own. Explain the connection between the social factor identified and comfort eating.

3 Discuss one benefit of baking your own biscuits rather than buying a commercial variety.

4 Eating biscuits could be considered comfort eating. Explain how comfort eating can form part of a healthy diet.

Conclusion

Based on the taste test of the biscuits and your responses to the analysis questions, would you be more likely to eat a commercial Arnott's Monte Carlo biscuit or a homemade Monte Carlo biscuit as a comfort food? Justify your decision.

Activity 6.4

Fending off the snack attack

Read the article that follows, then answer these questions:

1 Evaluate the validity of the news article by assessing the source, purpose, context, presentation of evidence and language used. Alternatively use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this news article. See pages 193–94 for additional information on completing a CRAAP test.

2 Outline two positive changes to the daily routine of some Australians during the COVID-19 restrictions.

3 Draw up a mind map to identify the key findings of global research into the dietary habits of individuals during lockdown.

4 Outline the types of comfort foods that people resorted to eating during the COVID-19 pandemic and discuss the reasons they chose these types of food.

5 Explain the meaning of the term 'COVID-washing' in relation to marketing strategies used by junk-food companies.

6 Discuss the relationship between comfort eating and the impact on physical and mental health. Use examples from the article to support your answer.

FENDING OFF THE SNACK ATTACK

It was pre-9am when I caught my partner snacking on, and sharing with our three-year-old daughter, some COVID-baked chocolate brownie I made the previous day.

I feigned shock, but really, who was I to judge when by 9.30am I'd succumbed to a slice myself.

Dessert for breakfast, breakfast for dinner, stress snacking, boredom binges and COVID baking: topsy-turvy habits have formed in the topsy-turvy world we're living in. And who can blame us?

This pandemic has upended many of the rhythms and routines in our lives, our eating patterns included. Research from around the world has suggested that the changes brought about by the pandemic have been both positive and negative.

On the one hand, more families are sharing meals together, which benefits everyone.

Not only is it related to reduced rates of obesity and enhanced emotional wellbeing, it adds some predictability and routine at a time that can be very fragmented, says Anne Fishel, an Associate Clinical Professor of Psychology at Harvard Medical School.

Some research also suggests that because people are cooking at home more and eating out less, they are eating more fruits and vegetables.

A review of the global research on the dietary habits of people in lockdown, published in March, found that many people were snacking more, eating more meals and consuming more comfort foods including sweets, fried food, snack foods, and processed foods.

Many people also reported weight gain and a reduction in physical exercise. Australian research echoes these findings.

A CSIRO survey of 3 745 people, published in June 2020, found about one third of respondents felt their diet had been worse during the restrictions; almost 40 per cent said they felt like they had gained weight.

Lead author, Emily Brindal, says that having the odd treat can help get us through stressful times and shouldn't have a big impact on our health or weight: 'But when it becomes a habit – or something that we are doing regularly without much thought – it is likely to create issues.'

Separate research, a collaboration between the University of Sheffield and Flinders University published in May, found 49 per cent of respondents reported snacking more, particularly on high-energy density foods.

Across the different studies, increased snacking and consumption of comfort foods was associated with higher levels of stress and anxiety.

This is something junk food companies are taking advantage of by 'COVID-washing' their products: boosting the image of their brand by including messages of concern or support for people's struggles during the pandemic.

It may be the result of COVID-washing or the hyper-palatability of processed foods, but Professor Felice Jacka is unsurprised we're turning to brownies for breakfast or salty snacks now more than ever.

'The food industry spends an incredible amount of effort, time and money to create "foods" that hit the reward systems in our brains most effectively,' explains Jacka, the director of Deakin University's Food and Mood Centre. 'This means that ultra-processed foods are particularly tempting when we're feeling low or stressed and need a boost of pleasure – similar to alcohol and online shopping.'

'[They] can exacerbate our anxiety and low mood,' Jacka says. 'And the current evidence suggests we can do some damage to our gut microbiota with even small binges on these foods.'

Nicole Dynan, an accredited practising dietitian adds that the detrimental effect on our gut health can affect both our physical and mental health.

'Poor dietary habits can result in fatigue as well as an increase in inflammation within the body which has been linked with chronic health conditions, including depression,' Dynan says.

She explains that this is because our nervous system and our gut are connected by neural pathways and serotonin (the happy hormone) which helps to regulate both our mood and basic gut functioning.

Still, there will be days when we may well need a chocolate brownie for breakfast. After all, the point isn't to come out of this pandemic the healthiest, most glittering versions of ourselves, but to come out alive and with our sanity intact, reminds Brindal.

'A unique opportunity: How the pandemic has changed the way we eat', by Sarah Berry, *Sydney Morning Herald*, 12 August 2021. The use of this work has been licensed by Copyright Agency except as permitted by the Copyright Act, you must not re-use this work without the permission of the copyright owner or Copyright Agency.

Understanding the Text

11 What is data analytics and why is it an important aspect of market research?

12 Explain how a large supermarket uses data analytics to influence the food choices of their customers.

13 Explain how social media influencers can affect the food choices and values of their followers. Give an example of how a social media influencer you follow has impacted on your food choices.

14 Discuss the way the colour used in the design of food packaging can influence consumer choice. Select three colours and give examples of products that match the emotion linked to each colour.

15 Write a short paragraph to explain why cartoons are a very effective strategy in marketing food to children.

16 Draw up a summary frame on body image. In your summary frame, include:

- a definition of body image
- why our feelings about our body image may differ at various times
- the factors that can contribute to the development of a poor body image
- the outcomes of a positive body image
- the problems associated with a poor body image.

17 Explain the similarities and differences between a 5:2 intermittent fasting diet, a 16:8 intermittent fasting diet and a keto diet.

18 Describe how following a restrictive diet can impact on emotional and psychological wellbeing.

19 Explain what is meant by comfort or emotional eating.

20 Describe the possible emotional and psychological consequences of comfort eating.

Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

Analysing information

Select a form of social media such as TikTok, Instagram or Facebook and prepare a SWOT analysis on the effectiveness of this type of social media in marketing a food product.

TYPE OF SOCIAL MEDIA:	
Strengths	Weaknesses
Opportunities	Threats

Evaluating concepts

Write a letter to the editor of a newspaper recommending changes to television advertising of junk food during children's viewing times.

Worksheet

EXAMINATION-STYLE QUESTIONS

Answers
Examination-style questions

Resources
Preparing for exams support

Question 1 (6 marks)



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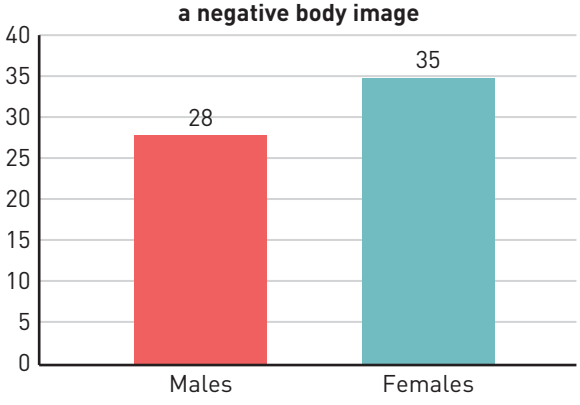
A new brand of baked beans is about to be launched onto the market. One aspect of the marketing campaign will focus on the food label.

Discuss the way in which the design of the label could impact on consumer emotions and values and shape their food choices.

Question 2 (14 marks)

Current research indicates that many Australian adolescent girls and boys are unhappy with their body image.

Percentage of young Australians who have a negative body image



Source: Beyond Blue

a Explain the meaning of the term 'body image' and describe how body image is formed. [3 marks]

b With reference to the graph, describe how the body image of both adolescent girls and boys can be influenced by food marketing. [6 marks]

c Discuss how an individual's perception of their body image can have both positive and negative impacts on their health. [5 marks]

Question 3 (6 marks)

In their sustainability program, Woolworths have committed to:

- 100 per cent of food waste being eliminated from landfill by 2025
- all stores being powered by renewable electricity including wind and solar energy by 2025
- the packaging of 'Own Brand' products using reusable, recyclable or compostable material
- the removal of all single-use plastic items for sale from stores
- improve animal welfare standards.

Analyse the role of media in shaping food information and influencing consumers' values and food choices. Refer to the Woolworths sustainability campaign in your response.

Question 4 (5 marks)

Discuss how social media influencers use platforms such as Facebook, TiKTok and Instagram to shape their followers' values, food knowledge and food choices.

Question 5 (5 marks)

'Social media can influence the way you eat and your choice of food, and it is not necessarily healthy.'

Discuss this statement.

Green-tea noodles with chicken and edamame beans

Green-tea soba noodles are the star of this dish. Soba noodles are a popular Japanese noodle made from buckwheat. They are a delicate pale green colour, similar to green tea, and their soft texture provides a great contrast to the firm mouthfeel of edamame beans. Miso, one of the key flavouring ingredients used in this recipe, is a paste made from soy beans. White miso is used in this recipe as it has a more mild flavour than red miso. This recipe includes a variety of green vegetables, so is a good source of vitamins and minerals, while the chicken provides an excellent source of protein.

1 small chicken breast fillet (150 grams)

2 cups fresh baby spinach, firmly packed (75 grams)

1 cup (25 grams) coriander

2 spring onions, finely sliced

½ long red chilli

1 clove garlic, crushed

1 teaspoon fresh ginger, finely grated

1 tablespoon white miso

½ lemon, juiced

1 teaspoon sesame oil

80 grams green-tea soba noodles

100 grams frozen edamame beans, thawed

METHOD

Poaching the chicken

1 Slice the chicken breast fillet in half lengthwise.
2 Place the chicken in a medium saucepan and cover with cold water. Bring to the boil, reduce the heat and simmer for 10 minutes.
3 Remove the chicken from the saucepan and set aside to cool. Reserve the poaching liquid. Shred or slice the chicken thinly.

Making the spinach and coriander sauce

1 Reserve one small handful each of spinach and coriander and half of the chopped spring onion to serve.
2 Slice the red chilli into very fine julienne shreds. Set aside to serve.
3 Place the remaining spinach and coriander, chopped spring onion, garlic, ginger, miso, lemon juice and sesame oil in a food processor. Add ¼ cup of the reserved chicken poaching liquid and blend until smooth.
4 Bring a medium saucepan of water to the boil and add the green-tea soba noodles. Cook for 5 minutes, until tender. Drain, rinse well and drain again.
5 Place the green-tea soba noodles in a serving bowl. Add the shredded chicken, edamame beans and spinach and coriander sauce and gently toss through the noodles.
6 Add the reserved spinach, spring onion and julienned red chilli. Very gently toss again.
7 Garnish with the reserved coriander leaves.

SERVES 1-2

Alternative ingredients

For a gluten-free alternative, substitute the green-tea soba noodles with rice or sweet potato noodles.

EVALUATION

1 Describe the sensory properties – appearance, aroma, flavour and texture – of the green-tea noodles with chicken and edamame beans.
2 Green is a significant colour in the final presentation of this main meal. Discuss how this could influence and reflect consumers' values and emotions when making their food choices and serving this meal to others.
3 Outline why poaching is considered a healthy method of cooking.
4 Classify the ingredients used in the green-tea noodles with chicken and edamame beans on a diagram of the Australian Guide to Healthy Eating.
5 Use the data from question 4 to evaluate the nutritional quality of the meal according to the guidelines of this food selection model.



Mark Fergus Photography

Broccolini and snow pea salad

Blanching vegetables heightens the colour and sets the flavour of vegetables. The goal for this green salad is to have all the vegetables bright green and 'al dente', so the cooking times are critical. The broccolini, beans and snow peas used in the preparation of this salad provide a good source of vitamins, especially vitamins A and C, with some folate, vitamin E and potassium. The vegetables are also high in dietary fibre and contain some protein. This salad complements meat, fish and poultry dishes with Asian flavours.

VEGETABLES

2 stalks broccolini
6 green beans
6 snow peas
1 teaspoon black sesame seeds
1 sprig coriander leaves

DRESSING

1 tablespoon tahini paste
1 tablespoon water
½ small garlic clove, finely chopped
½ teaspoon honey
2 teaspoons apple cider vinegar
3 teaspoons mirin
pinch of salt

METHOD

Preparing the vegetables

1 Trim the broccolini and cut lengthways to create stems that are the same size as the green beans.
2 Fill a medium saucepan with water and bring to the boil. Add the green beans first, then add the broccolini 30 seconds later. One minute later, add the snow peas and cook for another 30 seconds.
3 Drain and refresh in iced water.
4 Drain well again before serving.

Preparing the dressing

Combine all the ingredients in a small bowl and whisk together. Add extra water if it is too thick – the dressing should be a pouring consistency.

To serve

Place the mixed green vegetables on a serving plate. Drizzle with the dressing and then sprinkle with black sesame seeds and coriander leaves. Serve immediately.

Note: If black sesame seeds are not available, substitute with toasted sesame seeds.

SERVES 1

EVALUATION

1 Describe the sensory properties of the two elements of this recipe – the green vegetables and the dressing.

2 From a nutritional perspective, explain why the green vegetables are blanched and not boiled. List another cooking method that could achieve a similar outcome to blanching.

3 Why might some consumers select organically grown vegetables over conventionally produced vegetables for this salad?

4 The colours used when advertising food can create different emotions. Green is often said to be used to promote foods that are beneficial for growth and health. Do you agree or disagree with this suggestion? Write a paragraph to defend your opinion.

5 Plot the ingredients used in the broccolini and bean salad on a diagram of the Australian Guide to Healthy Eating. Evaluate the nutritional quality of the salad according to the guidelines of this food selection model.



Mark Fergus Photography

Sticky chicken wings

Chicken wings are often served as a finger food and are something that both children and adults enjoy. They can also be eaten as a light main course or included as part of a shared table. This recipe uses both boiling and baking to cook the chicken wings, which makes them very moist and tender. The combination of Asian herbs and spices gives the chicken wings a delicious complex flavour profile. The chicken wings provide a good source of protein; however, the honey and soy sauce add sugar and salt to the diet.

4 chicken wings

MARINADE

1 clove garlic, crushed

2-centimetre piece of fresh ginger, peeled and grated or finely diced

¼ teaspoon ground coriander

pinch of cinnamon

¼ teaspoon smoked paprika

¼ teaspoon dried chilli flakes

1 tablespoon honey

1 tablespoon soy sauce

1 tablespoon vegetable oil

½ lemon, juiced

pinch of salt

1 tablespoon coriander, chopped

1 tablespoon mint, chopped

METHOD

1 Remove the tips from the chicken wings then cut them in half at the joint.
2 Fill a large saucepan with salted water and bring to the boil. Add the chicken wings and simmer for 10 minutes. Drain the wings, then lay them out on paper towel and pat dry.
3 Combine the marinade ingredients in a large bowl. Add the chicken wings and toss them through the marinade, then leave to rest at room temperature for 30 minutes.
4 Preheat the oven to 200 °C and line a baking tray that has an edge on all sides with baking paper.
5 Remove the chicken wings from the marinade (reserve marinade) and place on the tray in a single layer. Bake in the oven for 10 minutes – turn after 5 minutes. The wings will caramelise and may char on the edges. The juices of the chicken should be clear.
6 Pour the marinade into a small saucepan and bring to the boil. Reduce the heat to simmer until the marinade starts to thicken. Brush over the cooked chicken wings.
7 Sprinkle with chopped coriander and fresh mint.

SERVES 1

Serve with rice and Asian greens such as steamed bok choy.

EVALUATION

1 Describe the sensory properties of the sticky chicken wings – appearance, aroma, flavour and texture.
2 Explain why, according to the Australian Guide to Healthy Eating, it is important to include foods such as chicken in the diet.
3 Justify why, according to the nutritional rationale of the Australian Dietary Guidelines, it is important to limit the consumption of fats such as vegetable oil.
4 Classify the ingredients used in sticky chicken wings and rice served with Asian greens such as steamed bok choy on a diagram of the Australian Guide to Healthy Eating.
5 Use the data from question 4 to evaluate the nutritional quality of the meal according to the guidelines of this food selection model.



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Monte Carlo biscuits

Monte Carlo biscuits have been a favourite sweet treat with Australian families since they were first produced by Arnott's in 1926. These biscuits are really two biscuits in one, sandwiched together with a delicious creamy icing and raspberry jam. Making your own raspberry jam adds a more intense raspberry flavour to the biscuits than can be achieved by using a commercial jam. If time is short, the raspberry jam can be made in advance and stored in the pantry until you are ready to make the biscuits.

RASPBERRY JAM

1 × 250 millilitre screw-top jam jar

300 grams frozen raspberries

300 grams sugar

BISCUITS

90 grams butter, at room temperature

¼ cup (50 grams) brown sugar

½ teaspoon vanilla essence

½ egg, beaten

100 grams self-raising flour, sifted

¼ teaspoon bicarbonate of soda

⅓ cup (35 grams) desiccated coconut

¼ cup raspberry jam

ICING

30 grams butter, at room temperature

¼ teaspoon vanilla essence

½ cup icing sugar, sifted

1 teaspoon milk

METHOD

To make the jam

1 Sterilise the screw-top jam jar. To sterilise the jam jar, place the clean jar in the oven at 100 °C until required.
2 Place the raspberries and sugar in a medium saucepan. Stir over a moderate heat until the sugar has dissolved.
3 Bring to the boil and cook, stirring constantly, for approximately 15–20 minutes, until the mixture reaches 106 °C on a sugar thermometer or until the jam gels when tested on a cold saucer.
4 Remove from the heat. Pour into the hot sterilised jar and seal immediately.

To make the biscuits

1 Preheat the oven to 180 °C. Line one large or two small baking trays with baking paper.
2 Cream the butter, brown sugar and vanilla essence together with a hand-held beater until very pale in colour.
3 Using a plastic spatula or metal spoon, stir in the beaten egg.
4 Stir in the sifted self-raising flour, bicarbonate of soda and coconut, ⅓ at a time and mix until well combined.
5 Roll rounded teaspoons of the mixture into ovals – they should be approximately 15 grams in weight. Each biscuit should be exactly the same size for this recipe, so weighing the mixture will ensure accuracy.
6 Place the biscuit ovals on the prepared trays, leaving a little room for them to spread.
7 Flatten each biscuit slightly with a fork dipped in flour.
8 Bake for approximately 9 minutes, until a light golden brown.
9 Allow to cool on the tray for 5 minutes before placing on a cake cooler.

Icing

1 Cream the butter, vanilla and icing sugar together until smooth and creamy. Adjust the consistency using the milk to make a smooth, spreadable icing.
2 Once the biscuits are cool, sandwich the biscuits together with a small amount of icing and ½ teaspoon raspberry jam.

MAKES 20 INDIVIDUAL BISCUITS OR 10 PAIRS

EVALUATION

1 Describe the sensory properties of the Monte Carlo biscuits – appearance, aroma, flavour and texture. Consider each element separately – biscuit, jam and icing.
2 Classify the ingredients used in Monte Carlo biscuits on a diagram of the Australian Guide to Healthy Eating.
3 Use the data from question 2 to evaluate the nutritional value of the biscuits as a snack according to the guidelines of this food selection model.
4 Monte Carlo biscuits are an example of comfort food. Explain what this term means.
5 Explain why eating comfort foods regularly could be a concern from a body image point of view.



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COMPONENTS OF THE AUSTRALIAN FOOD SYSTEM

FOOD PRODUCTION

PRIMARY PRODUCTION

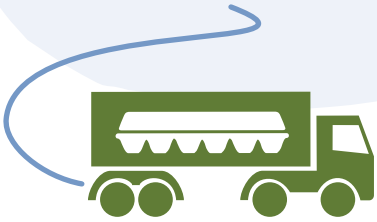
- Agriculture, horticulture, fisheries
- A wide range of plants and animals are produced for human consumption





FOOD PROCESSING AND MANUFACTURING

- Food processing: turns raw food products into ingredients for use in food manufacturing – olives into olive oil, flour into pasta
- Food manufacturing: value-added food products – precooked rice, chilled or frozen meals
- Packaging: processed food is packaged with required labels for distribution and retail sale



FOOD RETAILING AND MARKETING

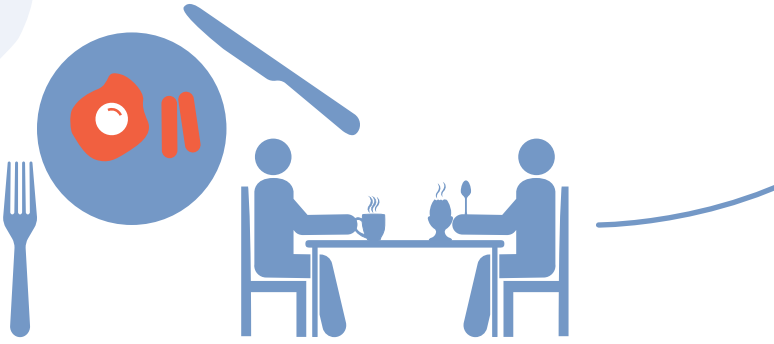
- Food retail: individual family members shop for food at supermarkets, fresh food markets, farmer's markets, convenience stores and small local stores
- Food marketing: social media, television, magazines, point-of-sale displays
- Food distribution: personal shopping, supermarket home delivery services, independent food delivery riders/drivers





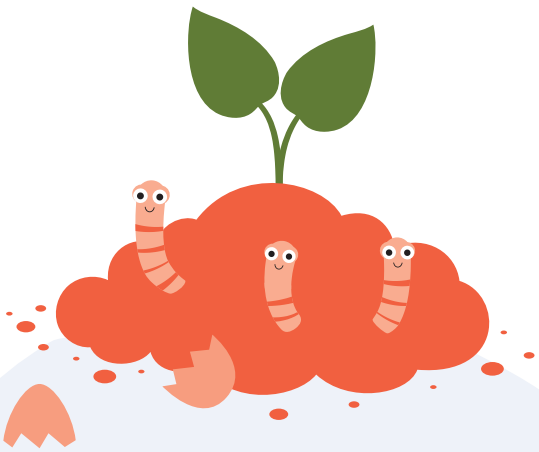
FOOD CONSUMPTION

- Domestic food: meal prepared from scratch by a family member, meal kits, take-away meals
- Food catering: hospitals, schools, restaurants, cafes, takeaway food outlets



7

FOOD SYSTEMS AND THEIR IMPACT ON CONSUMER BEHAVIOUR



DISPOSAL AND RECYCLING OF FOOD

- Composting: home composting systems, worm farms, local shire composting strategies
- Food rescue: primary producers, food manufacturing companies, supermarkets, cafes, bakeries donate excess food to food rescue services
- Renewable energy production: production of biogas from food waste



KEY TERMS

advergames video games that contain an advertisement to promote a particular brand, product or message by integrating and embedding it into the play

food citizenship involves individuals participating in, and making informed choices about, issues such as sustainability, ethics or health, in any stage of the food system

food sovereignty challenges the control of the food system and food supply by large corporations, and returns the decision making to farmers and individuals who produce and consume food, in order to ensure it is produced ethically and sustainably

food system a complex series of activities that enables food to move from farm to consumer and includes growing, harvesting, processing, transporting, manufacturing, consuming, disposing and recycling food

healthy diet a diet that follows the principles of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating

Resources
Study Design
links
Infographics
Flashcards

Food systems, behaviours and effects on health

To ensure good health in the long term, it is important for individuals to maintain a **healthy diet** – that is, a diet that follows the principles of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating. However, there are many barriers in the current food system that make maintaining a healthy diet difficult for some people.

Research shows that there is a strong relationship between the current food system and the behaviour of individual Australians, and that this has a major impact on their health. Evidence presented by the Institute of Health and Welfare shows that the rate of overweight and obesity among Australians has increased significantly in recent years. Approximately 67 per cent of all Australian adults aged over 18 years are now overweight or obese. Being overweight or obese can lead to major health issues, including type 2 diabetes, heart disease and some forms of cancer.

While it is clear that many Australians are not meeting the targets for physical activity, it is apparent that much of the increase in overweight and obesity is linked to the type of food available through the current food system. Each element of the food system, particularly the way in which our food is processed, marketed and consumed, can have an impact on personal behaviour, encouraging the overconsumption of food and sedentary behaviour. Some components of the food system, particularly the manufacturing and advertising sectors, as well as consumer activists, endeavour to politically influence the food system. All of these factors impact on individuals' food choice and **food sovereignty** – that is, the control producers and consumers have over the food system, ensuring that food can be produced ethically and sustainably.

WHAT IS A FOOD SYSTEM?

A food system is a complex series of activities and processes necessary to feed a large population. The food system enables food to move from farm to consumer and includes growing, harvesting, processing, transporting, manufacturing, consuming, disposing and recycling food. It is often described as the route from 'farm to fork'.

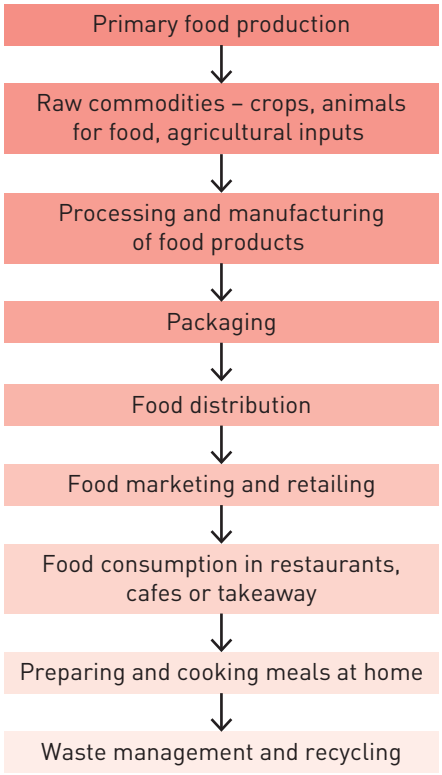


FIGURE 7.1 Components of current food systems

PRIMARY FOOD PRODUCTION AND EFFECTS ON HEALTH

The food that is grown by Australian farmers, pastoralists and fishers is some of the highest quality food produced across the globe. Consumers who purchase fresh produce to prepare and cook at home can make nutritious meals using fresh ingredients. This can have a positive health benefit, as these meals will generally be lower in fat, salt and sugar than similar commercially available, highly processed meals. Some consumers choose to purchase organic produce that is chemical-free, feeling that this strategy will have a positive impact on their long-term health.

FOOD PROCESSING AND MANUFACTURING AND EFFECTS ON HEALTH

Consuming a healthy diet is something all Australians are encouraged to do. However, in practice this can be a challenge for many people, given the role multinational companies play within the food system.

Food processing and manufacturing is a key feature of the current food system. Food manufacturers use

new processing and packaging techniques to extend the shelf life of products and provide consumers with a wide range of food options throughout the year. Food processing and manufacturing companies, including transnational food and beverage companies, play a key role in producing and distributing food that is low cost, but this food often has very little nutritional value. Many of these convenience or pre-prepared, highly processed foods are thought to be a key contributor to the increase in overweight and obesity among Australian consumers.

The trend towards the purchase of pre-prepared and convenience meals is driven by a change in the working patterns of many Australians. Prior to the COVID-19 pandemic, many people spent long hours at work, and in travelling to and from work, leaving little time for preparing food at home or for physical activities. This has led to a rise in the consumption of ready-prepared meals, such as heat-and-serve meals, pre-prepared foods and home-meal replacements. Meal solutions such as pre-prepared sauces and a greater range of pack and portion sizes offer convenience and versatility for consumers. Other consumers find it easier to purchase takeaway food than take the time to shop and cook a healthy meal, particularly when it is late and they are tired. However, many of these pre-prepared foods are high in saturated fat and sugar, which can lead to weight gain.



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Heat-and-serve meals are a convenient option for consumers, but it is important to check that they are not high in fat, salt or sugar.

Added sugar in processed foods

Consuming foods high in sugar is seen as major health concern, as it is linked to weight gain, which can result in the development of obesity, heart disease, type 2 diabetes and some cancers. Most shoppers are aware that when they purchase products such as sweet biscuits, soft drink or a chocolate bar, these products will undoubtedly be high in sugar. However, most of the sugar in processed foods is 'hidden', meaning consumers are often unaware that many of the staple breakfast foods and savoury products available on our supermarket shelves also have a high sugar content.

Sugar is added to baked products such as cakes, fruit pies, muffins, biscuits and sweet pastries to improve their colour and extend their shelf life. A high proportion of sugar adds bulk to products and ensures that ice-cream has a light, airy texture, and that confectionery such as caramel fudge has a chewy texture. However, the main reason sugar is added to so many processed foods is to improve their flavour or palatability. Food manufacturers add sugar to many food products to increase their sweetness and improve their flavour profile. Highly processed foods such as cakes, biscuits, ice-cream, pastries, flavoured yoghurt, breakfast cereals, flavoured milk and soft drinks all contain high levels of added sugar. Even savoury products like tomato sauce, frozen meals, pasta sauces, processed meat, sausages and canned soups contain significant amounts of hidden sugar.

Concerningly, many of the foods that are marketed as being 'low-fat' or 'light' contain more sugar than similar regular products. Fat naturally found in milk enhances the flavour of dairy products like yoghurt. When the fat is removed to produce 'lite' or 'low-fat' yoghurt, sugar is added to enhance its flavour. For example, 100 grams of full-cream strawberry yoghurt contains 9.2 grams of sugar, while 100 grams of low-fat strawberry yoghurt contains approximately 12.4 grams of sugar.

Food manufacturers mask the fact that a product is high in total sugar by using one of over 40 other names for sugar on the food label. Some of the alternative names used for sugar in processed food include agave nectar, barley malt, cane sugar, caster sugar, demerara, fruit juice concentrate, palm sugar, panela, powdered sugar and rapadura. Therefore, even if a consumer reads the label very carefully, it is often difficult to identify whether sugar has been added.

Packaging and portion sizes

Packaging food in large packages is another feature of the current food system that encourages overconsumption. Food manufacturers have increased the packaging size of many food items. The bigger the package, the more generous the serving. Sometimes foods are packaged so that there are multiple servings available in the one packet, making it difficult for consumers to know how much food they should eat. Often manufacturers add extra food in a package or bar for the same price, using this as a strategy to encourage the consumer to

purchase the product. However, as the packaging size increases and this becomes the norm, the amount of food many people eat as a snack will also increase, and consequently their kilojoule intake will increase as well.

Another key factor in the overconsumption of food is the portion size of food produced and sold in our supermarkets, bakeries and cafes. Food portions have dramatically increased over the past few decades and, as the amount of food we eat has grown, so too has the amount of kilojoules we consume. In the 1980s, individual serves of soft drink were sold in 237 millilitre containers, whereas today, the standard size is 375 millilitres. Cupcakes and scones have increased in average size over the same period, from 40 grams to more than 100 grams. King-sized or 'Texas' muffins have become the norm.

Cakes, slices and biscuits sold in bakeries and cafes are now so big that they are in fact large enough for two or three people to share. Similarly, a giant serve of popcorn at the movies is enough for the whole family. It is important to be aware that eating even a regular sized box of popcorn at the movies provides approximately 3400 kilojoules – almost half the daily adult kilojoule requirement.

Many other treats such as chocolate bars are now served in king-sized packets or twin packs. 'Super-sized' meals and 'meal deals' available in fast-food outlets provide far more food (and therefore, kilojoules) than we really need, leading to overconsumption.

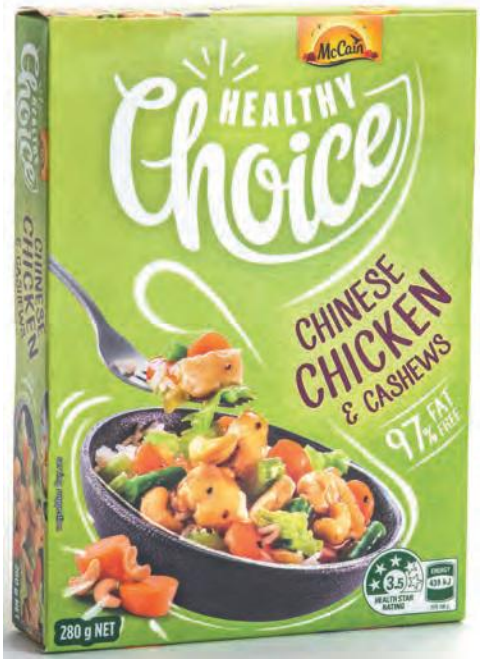


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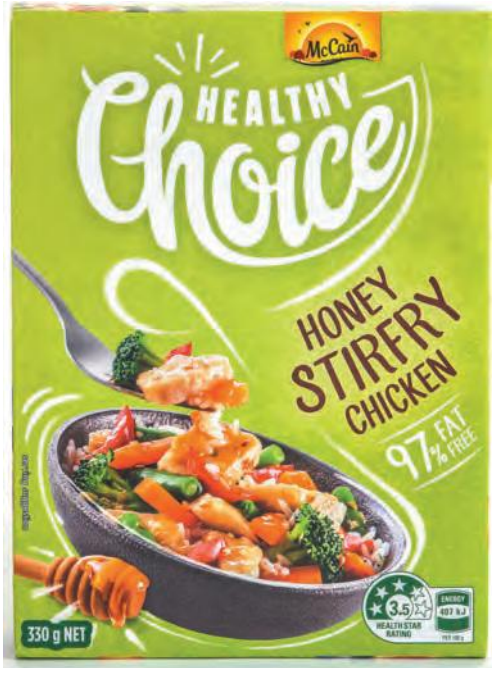
A regular sized box of popcorn at the movies provides approximately 3400 kilojoules, or almost half the daily adult kilojoule requirement.

One of the key reasons food manufacturers are eager to increase serving sizes is because customers like to feel that they are getting value for money. This means that consumers generally prefer to pay a little more for a larger serve than to pay what seems like an expensive price for a smaller portion.

Another issue is that in Australia, serving sizes listed on food packaging are often inconsistent, and the



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Similar products may be marketed as a single-serve meal despite having different portion sizes. For example, a serving of McCain Healthy Choice Chinese Chicken and Cashews (280 grams) and a serving of McCain Healthy Choice Honey Stirfry Chicken (330 grams).

serving size is determined by the food manufacturer rather than by regulation. This makes it difficult for consumers to exercise their food citizenship when trying to compare similar products and limit their kilojoule intake. **Food citizenship** means that individuals are able to make informed food choices based on issues such as sustainability, ethics or the food's ability to promote good health.

Practical Activity 7.1

An analysis of the nutritional and sensory properties of microwavable rices

Aim: To investigate how consumers demonstrate food citizenship when making decisions about the food they purchase.





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Method

1. Select two different packages of microwavable rice, such as the examples shown below.
2. Use the information on the label of each product to record details of the ingredients, country of origin, number of serves, portion size and nutrient content.
3. Examine the packaging materials and record information about disposal of the packaging.
4. Prepare both the packages of rice according to the instructions on the packet, and record the preparation time.
5. Taste test the two microwavable rice products and record your results of the sensory analysis in a table similar to the one below.

Results

	RICE PRODUCT 1	RICE PRODUCT 2
Ingredients and nutritional properties		
List of ingredients		
Country of origin		
Energy per 100 g		
Protein per 100 g		
Total fat per 100 g		
Carbohydrate per 100 g		
Sodium per 100 g		
Serves per packet		
Serving size		
Packaging of products		
Materials used		
Ability of the packaging materials to be recycled		
Preparation of the product		
Time taken		
Additional ingredients		

Sensory properties		
Appearance		
Aroma		
Flavour		
Texture		

Analysis

1. Discuss why the list of ingredients and their country of origin could be important information to consumers.
2. Based on your nutritional analysis, explain which product you would purchase to support healthy eating.
3. Could eating either of these products encourage over consumption? Explain your response.
4. One aspect of food processing and manufacturing is food packaging. Explain why a consumer may or may not purchase either of these products based on its packaging.
5. Explain why manufacturers provide information about the preparation of the product on the label.
6. After taste testing both products to compare their sensory properties, which one would you recommend? Justify your answer.

Conclusion

As a consumer you will practise food citizenship by making informed decisions about the food you purchase based on sustainability, ethics and health. Considering these factors, which product would you purchase in the future? Justify your choice.

FOOD RETAILING AND MARKETING

Food retailing and marketing are vital components of our food system and are essential features of modern living. Supermarkets, fresh food markets and a wide range of local food stores are the key hubs through which most Australians shop for their daily food needs. All food outlets use a range of marketing strategies to entice consumers into their stores and to purchase their products.

Special buys

Food advertising, including 'special buys' and '2 for 1' deals, is a key technique used to encourage shoppers to purchase an item, even though it may not have been on their shopping list. In-store and online advertising exposes customers to products that seem appealing, and plays on the consumer's FOMO, or fear of missing out. This type of advertising also generates a sense of urgency among shoppers by making them think their favourite soft drink or sweet biscuit might only be available for a short time.

Research undertaken by Deakin University shows that 'unhealthy products are also "on special" almost twice as often as healthy foods. What's more, the discounts on unhealthy foods are much larger than the discounts on healthier foods.' As a result, many shoppers find that, by the time they reach the check-out, they have a large number of unhealthy products in their trolley.

As health professionals constantly remind us, consuming products that are high in fat, salt and sugar can have a detrimental impact on health and lead to unwanted weight gain and associated health impacts, including type 2 diabetes, cardiovascular disease and some forms of cancer.

Marketing to children

Food marketing is another important feature of our current food system. It allows food manufacturers to inform consumers about new products, including particular features that may, for example, make meal preparation easier or provide improved nutritional properties.



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In-store promotions expose customers to products that appear to be very appealing but may have little nutritional value.

However, marketing is also intended to persuade consumers to purchase a particular product. One key concern of health professionals is that food manufacturers and marketers are using innovative digital marketing techniques to target children with messages promoting unhealthy food products. Today's children are digital natives; they have grown up with digital devices, which form part of their everyday life. Consequently, they are exposed to advertising through a range of digital formats, including YouTube, games apps, websites, text messages, social media platforms such as TikTok, and advergames. Advertising to children commonly promotes products that are high in sugar, fat and/or salt, including sugary drinks. These forms of marketing influence children's food choices and thus can contribute to weight gain and obesity in children.

Advergames, a relatively new marketing technique, are video games that contain an advertisement to promote a particular brand, product or message by integrating and embedding it into the play. This form of advertising is often used by fast-food companies to market foods to children. It was developed to overcome the restrictions enforced by government bodies on traditional marketing to children, such as television advertising. The games promote a sense of fun and achievement, and these positive feelings become associated with the brand being advertised. The child can become immersed in the game over a prolonged period, and as a result may develop a personalised relationship with the game and brand. This encourages the child to ask their parent to buy more of the product for them to consume. When children play advergames, particularly those that feature unhealthy foods, they are more likely to choose unhealthy snack foods.

Impulse buying

Encouraging impulse buying is another key strategy employed by food retailers and food marketers. The supermarket giants spend huge amounts of advertising dollars promoting unhealthy food products such as soft drinks, chocolate, confectionery and potato crisps. These products take up a huge amount of shelf space in all supermarkets. Research has also shown that approximately 40 per cent of the end-of-aisle displays in supermarkets are dominated by snack foods, biscuits and confectionery. These products are also highly visible at every check-out. As these products are front and centre at all shopping outlets, it makes them very difficult to avoid and is a key to impulse buying.

Another strategy food retailers and marketers use to encourage impulse buying is the placement of products on the shelf. Supermarkets often place products together that are not in the same category, such as soft drinks, nuts and potato crisps. The rationale behind this strategy is that if you are buying drinks, you will probably also need some snacks! Consequently, it is very easy to over-consume unhealthy products. If these products are consumed as a regular part of the daily diet, this can lead to overweight and obesity.



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Supermarket check-out counters are designed to encourage impulse buying, with snack foods close at hand.

Online shopping

One of the most significant changes to the current food system in recent decades has been the sharp rise in online grocery purchasing. The move to online shopping accelerated during 2020 and 2021 as a result of the COVID-19 lockdowns. Householders became more cautious about shopping in-store, and many moved to ordering their weekly groceries online and having them home-delivered. This shift to online grocery purchasing was largely driven by younger,

tech-savvy populations in urban cities who have higher incomes.

However, this move to online shopping encourages sedentary behaviour. Customers can simply sit at their computer screen and order their weekly food supplies without having to step outside the door. They are no longer gaining any incidental exercise by wandering the aisles of the supermarket; they simply select the food they want and decide on a delivery time or a pick-up location. This service appeals to customers who appreciate the convenience of being able to quickly collect their groceries on their drive home from work.



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Click&Collect services enable consumers to collect their groceries on their way home from work.

Another health implication of online shopping is that it is very easy to purchase high-fat, high-sugar snacks with the click of a button. It is only when the groceries arrive that consumers see how many unhealthy snack foods they have purchased – often more than they would have chosen if shopping in-store.

The cost of food

Food is a significant expense for Australian families – it is the second highest cost to the household budget after housing. The COVID-19 pandemic brought into focus the cost of food for many families who were faced with unemployment or a reduction in their work hours. Many families were forced to reduce the amount they spent on living expenses, including the purchase of groceries.

The cost of food in the supermarket is the same for everyone, but affordability will be very different, depending on income. Research has shown that low-income families spend between 30–40 per cent of their disposable income purchasing food, while those who have stable employment and an average income usually spend only 20 per cent of their household budget on food.

A key concern with the design of the current food system is that it makes it difficult for people who have a limited budget to purchase healthy food. The production of large volumes of inexpensive food with low nutritional value has become a mainstay of Australia's food manufacturing industry. Foods such as frozen pizza, meat pies, frozen potato chips, ice-cream, sweet biscuits and savoury snack foods are inexpensive to produce, but they are generally high in fat, salt and sugar. By comparison, the cost of fresh food, such as fresh fish or lean meat and poultry, is very expensive, and often out of reach of people on limited incomes. This disparity in food costs forces many people on low incomes to purchase nutrient-poor, energy-dense foods that are high in fat, salt and sugar. For example, a kilogram of home-brand sausages, minced meat or a frozen pizza is far less expensive than an equal amount of fresh salmon or lamb chops. Regularly consuming high fat, salt and sugar foods that inevitably supply more kilojoules than the body requires can have a significant impact on long-term health and lead to excess weight gain. Research has shown that the greatest burden of disease, including cardiovascular disease and type 2 diabetes resulting from overweight and obesity, is experienced by those Australians who have lower income levels.

The inequality in the cost of food is even greater in rural and remote regions. Transporting food to retail centres is an essential feature of our food system; however, transport costs are expensive and this drives up the cost of food in rural areas. Another concern for people living in rural Australia is that it may not be financially viable for a supermarket to operate in small communities. A lack of competition in rural areas may mean that consumers are forced to pay higher prices for food, impacting further on their food budget and limiting the amount of nutritious fresh food they are able to purchase.



Alamy Stock Photo/Carolyn Jenkins

Frozen pizza can be an inexpensive meal, but may be high in saturated fat and salt.

Activity 7.2

Unintended COVID consequences: Victorians snacked more, Aussies gained weight

Read the article that follows, then answer these questions:

1. Evaluate the validity of the news article by assessing the source, purpose, context, presentation of evidence and language used. Alternatively use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this news article. See pages 193–94 for additional information on completing a CRAAP test.
2. Identify four changes in the behaviour of Australians, including Victorians, that could have led to an increase in their weight during the COVID-19 restrictions of 2020.
3. The article states that 25 per cent of Victorians experienced a sense of loneliness as a result of the COVID-19 restrictions. Write a short paragraph explaining how a person's mental wellbeing can influence their food intake.
4. Discuss the ways in which food and drink companies used marketing strategies during the pandemic to increase the sale of unhealthy food products.
5. Explain how an increase in body weight can have implications for long-term health. Refer to the information in chapter 2 to support your answer.

UNINTENDED COVID CONSEQUENCES: VICTORIANS SNACKED MORE, AUSSIES GAINED WEIGHT

A new LiveLighter® survey has revealed 37 per cent of Australians reported gaining weight between February and July this year – a time when most Australian states were under some form of COVID-19 restrictions.

While around a third of Australians reported an increase in fruit and vegetable consumption (30 and 34 per cent respectively), there was a concurrent increase in consumption of unhealthy products, particularly among younger adults (18–24 years), parents and those under financial stress since the implementation of COVID-19 restrictions. In Victoria, almost half (48 per cent) reported an increase in snacking.

LiveLighter®'s annual Shape of Australia survey analysed responses from more than 2,000 Australians aged 18–65 regarding how Australians have changed a number of lifestyle behaviours since February 2020.

National findings of the survey included:

- 37 per cent said they had gained weight.
- 72 per cent were concerned about their weight, 49 per cent were trying to lose weight.
- 41 per cent are snacking more throughout the day compared to before COVID-19.
- 26 per cent have increased ordering food directly from a local restaurant or café and 24 per cent have increased ordering takeaway from an online delivery service.
- Younger adults, parents and those under financial stress due to COVID-19 were more likely to be snacking more, eating more fast food and drinking more alcohol (compared to older adults, non-parents and those with no financial stress).

Compared to respondents from other states across Australia, Victorians were more likely to report the following health behaviour changes since the implementation of COVID-19 restrictions:

- More likely to have a significant change in exercise, with 32 per cent saying they were exercising more and 38 per cent exercising less.
- More likely to decrease their vegetable consumption, double that of other states (10 per cent compared to 5 per cent)
- 54 per cent experienced at least one type of personal stressor, with 25 per cent experiencing loneliness
- 48 per cent were snacking more, almost 10 per cent more than in other states across Australia

LiveLighter® Campaign Manager and dietitian, Emma Glassenbury, said while the survey highlights that some behaviours changed for the better, it's important to consider the way harmful industries capitalised on the pandemic, marketing their unhealthy foods, sugary drinks and alcohol, especially during times of increased screen usage.

'While most of us try to stick to a healthy diet as much as possible, this isn't easy when we're bombarded by unhealthy food and drink advertising every day, let alone at a time when feeling particularly vulnerable and physically isolated due to COVID-19 restrictions.

'There's no doubt unhealthy food and drink companies acted quickly to leverage off the pandemic. From encouraging unhealthy stay-at-home behaviours, normalising unhealthy food consumption and employing sneaky marketing tactics – it's no wonder Victorians' healthy efforts were undermined.

'The fact remains that two-thirds of adults and one in four children are above a healthy weight in Victoria, putting them at increased risk of chronic diseases including 13 types of cancer. What's more, recent research has suggested excess weight and poor diets are contributing factors to serious illness and death from COVID-19, adding another layer of complexity for concern,' Ms Glassenbury said.

To reduce Australians' risk of developing serious health problems linked to being above a healthy weight, Cancer Council WA's Obesity Prevention Manager, Kelly Kennington, emphasised the need for governments to hold these companies to account.

'With the added pressures of home-schooling and working from home, we know this year has been a challenging one for all of us. These industry tactics are putting people at risk of health impacts that will extend far beyond the life of this pandemic.

'Today's survey results add to a litany of evidence – we must take action on overweight and obesity in Australia. To protect the health of our nation, governments must set higher standards for how companies market and sell their unhealthy products. We now have a real opportunity to put our health above company profits through the upcoming National Obesity Strategy,' said Ms Kennington.

'Unintended COVID consequences: Victorians snacked more, Aussies gained weight', LiveLighter, 10 December 2020. LiveLighter® © State of Western Australia, reproduced with permission.

Understanding the Text

1 Explain what is meant by a 'farm to fork' food system.

2 Outline how preparing meals at home from fresh ingredients can have a positive impact on the health of Australians.

3 Draw up a mind map to summarise the impact of food processing and manufacturing on the food available to consumers.

4 Explain why sugar is added to many processed foods. List four savoury products that are high in hidden sugar.

5 Why is it often difficult for consumers to determine the amount of sugar in processed food?

6 Explain why the portion size of food can lead to overconsumption.

7 List three reasons why the 'special buys' marketing strategy can be a health hazard for consumers.

8 Prepare a PMI (plus, minus, interesting) chart on marketing to children, including advergames.

9 Explain how the move to online shopping has impacted on the health of some people.

10 Discuss how the cost of food can affect the health of people on a limited income and those living in rural and remote regions.

Answers
Understanding the Text

FOOD CONSUMPTION

Just as the production of our food has changed over the past century, so too has our consumption. Australian consumers are fortunate to have access to a wide variety of delicious, convenient and safe ingredients that are relatively cheap and easily obtained from local suppliers. However, a feature of our current food system is that more meals are now being eaten away from home than in past generations. The number of casual dining and takeaway food outlets has increased rapidly in recent years – so much so that consumers can purchase ready-to-eat snacks or meals at any time and in almost any location, from a 24-hour petrol station, a cafe near their work or school canteen, food trucks and coffee carts at sporting or community events, and vending machines and fast-food outlets in hospitals. Much of the food that is available through these outlets is highly processed and often energy dense, and therefore high in kilojoules and of poor nutritional quality.

Burgers are one of Australian families' favourite takeaway foods. They are relatively cheap, easy to eat and available from a wide range of local stores. Like many other fast-food products, they can add interest and variety to a diet, but should be considered a discretionary food rather than a regular component of family meals.

McDonald's is one of the most popular fast-food outlets and today has 970 restaurants across Australia. Like many other fast-food restaurants, the chain offers a wide range of food, so it is important for consumers to make wise choices when deciding what to eat. Eating a Big Mac (2300 kJ), medium fries (1240 kJ) and a medium Coca-Cola (613 kJ) would provide 4153 kJ – almost half of the 8700 kilojoules recommended as the average daily intake for an Australian adult. Including a dessert such as a hot fudge sundae adds another 1460 kJ to the energy value of the meal.

McDonald's does offer a variety of salads and wraps that are marketed as healthier options, but it is important to look closely at the kilojoule content of these meals. A grilled chicken Caesar salad provides 2120 kJ – almost the same energy value as a Big Mac! The classic chicken salad would be a far healthier choice, as it provides just 1230 kJ.



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Snacking on a doughnut adds 2030 kJ, or almost a quarter of an adult's daily kilojoule intake.

Evidence clearly suggests that even a small reduction in the amount of food you eat can make a big difference in managing your weight. So one of the best strategies is to resist king-sized treats and meal deals, and to only order small portions when eating out. Alternatively, share a sweet treat such as a muffin or cake with a friend. Eating more slowly will also enable your brain to register when you have had enough. Finally, only eat enough to satisfy your hunger – you can always leave some food on your plate!

Practical Activity 7.3

Creating and responding to a design brief – Ethical and sustainable fast food

The food provided by large multinational companies is convenient, tasty and relatively inexpensive, enabling them to dominate the fast-food market. The marketing techniques used by these companies also influence individuals to overconsume these foods, which is contributing to the rising rates of overweight and obesity among Australian adults.

To address this issue, you are to redesign and prepare a popular fast-food product that is appealing, and more nutritious and environmentally sustainable, than those currently on the market. As it is a 'fast food', it must be possible to prepare the product in 60 minutes or less. The product should have wide appeal to young people and address at least two sustainability issues.

Part A – Designing and investigating

1. Develop five criteria questions to assess the success of your recipe.
2. Develop a mind map of sustainability issues that could be addressed in the design brief.
3. Research the menu of a fast-food company online. Select three food items that you believe could be modified successfully using the specifications outlined in the design brief.

4 Select the food item you intend to redesign, and justify your choice.

5 Annotate a picture of the food item to describe how you will modify it to make it a more nutritious and sustainable fast food.

Part B – Producing and evaluating

1 Complete a food order for your teacher.

2 Produce the food item following all safety and hygiene procedures.

3 Evaluate the success of your product based on your five evaluation criteria questions.

Note: Part A of the design brief can be completed without completing Part B.

Plate size

In the past it has been suggested that overeating and being overweight is the result of personal behaviour such as a lack of self-control. It is now recognised that environmental influences on food consumption, such as serving plate size, have a major impact on overeating. A dinner plate in the 1950s was 25 centimetres in diameter, whereas today it has grown to between 30–40 centimetres. This increase is now considered a typical way to serve, present and eat food. However, research carried out by the University of Cambridge in the UK found that people eat and drink more when large tableware is used, adding to excess kilojoule intake.

It was suggested that if portion sizes were reduced, energy consumption could be lowered by 16 per cent. Cafes, restaurants and takeaway food outlets can help consumers reduce their kilojoule intake by providing smaller, more realistic serving sizes.

Food delivery apps

Food delivery apps have changed the way food is consumed in Australia. Almost every cafe and restaurant enables customers to purchase their favourite snacks or main meals at the click of a button. Food delivery apps such as Menulog, UberEats, Deliveroo and DoorDash have become popular with consumers, who can select a variety of dishes from their favourite cuisines, available in their local area.

According to research undertaken by the University of Sydney and the University of Auckland in 2020, the most popular meals ordered using food delivery services were from fast-food chains including McDonald's and Subway. The study also reported that ordering food from independent takeaway food outlets such as fish and chip and kebab shops was very popular. An analysis of the food items delivered by Uber Eats from independent takeaway stores showed that 'more than 80 per cent of all the menu items were discretionary or "junk" foods. A large number of menu items (42 per cent) were categorised as "discretionary cereal-based mixed meals", which includes foods such as pizzas, burgers, kebabs and pidés. Other types of junk foods could be battered fish or chicken schnitzel, and sugary drinks, among others.'

Also of concern to health professionals are some of the marketing strategies used by food delivery app services. It has been found that food items that are high in fat, salt and sugar and low in fibre are twice as likely to be categorised under the 'most popular' tab on a food delivery app than healthier meal options.

As with other takeaway food options, consumers need to carefully consider the foods that are available through food delivery apps and avoid those that are energy dense but nutrient poor and that may lead to overconsumption of high-kilojoule foods. The use of food delivery apps also increases sedentary behaviour, as consumers simply have to open the front door to collect their food. Sedentary behaviour can have serious effects on a person's health and can be associated with the development of overweight or obesity, which can lead to type 2 diabetes, stroke or heart disease.

Similarly, some food retailers use marketing strategies in an effort to persuade consumers to purchase products such as discretionary foods high in fat, salt and sugar that can have a negative impact on their long-term health. This can be seen in a campaign run by BP



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Consumers can purchase their favourite takeaway food at the click of a button.

Australia. Like many other service stations, BP provides customers with the opportunity to purchase groceries and pick up a hot or cold snack when they fill up their car with petrol. Recently, BP has joined forces with food delivery services Uber Eats, Menulog and Deliveroo in a campaign titled 'Couchfood'. BP research has shown that 25 per cent of younger Australians spend a considerable amount of money each week on food ordered through meal delivery apps. As a result, the Couchfood marketing campaign highlights the convenience of having snack foods delivered to the door, stating that 'chips, choccies, drinks and more are on the Couchfood menu along with everyday essentials such as milk and bread – all delivered to your door with Couchfood'. This increase in online food delivery can be a health hazard if foods such as discretionary foods are eaten in excess.



iStock.com/bombuscreative

Marketing strategies target younger consumers, encouraging them to purchase discretionary food items.

Activity 7.4

Delivery apps blasted for junk food

Read the article that follows, then answer these questions:

1. Evaluate the validity of the news article by assessing the source, purpose, context, presentation of evidence and language used. Alternatively use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this news article. See pages 193–94 for additional information on completing a CRAAP test.
2. Explain why Dr Alexandra Jones and Jane Martin are concerned by food delivery services such as Couchfood.
3. Outline the strategies Deliveroo is using to encourage consumers to make healthy food choices. Do you think these strategies will encourage consumers to order healthy food options if they use food delivery services? Justify your answer.
4. Explain why discretionary foods are frequently ordered on food delivery apps.
5. Describe two strategies outlined in the article that could be implemented to reduce the harmful effects of consuming energy dense snack foods.

DELIVERY APPS BLASTED FOR JUNK FOOD

Public health advocates have denounced the move by food delivery companies Uber Eats and Deliveroo to partner with convenience stores to deliver junk food.

Two weeks ago BP service stations expanded their 'Couchfood' range in a partnership with Deliveroo, bringing high-fat and high-sugar snacks such as potato chips, chocolate bars and soft drinks within arms' reach for app-users who only need to leave their lounge chair to answer the door. The Couchfood range was first launched last year through Uber Eats.

The majority of options for sale are highly processed items including chips, chocolate, ice-cream and soft drink, while there are a small number of sandwiches and grocery items such as milk and bread.

Dr Alexandra Jones, a food policy research fellow at the George Institute for Global Health, said the initiative was a major problem given two thirds of Australian adults and a quarter of children are overweight or obese.

'This kind of innovation provides an ominous insight into an unhealthy future, one where human progress looks like a bunch of Homer Simpsons permanently parked on the couch procuring junk food without lifting a finger,' Dr Jones said.

Jane Martin, executive manager at Obesity Policy Coalition, agreed that Australians are eating 'way too much unhealthy food' and

the availability of junk food on food apps was 'undermining efforts for a healthy diet'.

'It's all extra energy in the diet that's not required and you're not even walking down to the shops so there's not incidental exercise either,' she said.

Deliveroo spokeswoman Joanne Woo said the company wants to 'empower consumers to make healthy choices'.

'Over the past two years we've seen 66 per cent of customers choosing healthier options on the platform,' Ms Woo said.

'We've been actively working with our restaurant partners to expand the healthy options available on our platform and we're really proud that the number of restaurants focused on healthy options on the Deliveroo platform has grown by 59 per cent over the past year alone.'

A spokesman for Uber said the company takes about 37,000 orders for salads each month.

'We are seeing an increase in healthy eating choices with searches for "vegan", "keto" and "kombucha" growing by more than 25 per cent in the last 12 months,' he said.

'With access to more than 20,000 restaurants the app offers consumers the freedom and convenience to pick what they want.'

Dr Jones said part of the problem is that unhealthy foods are so much cheaper than fruit and vegetables.

'The products marketed and sold by the processed food industry are making Australians sick. Our food system currently promotes the processed food industry's profits over health,' she said.

'Unhealthy foods are more profitable to food companies because they're packed full of cheap ingredients like salt, sugar and fat which our brains find irresistible.'

Ms Martin said the market for unhealthy food such as chips and chocolate was driven by 'price, palatability and promotion'.

She called on authorities to introduce a sugar tax to make such options less affordable and drive down demand for the products, echoing the call made by Australian of the Year Dr James Muecke who said sugary products should be 'less accessible to the public'.

Dr Jones said the delivery companies could be 'a force for good' if they improved access and affordability to healthy options.

'At the very least their marketing could stop glamorising unhealthy eating habits. There's nothing joyous in the long run about being glued to the couch eating junk food.'

'Junk on demand: Food delivery giants bring salt and sugar within arms' reach', Josh Dye, *Good Food*, 1 March 2020. The use of this work has been licensed by Copyright Agency except as permitted by the Copyright Act, you must not re-use this work without the permission of the copyright owner or Copyright Agency

Political influences on the food system

In Australia, our food system is overseen by both federal and state governments. Their responsibilities include setting food policy, developing food standards, and implementing and enforcing food regulations. The Australian Government has positive health policies in place, such as the Eat for Health Program, which includes the Australian Dietary Guidelines and the Australian Guide to Healthy Eating, to help people make healthy food choices. However, key players in the food system, including the manufacturing industry, the advertising industry and consumer groups, endeavour to influence many government decisions in relation to food policies and standards. This influence on the political system impacts on the food choices available to consumers and on the food sovereignty of both producers and consumers.



FIGURE 7.2 Political influences on the food system

THE MANUFACTURING INDUSTRY

Multinational food and beverage companies produce much of the processed food on our supermarket shelves. Many of these products are high in fat, salt and sugar, and as a result, make a major contribution to the obesity epidemic facing the nation.

The food industry and food marketing sectors have been very successful, over many decades, in minimising the impact of government regulation on the food manufacturing and marketing sector. Many of these companies are opposed to any mandatory regulation of their industry, such as reducing the sugar, fat and salt composition of discretionary foods, or restrictions on the way these products can be marketed. An argument often used by the food manufacturing industry is that responsibility for food choice should rest with consumers, as broader regulation would interfere with an individual's right to free choice. However, this argument demonstrates that governments have a clear conflict of interest between developing public policy that protects the health of the population, and supporting private industry that benefits from the sale of unhealthy products to consumers.

Lobbyists

Many industry and consumer groups endeavour to influence public policy and regulations made by federal and state governments in relation to the current food system. These groups often employ lobbyists to meet with government ministers, members of the opposition party or their representatives, in an effort to persuade or influence them on particular issues. A lobbyist aims to use their financial and political power to sway legislators to their point of view, in order to gain an advantage for the organisation or industry they represent. This may mean that they are able to promote legislation that is favourable to them or to block measures that may have a negative impact on the industry.

For example, lobbyists for the manufacturers of confectionery, energy dense snack foods and beverages that are high in sugar consistently argue that they promote responsible consumption of their products, and that people can enjoy these treats in moderation without causing undue harm. They claim that they are able to self-regulate the marketing of their products and should not be subjected to mandatory government regulation. However, many health professionals rebut this argument, stating that the high consumption of discretionary products contributes to overconsumption of fat, salt and sugar and adds to the growing rates of overweight and obesity in the Australian population.

Health Star Rating

Food labelling, including the nutrition information panel and the Health Star Rating, is one of the key ways in which consumers can determine the ingredients and nutritional profile of the foods they purchase. This information can help consumers make healthy choices when shopping for food.

The Health Star Rating system is a national, voluntary, front-of-pack system, developed by federal and state governments in collaboration with the food industry and public health and consumer groups. The system recently underwent a five-year review, and the updated system was implemented in November 2020. Companies apply a rating system of between half a star and five stars to the front of their food product packets, giving shoppers a quick and easy method of comparing the nutritional profile of similar packaged products. The system awards a star rating according to the quantity of the specific components found in the food. It takes into account the energy, saturated fat and sodium and total sugar, as these are associated with the greatest risk factors for chronic disease. The rating also takes into account positive aspects of the food, such as the inclusion of fruit, vegetables, nuts and legumes and in some cases dietary fibre, protein and calcium.



© Commonwealth of Australia

The Health Star Rating system helps shoppers compare the nutritional profile of similar products so they can make healthier food choices.

Food industry groups were involved in the review of the Health Star Rating system. While many consumer groups and health professionals urged the government review committee to make the system mandatory for all companies, representatives of the food manufacturing industry lobbied government to keep the system voluntary. The food industry was concerned that sales of products displaying a low health star rating would decline, and that this would impact on the company profit margin.

While the Health Star Rating system remains voluntary, health professionals are concerned that food manufacturers are only likely to include the rating on products that are rated 4–5 stars, and are less likely to include it on those with lower ratings. In a media release in July 2020, the Obesity Policy Coalition stated that the Health Star Rating system should be 'made mandatory to ensure companies feature the star rating on all products, not just those which receive a high rating. Current coverage only accounts for around 30 per cent of products. When companies use the system selectively, rewarding themselves with a higher Health Star Rating for healthier products and not displaying it on others, it can give the whole product range a healthy halo.'

A voluntary Health Star Rating system can also be confusing for shoppers, who may question why some products have a star rating and others do not. This can make it difficult to make healthy food choices, impacting on consumers' food sovereignty. The good news is that many food manufacturing companies, including Kellogg's, Sanitarium, Uncle Tobys and Four'N Twenty, have moved to include the Health Star Rating on all their products. Similarly, food retailers Coles and Woolworths have committed to including a Health Star Rating on all their home-brand products.

Sugar tax

One strategy used by many countries to change consumer behaviour and improve health outcomes is the use of a taxation policy that increases the price of particular products – for example, a tax on cigarettes and on alcoholic drinks such as alcopops.

Excessive consumption of sugary drinks is considered one of the main causes of overweight and obesity in Australia.

In recent years, more than 50 countries across the globe have introduced a tax on sugar-sweetened beverages (SSB). However, despite a Federal Government Senate Committee recommending the tax, it has not been legislated by the Australian Government. A tax on sugar-sweetened beverages is urgently recommended by the World Health Organization (WHO), along with the Australian Medical Association (AMA) and the Obesity Evidence Hub – a joint project sponsored by the Cancer Council Victoria, the Bupa Health Foundation and the Obesity Policy Coalition.

Evidence worldwide demonstrates a clear link between the consumption of sugar-sweetened beverages and overweight and obesity, which can lead to chronic conditions including type 2 diabetes, heart disease, stroke and cancer. Whole aisles of Australian supermarkets are lined with sugar-sweetened beverages, including soft drinks, sports drinks, fruit juice drinks and cordial. One 375 millilitre can of soft drink contains more than 7 teaspoons of sugar, while a 600 millilitre bottle of sports drink contains approximately 9 teaspoons of sugar. These drinks provide no nutritional benefit other than being high in kilojoules. According to Jane Martin of the Obesity Policy Coalition, the average Australian who enjoys soft drinks regularly consumes over 14.6 kilograms of sugar each year.



Alamy Stock Photo/Fir Mamat

Uncle Tobys Chewy Choc Chip muesli bars have achieved a 4-star health rating.



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A 375 millilitre can or cup of soft drink contains more than 7 teaspoons of sugar.

The WHO and the AMA argue that an increase in the price of sugar-sweetened beverages would encourage consumers to reduce their consumption of these drinks and replace them with healthier options, especially water. A tax on sugar-sweetened drinks would also encourage soft drink manufacturers to reformulate their products so they are considerably lower in sugar, and to produce products that are much healthier for consumers. In addition, this tax would provide significant savings to the healthcare system due to the reduction in obesity and type 2 diabetes in the population.

However, soft drink manufacturers have a vested interest in protecting a very profitable product, and so are opposed to the introduction of such a tax. In their 2016 report into a tax on sugary drinks, the Senate Committee reported that 'Coca-Cola Amatil and other submitters … claimed there is very little evidence that taxes targeting SSBs actually work to reduce obesity rates'. The soft drink industry also claims that such a tax would inevitably increase the price of these products, and would therefore disproportionately affect consumers on lower incomes, who could least afford it.

Unfortunately, it seems that the powerful soft drink lobby is continuing to use its influence to delay the introduction of a tax on sugar-sweetened beverages, despite the serious health implications for a significant proportion of the Australian population.

THE ADVERTISING INDUSTRY

As discussed in chapter 6, advertising is present in every aspect of our lives. It is there the moment we check our Facebook, Instagram or TikTok feed, when we switch on the television, play a game on a smartphone, catch a bus or train, walk into a supermarket or watch a video online. Over many decades, the advertising industry has developed a series of effective strategies to appeal to consumers' values and emotions in an effort to sway them to purchase a particular product or brand. Advertising is very appealing, as it uses imagery that is interesting, engaging and relevant to create a desirable product.

Advertising to children

The latest data released in July 2020 by the Australian Institute of Health and Welfare indicates that of all Australians aged 2–17, approximately 25 per cent were overweight or obese. Of concern to health professionals is that many of these children and adolescents will carry this excess weight throughout their adult lives. Evidence also shows that young children are now developing serious health conditions, including type 2 diabetes, as a consequence of being overweight or obese.

The Australian Medical Association and the Obesity Policy Coalition, along with many other health experts, have highlighted the relationship between advertising unhealthy food products to children and the increasing incidence of overweight and obesity among young Australians.

Evidence presented by the Obesity Evidence Hub shows that children and adolescents are exposed to a vast array of advertising for food products, and that their attitudes to consuming these products are influenced by this marketing.

4–6-year-olds

Children aged 4 to 6 years believe a product tastes better if it has a cartoon character on the pack.

5–8-year-olds

The average Australian 5–8-year-old is exposed to at least 827 unhealthy food advertisements on television each year.

10–14-year-olds

Children aged 10–14 years think food and drink sponsors of their local sports clubs are 'cool', and are persuaded to buy their products.

FIGURE 7.3 Advertising influences the attitudes of children and adolescents towards consuming unhealthy food

Source: Obesity Evidence Hub, September 2020

The prevalent marketing of unhealthy food products to children is well recognised by the health sector. Jane Martin from the Obesity Policy Coalition has said that 'We know that the processed food industry is getting away with airing three unhealthy food ads every hour during children's peak TV viewing times; with making apps designed specifically to promote unhealthy brands to very young children; and with saturating digital media with unhealthy food so that Australian children aged 13–17 years are exposed to almost 100 online promotions for unhealthy food every single week.'

It is clear that advertising has a negative impact on the foods children and young people consume, encouraging them to choose high fat, salt and sugar products in preference to healthy foods such as fruit and vegetables. Research has shown that children younger than five years of age cannot consistently differentiate between a television program and an advertisement. As a consequence, the health sector has, for many years, advocated that both state and federal governments should place limits on junk food advertising to children.



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Five-year-old children are exposed to at least 827 unhealthy food advertisements on Australian television each year.

Legislative control over advertising to children

In Australia there is little regulation over the marketing of unhealthy food to children. The main codes of practice are self-regulatory codes that have been developed by the Food and Grocery Council and the Australian Association of National Advertisers (AANA). The only legislation that applies to advertising to children is the Children's Television Standards 2009. Unfortunately, this legislation only applies to children's free-to-air television and not to other forms of media, and it contains almost no restrictions on advertising of food to children.

In 2018 the Australian Food and Grocery Council developed two self-regulatory codes:

- the Responsible Children's Marketing Initiative, which covers food products obtained from retail outlets such as supermarkets
- the Quick Service Restaurant Initiative for Responsible Advertising and Marketing to Children, which covers all food sold in quick service or fast-food restaurants.

In July 2020, the Australian Association of National Advertisers (AANA) became responsible for the management of these two initiatives.

Of concern to health groups within Australia and also the World Health Organization is that industry self-regulation has been ineffective in reducing children's exposure to unhealthy food marketing. The development of new and emerging technology has also meant that advertising of these products has become far more widespread.

Many health organisations have called for stronger mandatory restrictions on the advertising of unhealthy food products to children. However, the federal government has not responded to these calls, and instead relies on industry to self-regulate the advertising of unhealthy food products to children. Jane Martin from the Obesity Policy Coalition has said that 'leaving oversight of marketing of unhealthy food to children in the hands of the same companies that seek to encourage them to eat their unhealthy products is like leaving Dracula in charge of the blood bank.'

Arguments against mandatory regulations

Those who oppose mandatory regulation of advertising unhealthy food products to children claim that these products can be safely included as part of a balanced diet if eaten in moderation. Many also argue that it should be the responsibility of individuals, including children, to make decisions about what they consume, rather than governments. A report by the Australian Food and Grocery Council (AFGC) reinforces this view, stating that with regard to the consumption of unhealthy food products, **'it remains the primary responsibility of parents to guide their children's behaviour in this area'.**

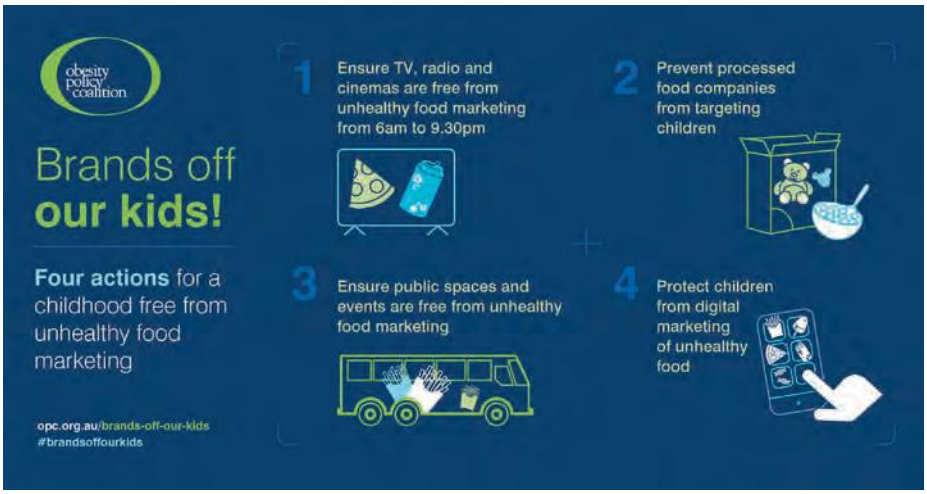
Other arguments put forward by the food manufacturing and advertising industry opposed to mandatory legislation are outlined in Figure 7.4.

'Brands off our kids'

According to a 2021 report released by the Obesity Policy Coalition, 'advertising spend on sugary drinks is almost double the spend on all other drink options combined'.

In an effort to highlight the problems associated with unhealthy food marketing to children, the Obesity Policy Coalition released a report on their

website in March 2021, titled 'Brands off our kids'. The media release and report aim to highlight the Coalition's concern that marketing by the processed food industry and sugar-sweetened soft drink manufacturers targets children with unhealthy food products. The Obesity Policy Coalition has also called for the federal government to establish a 'National Obesity Strategy'. They argue that this strategy 'provides the framework to include the four actions identified in *Brands off our kids!* to ensure a childhood free of unhealthy food and drink marketing'.



With permission of the Obesity Policy Coalition

The Obesity Policy Coalition used a media release to inform Australian parents of a new campaign promoting the protection of children's health.

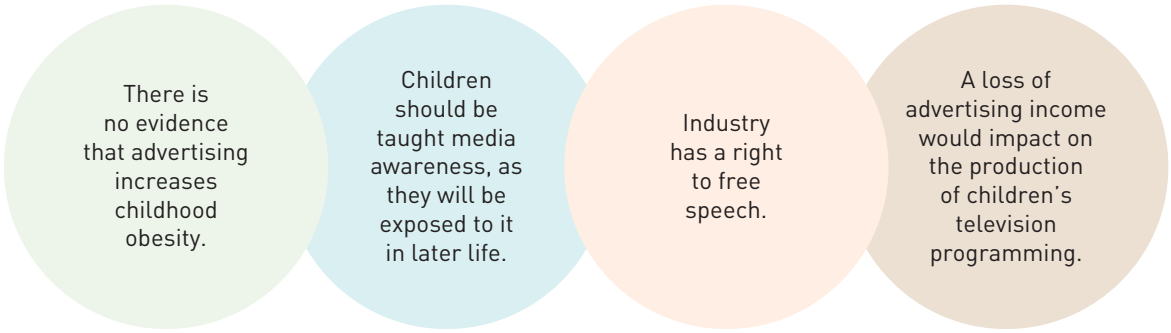


FIGURE 7.4 Arguments presented by industry to oppose mandatory legislation on food marketing to children

Activity 7.5

Sugar ads 'prey on addiction', warns Australian of the Year

Read the article that follows, then answer these questions:

1 Evaluate the validity of the news article by assessing the source, purpose, context, presentation of evidence and language used. Alternatively use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this news article. See pages 193–94 for additional information on completing a CRAAP test.

2 Outline three strategies Dr Muecke recommends to reduce the incidence of type 2 diabetes in the Australian population.

3 Explain why the Obesity Policy Coalition is also demanding government support for healthy eating strategies.

4 Outline the argument promoted by Tim Piper from the Australian Industry Group in relation to the consumption of unhealthy snack foods.

5 Identify the strategies the Victorian Government has stated it would implement to address childhood obesity.

SUGAR ADS 'PREY ON ADDICTION', WARNS AUSTRALIAN OF THE YEAR

Australian of the Year and eye surgeon Dr James Muecke has accused retailers and confectionary makers of 'preying on addiction', calling for government action to tackle the nation's growing obesity problem.

'You can't walk into a servo or walk through the supermarket checkout without seeing two-for-one chocolates,' Dr Muecke told *The Sydney Morning Herald* and *The Age*.

'The government can and should address how it is so readily accessible.'

Dr Muecke, who treats patients with diabetes-related vision loss and sparked headlines when he declared his support for a sugar tax during his Australian of the Year acceptance speech, said the measure was just part of the 'multi-pronged approach' needed to tackle the obesity crisis.

Dr Muecke said the 'pernicious advertising of sweet products' on petrol bowser pump handles should be banned, and called for a national free-to-air, government-funded public education campaign to increase awareness of the link between sugar consumption and type 2 diabetes.

The comments come as the Obesity Policy Coalition, which includes the Cancer Council, prepared to release a report showing successive state and federal governments had failed to act on expert recommendations set down a decade ago to make Australia 'the world's healthiest country' by 2020.

Obesity Policy Coalition executive manager Jane Martin said with two-thirds of Australian adults and a quarter of children above a healthy weight, it was 'time for renewed focus and leadership from Australian governments.'

'Our analysis found that the focus tended to be on individuals simply changing their behaviour, however with around 12 million Australian adults above a healthy weight it is clear that fundamental changes need to be made in our society more broadly to support healthy eating and active living,' Ms Martin said.

New research has found Australia's obesity epidemic is now officially stunting our life expectancy.

'Corporations continue to peddle unhealthy products and profit at the expense of people's health, including children. We've seen industry continually push back on controls that would introduce higher standards to put people's health above profits.'

Tim Piper, Australian Industry Group's head of confectionery, said the industry was working to educate consumers that 'they shouldn't overindulge' in what was intended to be 'a treat food'.

'Eat it appropriately and the issue of obesity is much less likely to be a factor,' Mr Piper said.

Ms Martin said the industry had attempted to 'dodge regulation under the guise of self-compliance' and that policies including a tax on sugary drinks, improved food labelling and reducing children's exposure to unhealthy advertising had 'been shown to work around the world'.

'Focusing effort on approaches around individual behaviour change will not succeed in making the changes that we need to see unless we make this easy for people,' she said.

The federal government is developing a national obesity strategy with the states and territories.

Victorian health minister Jenny Mikakos said the state was working on a childhood obesity strategy 'to protect Victorian kids from the serious health risks associated with obesity', which must be tackled nationally.

'We believe Victorians should be given the information they need to access healthy options – that's why we have legislated kilojoule labelling, advocated for sugars labelling on infant food and continue to support the Health Star Rating,' she said.

'"Addictive as nicotine": Australian of the Year calls for end to sugar dependency', Dana McCauley, 3 March 2020, *Sydney Morning Herald*. The use of this work has been licensed by Copyright Agency except as permitted by the Copyright Act, you must not re-use this work without the permission of the copyright owner or Copyright Agency

CONSUMER ACTIVISM

Over recent decades, consumers have demonstrated their increasing concern about the way their food is grown and processed. Consumers, along with many primary food producers, have asserted their desire for food sovereignty by challenging the control large corporations have over the supply of food. Shoppers have used their purchasing power or food citizenship to make positive change in some sectors of the food supply chain, and as a result, there is now a greater emphasis on ensuring that food is produced ethically and that the environmental impacts of food production and food packaging are minimised.

Consumer-led demand to prevent cruelty to animals has seen changes to legislation on the production of cage eggs, and today the major supermarkets no longer stock cage eggs under their own brand. Similarly, consumer demand for improved animal welfare has seen the supermarket sector move to ensure that fresh pork, ham and bacon products sold under their company label is sow or gestation stall-free. Another concern for many consumers has been the use of palm oil in processed foods, because of the impact on the environment and the habitat for endangered orangutans and Sumatran tigers. As a result, many food manufacturing companies are now moving towards ensuring that any palm oil used in their products is sourced sustainably. More detailed information on these ethical and environmental concerns can be found in chapter 11.

The Obesity Policy Coalition (OPC)

The Obesity Policy Coalition (OPC) is an organisation that aims to influence government policy and regulations to improve the diet of all Australians and help prevent obesity, particularly in children. The Obesity Policy Coalition uses their website to publish media releases and opinion pieces to help inform Australians and to pressure all levels of government to improve the food system so that healthier food choices are available to consumers.

In August 2021 the Obesity Policy Coalition issued a media release titled 'More than a spoonful of sugar … New research reveals the harmful sugars hiding in toddler snack foods'. According to the media release, many products produced and marketed to babies and toddlers are labelled and advertised as being healthy, nutritious products perfect for the growing child. However, this type of advertising can mislead parents into thinking they are providing a healthy meal for their child when many of these products contain high levels of sugar. Consuming these products on a regular basis can result in the child having a strong preference for sweet foods and put them at risk of tooth decay and of becoming overweight at a young age.

The Obesity Policy Coalition has urged the federal government to develop regulations regarding the composition, labelling and marketing of foods for babies and toddlers.

This media release attempts to highlight the issue of the high level of sugar in commercial baby and toddler food, bringing it the attention of Australian consumers and governments. It also emphasises the importance of preventing overweight and obesity in children, and of introducing legislation necessary to avoid long-term health issues for growing children.



With permission of the Obesity Policy Coalition

Advertising of baby and toddler foods can be deceptive and confusing for parents.

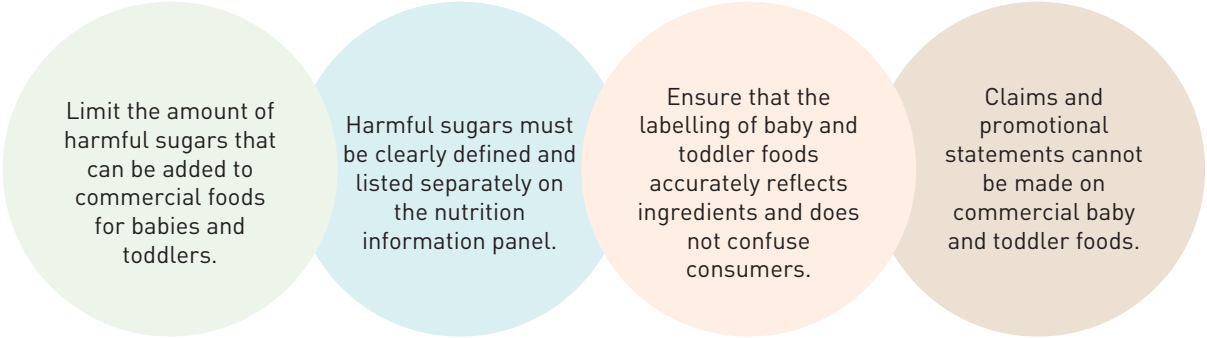


FIGURE 7.5 Strategies recommended by the Obesity Policy Coalition to improve processing and marketing foods for babies and toddlers

Source: Obesity Policy Coalition

Understanding the Text

11 Discuss the way in which food availability and the consumption of food has changed in recent years.

12 Explain why eating a burger may lead to overconsumption.

13 How has the size of serving plates changed over the years, and what implications does this have for health?

14 Explain how food delivery apps can encourage overconsumption of food and increase sedentary behaviour. Use examples to support your answer.

15 Why do many health professionals argue that there should be mandated legislation applying to the advertising of food products to children?

16 Discuss the arguments for and against making the Health Star Rating system mandatory.

17 Write a brief blog post in support of the introduction of a tax on sugar-sweetened beverages.

18 Explain why Jane Martin from the Obesity Policy Coalition is concerned about advertising unhealthy food products to children.

19 Outline the concern health professionals have over industry self-regulation when advertising food products to children. Do you agree or disagree with the Australian Food and Grocery Council (AFGC) that there should not be mandatory regulation of advertising unhealthy food products to children? Justify your decision.

20 Discuss how consumer activism and organisations such as the Obesity Policy Coalition can impact on food choices and food sovereignty. Give examples to support your answer.

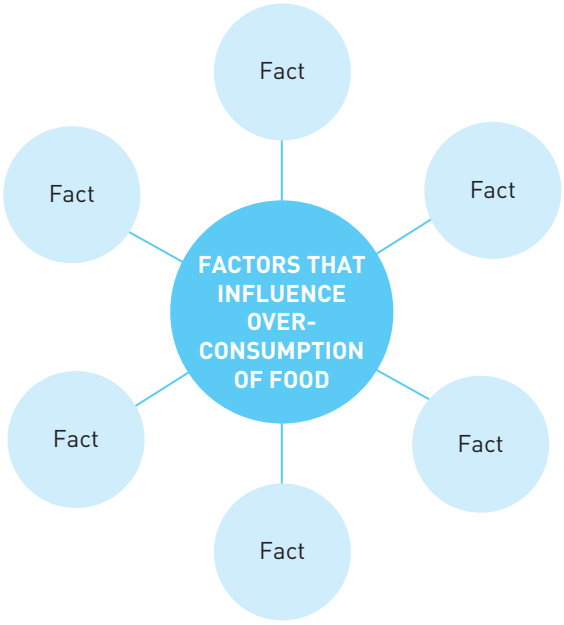
Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

Applying knowledge

Draw a diagram to identify the factors that influence the overconsumption of food.

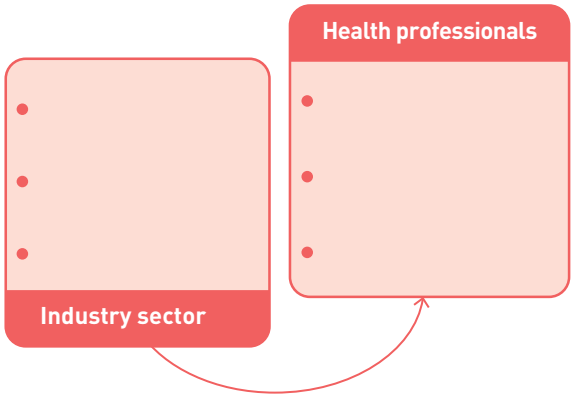


Analysing information

Discuss how eating foods high in added fat, salt and sugar has a direct impact on the health of consumers.

Evaluating concepts

Compare and contrast the arguments put forward by industry lobby groups and health professionals on the need for mandatory regulation of the manufactured food industry.



EXAMINATION-STYLE QUESTIONS



Answers
Examination-style questions

Resources
Preparing for exams support

Question 1 (6 marks)

More than 50 per cent of Australian consumers use food delivery apps to order food from a variety of restaurants. Once the restaurant or cafe has prepared the food, a delivery rider or driver delivers the meal to the customer's door.

a Explain how the use of online food delivery apps may encourage overconsumption of food and increase sedentary behaviour. [3 marks]

b Discuss the impact of the use of online food delivery apps on the long-term health of individuals. [3 marks]

Question 2 (4 marks)

Explain how a reduction in physical activity and an increase in sedentary lifestyles contribute to people becoming overweight or obese.

Question 3 (6 marks)

According to the Australian Bureau of Statistics, rates of overweight and obesity have increased over the last 20 years. Explain two factors that have led to this increase. Use examples to support your answer.

Monkey bread

Monkey bread is delicious, slightly spicy bread. Shaping the dough into small balls before layering the two elements – dough and flavourings – in the baking tin creates a visually interesting loaf. It also makes the loaf easy to eat, because each section breaks off without needing to be cut. Monkey bread provides a good source of carbohydrate, and the addition of cracked wheat increases the proportion of dietary fibre in this bread. The sunflower kernels provide a source of iron, vitamin B_6 and magnesium, as well as a good source of polyunsaturated fat. However, the butter used in the layering of this bread means that it is higher in saturated fat than other white breads.

DOUGH

2 cups white bread flour
1½ teaspoons freeze-dried yeast
1 tablespoon powdered milk
1 teaspoon sugar
½ teaspoon salt
2 tablespoons cracked wheat
2 tablespoons sunflower kernels (not seeds)
1 cup warm water
1 tablespoon olive oil

LAYERING MIXTURE

30 grams butter, melted
1 tablespoon sesame seeds
1 tablespoon poppy seeds
2 cloves garlic, crushed
1 tablespoon coriander, finely chopped
1 fresh chilli, deseeded and finely chopped

METHOD

Making the dough

1 Sift the flour, yeast, powdered milk, sugar and salt.
2 Add the cracked wheat and sunflower kernels and mix well.
3 Combine the warm water and olive oil. Make a well in the centre of the flour mixture, then add three-quarters of the liquid and mix. Gradually add the remaining liquid, using just enough to make a soft dough.
4 Turn the dough onto a floured bench and knead until smooth and elastic – this may take about 5 minutes. Return to the mixing bowl.
5 Cover the dough with oiled cling wrap and leave in a warm place to prove – the dough should double in size.

Making the layering mixture and preparing the dough

1 Preheat the oven to 200 °C.
2 Make the layering mixture by combining all the ingredients in a small bowl.
3 Grease a small log tin or ring tin.
4 Turn the proved dough onto a floured bench and knead until smooth.
5 Break off pieces of dough about the size of a walnut and pack into two parallel rows on the base of the tin. Spread half of the layering mixture over the balls of dough.
6 Top with another row of dough balls down the centre of the tin. Spread the remaining layering mixture over the top.
7 Cover with cling wrap and allow to prove for 10 minutes or until doubled in size. Spray with cold water.
8 Bake at 200 °C for approximately 15–20 minutes. The bread should be golden brown and make a hollow sound when tapped.

EVALUATION

1 Describe the sensory properties – appearance, aroma, flavour and texture – of the monkey bread.
2 Outline the tests that can be carried out to determine if the bread is cooked.
3 List four food products that could be served with the monkey bread to make it a healthy lunch for children and families. Justify your answer.
4 Refer to the serving sizes in the Australian Guide to Healthy Eating in chapter 2 (page 42) to check the size of one portion of bread. Using this information, what sized portion would you serve of monkey bread?
5 The Australian Government has positive health policies in place, such as the Eat for Health Program, including the Australian Dietary Guidelines. Consider these guidelines and explain why eating a serve of monkey bread for a snack would be preferable to a packet of potato crisps.



Mark Fergus Photography

Spinach and pine nut cannelloni

Wheat flour is the main structural component of the cannelloni. The preparation of the cheese sauce and the baking of the cannelloni also demonstrate the gelatinisation of starch. When making the cheese sauce, the starch gelatinises, creating a smooth and viscous mixture. During the baking of the assembled cannelloni, the pasta gelatinises, using the liquid from the vegetable sauce. The Maillard reaction also becomes evident on the surface, creating a golden brown colour. The production of this recipe provides an opportunity to develop skills in several wet and dry cooking techniques. The recipe for spinach and pine nut cannelloni provides a wide range of important nutrients. The vegetables in both the tomato and mushroom sauce and the spinach and pine nut filling are a source of dietary fibre, vitamins C and B6, and the minerals iron and magnesium. The pine nuts are a source of protein and polyunsaturated fat. The ricotta cheese, tasty cheese and milk are all good sources of calcium, but the cheeses are also high in salt. The pasta provides a good source of carbohydrate.

TOMATO AND MUSHROOM SAUCE

2 ripe tomatoes
1 tablespoon oil
½ onion, finely diced
1 clove garlic, crushed
½ capsicum, diced
60 grams mushrooms, finely sliced
250 grams diced canned tomatoes
¼ cup tomato paste
½ teaspoon dried basil
¼ teaspoon oregano
½ teaspoon sugar

SPINACH AND PINE NUT FILLING

¼ cup pine nuts
125 grams frozen spinach, defrosted
200 grams ricotta cheese
1 egg
freshly ground black pepper

CHEESE SAUCE

30 grams butter
1½ tablespoons flour
200 millilitres milk
50 grams grated tasty cheese

CANNELLONI

2 fresh lasagne sheets
2 tablespoons grated parmesan cheese

METHOD

Making the tomato and mushroom sauce

1 Prepare the vegetables.
2 Score the tomatoes, then plunge them into boiling water. Leave for 20 seconds, then remove and run under cold water. The skin should slip off the tomatoes easily.
3 Dice the peeled tomatoes.
4 Heat the oil in a saucepan and sauté the onion and garlic until translucent. Add the diced capsicum and cook for 3–4 minutes, or until just beginning to soften.
5 Add the sliced mushrooms and sauté until tender.
6 Add the diced tomato, canned tomatoes, tomato paste, herbs and sugar.
7 Bring to the boil and simmer gently, uncovered, for 15 minutes or until the sauce thickens slightly. Stir regularly to prevent the sauce from burning.

Making the spinach and pine nut filling

1 In a small saucepan, gently heat the pine nuts until just beginning to brown. Stir occasionally. This will take only 1–2 minutes. No oil is needed because of the high fat content of the pine nuts.
2 Squeeze as much moisture as possible from the defrosted spinach.
3 Mix the pine nuts, spinach, ricotta cheese and egg in a small bowl. Add a little black pepper to taste. Set aside until ready to assemble the cannelloni.

Making the cheese sauce

1 Melt the butter over a low heat. Stir in the flour, then remove from heat.
2 Gradually stir in the milk. Cook over low heat, stirring continuously with a wooden spoon until the sauce boils and thickens. Remove from the heat.
3 Add the cheese and stir until melted.
4 If not using immediately, cover the top of the sauce with cling wrap to prevent a skin from forming on the surface.

Assembling the cannelloni

1 Preheat the oven to 200 °C.
2 Cut each lasagne sheet into three – this will make six cannelloni rolls.
3 Spoon half of the tomato and mushroom sauce into the base of an ovenproof dish (15 × 22 centimetres).
4 Place 2 tablespoons of the spinach and pine nut filling on one of the pasta sheets. Roll up lightly to form cannelloni. Repeat until all of the pasta sheets and spinach and pine nut filling have been used.
5 Place the filled cannelloni on top of the tomato sauce and cover with the remaining tomato and mushroom sauce.
6 Cover with the cheese sauce and sprinkle parmesan cheese over the top.
7 Bake at 200 °C for 20–30 minutes.

SERVES 2

EVALUATION

1 Describe the sensory properties – appearance, aroma, flavour and texture – of each component of the spinach and pine nut cannelloni: the pasta, tomato and mushroom sauce, the spinach and pine nut filling, and the cheese sauce.
2 This recipe contains milk and cheese. Explain why, according to the rationale of the Australian Dietary Guidelines, it is important to include dairy products in the diet.
3 Classify the ingredients on a diagram of the Australian Guide to Healthy Eating and explain how well this dish meets the recommendations of this model.
4 What accompaniments could you serve with the spinach and pine nut cannelloni to improve the nutritional properties of this meal? Justify your recommendation.
5 A range of cannelloni dishes are available in the supermarket. Select one of these products and use the labelling information to assess the Health Star Rating given to this product.



Mark Fergus Photography

Coconut chicken bowl

One-bowl meals with several elements are a great way to ensure a meal meets the proportions of the Australian Guide to Healthy Eating. Layering the elements – rice, chicken and slaw – encourages family members to eat and enjoy a wide range of foods that contrast and complement each other, and to try items that they may not otherwise select. The chicken is a good source of protein, the rice is pure carbohydrate, and the slaw is an excellent source of dietary fibre and a range of vitamins and minerals.

CRISPY CHICKEN

2 chicken thigh fillets with skin on

2 teaspoons vegetable oil

salt flakes

COCONUT RICE

½ cup jasmine rice

½ cup cold water

70 millilitres coconut cream

ASIAN SLAW

⅛ white cabbage, finely shredded

½ red chilli, de-seeded and finely sliced

¼ carrot, grated

¼ Granny Smith or Pink Lady apple, grated

⅛ fennel, finely sliced

2 spring onions, sliced

1 tablespoon cranberries

1 tablespoon oil

1 tablespoon light soy sauce

1 teaspoon fish sauce

½ lime, juiced

¼ teaspoon caster sugar

1 tablespoon mint leaves, chopped

1 tablespoon coriander leaves, chopped

1 tablespoon roasted peanuts, chopped

METHOD

1. Preheat oven to 200 °C.
2. Rub the chicken thigh fillets with oil, place skin side up on a baking tray then sprinkle with salt flakes.
3. Roast for 20–25 minutes, until the skin is golden and crispy. Remove from the oven and allow to rest for 5 minutes.
4. Remove the skin from the thighs, shred the skin and reserve. Shred the meat and set aside.
5. Meanwhile, select a small saucepan with a tight-fitting lid. Wash the rice then place it in the saucepan with the water and coconut cream. Cover and bring to the boil, then reduce heat to very low and cook, covered, for 10 minutes.
6. Remove from heat and leave, covered, for another 10 minutes. Fluff with a fork before serving.
7. In a large bowl, combine the prepared cabbage, chilli, carrot, apple, fennel, spring onions and cranberries.
8. To prepare the dressing, whisk together the oil, soy sauce, fish sauce, lime juice and caster sugar. Pour the dressing over the slaw, add the shredded chicken and toss together. Add mint and coriander leaves and toss again.
9. Serve the rice in a large serving bowl, add the slaw and chicken. Top with some of the shredded crispy chicken skin and chopped peanuts.

SERVES 1

EVALUATION

1 Describe the sensory properties – appearance, aroma, flavour and texture – of the coconut chicken bowl.

2 Explain why, according to the Australian Dietary Guidelines, it is important to include grains such as rice in the diet.

3 The chicken is rubbed with vegetable oil and then baked. Explain why this is a healthier cooking method compared to shallow or deep frying the chicken.

4 Classify the ingredients of the coconut chicken bowl on a diagram of the Australian Guide to Healthy Eating.

5 Based on the data collected in question 4, comment on how well the meal meets the recommendations of the model.



Mark Fergus Photography

HOW TO SPOT A FAD DIET



- Is it based on healthy eating and exercise?
- Does it offer rapid weight loss?
- Is the long-term maintenance of the diet sustainable?
- Are there likely problems with the diet?

ANALYSING WEIGHT LOSS CLAIMS



- Exaggeration
- Lack of evidence
- Use of the fear factor
- Ethics versus financial gain
- Language used

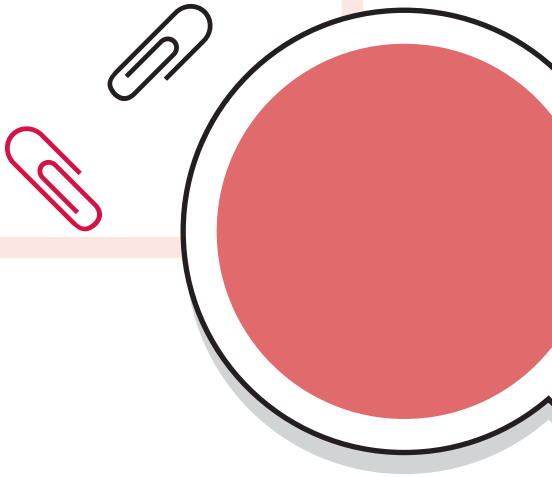
ASSESSING THE VALIDITY OF INFORMATION



- Source
- Purpose
- Context
- Presentation of evidence
- Language used

PUTTING THE AUSTRALIAN GUIDE TO HEALTHY EATING INTO PRACTICE

- Correct proportions of food groups
- Food from each of the five food groups
- Energy balance
- Reducing salt
- Reducing sugar
- Reducing fat



8

ASSESSING FOOD INFORMATION

KEY TERMS

accuracy the reliability and correctness of content

context the background or setting to a statement or idea so that the reader can understand where the information came from

CRAAP test a test that uses criteria to evaluate and validate sources of information

currency refers to how valuable and timely the information is to the topic

fad diets weight-reduction diets that either eliminate one or more of the essential food groups, or recommend consumption of only one type of food

food fad refers to a food or ingredient that people are interested in for a short period of time, such as chia, quinoa, teff or kale

nutrient supplement provides concentrated nutrients, most often vitamins and minerals, that may otherwise not be consumed in sufficient quantities

objective fair, impartial, independent and not biased

principles of research include credible sources, evidence-based information, accurate analysis of data

purpose the reason the information is being written

source the person or institution who wrote or published the article

relevance how valuable the information is to the topic

Resources
Study Design
links
Infographics
Flashcards

SOURCES OF FOOD INFORMATION

- Academic or scholarly articles
- News items in newspapers
- Magazine articles
- TV news reports



ASSESSING WEIGHT-LOSS AND NUTRIENT SUPPLEMENT COMPANIES

- Is there commercial gain?
- Is the program/supplement ethical?
- How effective is the program/supplement





The principles of evidence-based research

To be able to evaluate the information we receive about nutrition and health issues or contemporary food trends, it is essential to understand how to assess the reliability and validity of information. As discussed in chapter 2, the Australian Dietary Guidelines, along with being able to recognise credible sources, use evidence-based information and accurately analyse data, will enable us to become more informed consumers of health information.

The Australian Dietary Guidelines and the Australian Guide to Healthy Eating are based on three main **principles of research** – the recognition of credible sources, using evidence-based information and the accurate analysis of data.

The Eat for Health Program is underpinned by the latest evidence to develop nutritional guidelines that form the standard or guide, to validate food information. Both the Australian Dietary Guidelines and the Australian Guide to Healthy Eating group foods according to their type, and the key nutrients they contain. This helps Australians determine the food they should eat each day according to their age, gender, body size and activity levels. Classifying individual foods into the five food groups enables individuals to not only select nutritious foods, but also to focus on the amounts of each food that should be consumed for health and wellbeing.

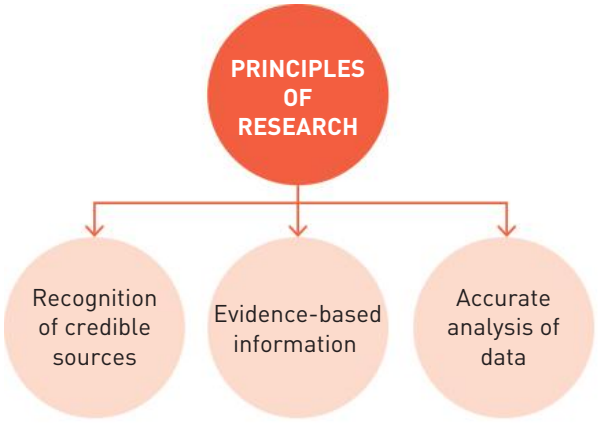


FIGURE 8.1 The principles of research

CRITERIA FOR ASSESSING THE VALIDITY OF FOOD INFORMATION

Regardless of whether information is presented online or in magazines, newspapers or books, consumers find it extremely challenging to negotiate and validate the information that is presented. Before deciding on a diet or adopting a **food fad** or trend, it is important to apply a series of criteria to assess the validity of the information.

Source

Check whether the information comes from a reliable and credible **source** – that is, the person or institution who wrote or published the article. For example, is the article written by an academic or specialist in the field, who has referenced the information and verified the facts? These articles are usually published by reputable institutions such as universities or organisations such as government bodies or Nutrition Australia or the Cancer Council of Australia. These articles are often validated by peer reviews; that is, colleagues who have a similar professional standing or qualifications.

Other sources, such as a social media post, newspaper or popular magazine, may not contain any reference to their sources of information, so it is important to take a critical approach to the contents of these articles.

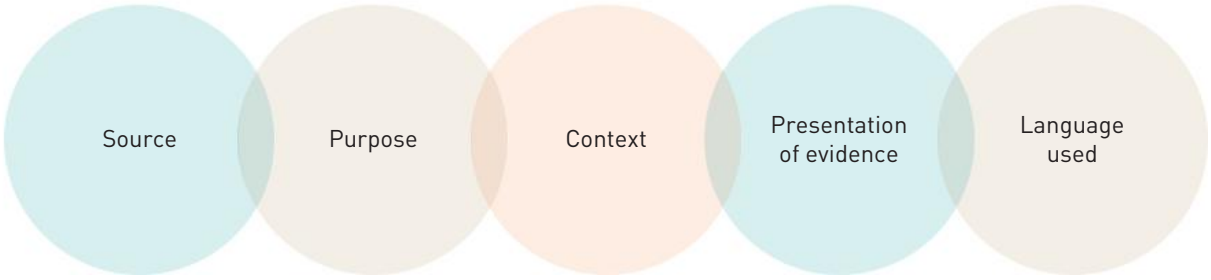


FIGURE 8.2 Criteria used when assessing food information

Purpose

Determining the reason for the publication will help to assess its validity. Asking 'Why has this article or information been written?' helps the reader to decide whether the intention is to provide and share factual information or advice, to help clarify a topic or question, to promote someone's personal point of view, or to increase the sale of a particular product.

Context

The context provides the reader with the setting or framework for the article, and will allow the reader to understand the background behind the information being written.

Presentation of evidence

It is important to assess the **accuracy** of the information – that is, whether it is reliable and correct – by assessing the evidence provided in the article.

- Is the article based on evidence-based information and scientific facts?
- Are the facts cited and verified in references, footnotes or a bibliography?
- Is the article illustrated with graphs and tables that present research data?
- Does the article report facts or does it offer personal opinions?

Language used

The language used should be appropriate for the reader or audience. A scientific article may include technical or professional terminology that is understood by other scientists or health professionals working in the same field. However, if the article is aimed at the general public, it will need to be written in a simpler way, using less technical language that is easily understood.

CRAAP test

The **CRAAP test** is another method widely used in the tertiary and academic circles for evaluating the validity and objective reliability of information and to determine if a source used can be trusted.

The criterion for assessing the validity of information sources are based around five areas: currency, relevance, authority, accuracy and purpose.

1 Currency

Ensuring the information has **currency** is important when assessing information. Consider when the information was published or posted online, and if it has been revised or updated since. If it is not current, it may be too old to be useful. Information that was published 20 or 30 years ago may be less reliable, as new research may have been undertaken in the area. When evaluating the currency of the information, it is essential to check the copyright date on the page, and if any links listed on websites are still accessible and functional.

2 Relevance

It is important to evaluate the information for its **relevance** to the topic; that is, how valuable the information is to the topic, who the audience will be and its suitability for the intended audience. The **context** is the background or setting to a statement or idea; this helps the reader understand where the information came from.

Considering the relevance or context of the information will determine whether the information can be comprehended or if the level is too basic or too advanced. Information for the public will vary in its depth; information for children will be simple, while information targeted to professionals will require some advanced understanding. The information depth and prior knowledge will also determine the language used. Technical knowledge and the language used must be appropriate for the target audience; for example, if the audience is the general population, it must be non-technical and easily understood.

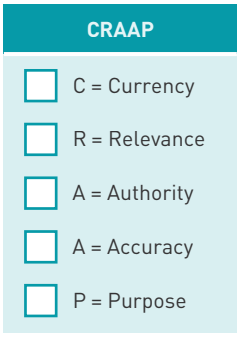


FIGURE 8.3 The CRAAP test is a well-recognised method of evaluating the reliability of information.

3 Authority

To validate information, it is important to know something about the **source** or author. Question whether they are an expert or professional in their field of study, or are affiliated with a reputable educational institution, university or government agency. The source of the data or quotations must be reliable to ensure the information is accurate and error free. Check the reliability of the source by making sure facts are cited in references, footnotes or a bibliography. In addition, check that contact information such as an email address or publisher is provided.

Ask yourself the question, 'Is the author impartial or is the article used to sell products to customers for commercial gain?'

4 Accuracy

It is important to determine the accuracy of the information and whether it is true and correct, free from error and based on proven facts. Articles illustrated with graphs and tables that present research data should outline the methods used in determining this information, as this will assist in determining its accuracy. In presenting the evidence, it is important that the claims can be verified against other sources. If the claims or information are borrowed or taken from other sources, they must give credit to the original source by citing the work and adding it to the list of references or bibliography. To ensure accuracy of the information, it should be peer reviewed; that is, checked with other experts in the field.

5 Purpose

It is important that information presented is **objective** if it is to be of value to consumers. That is, the information must be fair, impartial, independent and unbiased. It is essential to identify the **purpose** – that is, the reason the information is being written. Is it to provide advice, advocacy, opinion, to express personal views, or to sell a product for commercial gain? Question whether the information is targeted to the general population or if it is designed for a specialised audience. Also examine whether the views presented are affiliated with a political, commercial or social agenda. Sometimes there is a conflict of interest if a website or publisher stands to benefit from producing the information. Make sure the facts presented can be found in another source to check their accuracy.

Activity 8.1

Undertaking a CRAAP test to assess the validity of food information

Read the article below, then use the following table to score each criteria question and establish the article's reliability and validity.

CRITERIA	EVALUATION	0	1	2	3
Currency	• Is the information up to date and relevant? When was it published? • Has the information been revised or updated? • Are any links still functional?				
Relevance	• Is the **context** or background to the statement or idea clear and easily understood by the reader? • Does the information answer your questions? • Who is the intended audience? • Does the information and the **language used** suit the intended audience and is it at an appropriate level?				
Authority	• Is the **source** or author an expert in the area? • Who is the author's publisher or sponsor? • Does the author have affiliations with a particular organisation?				
Accuracy	• Is the information supported by **evidence**? • Has the information been peer reviewed? • Where does the information come from and is it accurate and error free?				
Purpose	• What is the **purpose** of the information? • Is the information fact or opinion? • Are there any personal, commercial, or political biases?				

How well did the food information score?

12–15 points = excellent source of information
8–11 points = good source of information
4–7 points = useful ideas, but little citing of references to validate information
0–3 = unreliable information

PROFITS SOAR FOR ALGAE FARMERS AMID CHLOROPHYLL BOOM, BUT EXPERTS CAST DOUBT ON HEALTH BENEFITS



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Many online influencers have promoted chlorella, which has led to increased consumer demand.

The only farm in Australia that grows chlorella is scrambling to meet demand amid a TikTok and Instagram frenzy, but doctors and dieticians say you should probably just eat your veggies.

Now the farm is looking to expand its operation as demand for the nutrient-rich algae – which contains chlorophyll – soars in popularity online.

Hyped or healthy?

Algal supplements have been around for many years but social media marketing for chlorophyll dietary supplements seems to be driving a spike in demand.

Chlorella is marketed as having the highest source of natural chlorophyll on the planet and there is no shortage of recommendations coming from prominent influencers.

The hashtag 'chlorophyll' has trended on TikTok, Instagram and other social media sites, with searches bringing up hundreds of thousands of posts.

But the health benefits of chlorophyll – the pigment that makes the leaves of plants green – are questionable, according to Nutrition Australia dietitian Leanne Elliston.

'It's important chlorophyll does get researched thoroughly – it's still fairly early days for me to recommend using this on a regular basis,' she said.

'There needs to be vigorous studies – we need to look into more studies to find whether chlorophyll is in fact an important component in our health.

'I think what's most important is the other nutrients in green leafy vegetables – your folate, vitamins, iron and antioxidants.'

'Extremely limited studies'

Dermatologist Leona Yip said chlorophyll has taken off as a treatment for skin problems, but more research was needed into its potential benefits.

'We know theoretically chlorophyll has some antioxidant and anti-inflammatory properties, but there are extremely limited human studies,' she said.

'We don't know whether this translates to benefits to treat problems like acne, rosacea, or whether it even gets to your skin at all.'

Ms Elliston said in most cases the extraction of nutrients for supplements came in second to simply eating the raw products that contain the vitamins and minerals.

'When we consume those nutrients in isolation they never work quite as well as nature has intended,' she said.

'It's always a good idea to get nutrition from foods.'

Dr Yip and Ms Elliston said people who took health advice from online sources were unlikely to seek medical advice from specialists.

'When I see patients, I talk about scientific, evidence-based skincare like retinoids, antioxidants – things we know have more credible evidence,' Dr Yip said.

'Maybe people on social media buying into that hype are not into seeing medical doctors, maybe they prefer to go with what's being marketed.'

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Understanding the Text

Answers
Understanding the Text

1 Outline the three principles of evidenced-based research and explain why these principles are important to the health and wellbeing of individuals.
2 Explain the basic principles of the nutritional rationale that underpins the Eat for Health Program.
3 What is the CRAAP test? Identify the five areas of focus in a CRAAP test.
4 If food information lacks currency, how does this detract from its value as a reliable source?
5 Explain the value of presenting a context for the reader when reporting food information.
6 Justify why it is important to ensure that the information presented is relevant to the reader.
7 Identify three ways the source of information can be validated.
8 Discuss some strategies readers can use to determine the accuracy of food information.
9 Describe two strategies that can be used to verify the evidence presented.
10 Explain what is meant by ensuring that food information is objective.

Food fads, trends and diets

It is well understood that the best way to lose weight is to eat a healthy, well-balanced diet that provides fewer kilojoules, and therefore less energy, than the body requires, and to exercise regularly. Unfortunately, this message may not be as enticing as that promoted by a social media influencer, Hollywood star or sporting celebrity who claims that a particular diet or product is the secret to their weight loss or improved health.

Following the latest food fad, food trend or diet can sometimes cause consumers to make poor food choices by restricting their intake of certain healthy foods or consuming a specific food. **Fad diets** are of particular concern because they are weight-reduction diets that either eliminate one or more of the essential food groups, or recommend the consumption of only one type of food. A **food fad** can also be detrimental to health as they focus on a food or ingredient that people are interested in for a short period of time, such as chia, quinoa, teff, kale, oat milk or algae.

Following a fad diet or food fad can be challenging for consumers because the information provided by health food 'gurus' often clashes with the advice of nutritional experts. Consumers can become very confused when trying to balance compelling new information with current health knowledge.

According to University of Sydney Professor of Dietetics, Margaret Allman-Farinelli, messages such as 'eat five serves of vegetables a day' or 'limit processed meats like ham and salami' are the result of hundreds of scientific studies and painstaking research that has been peer-reviewed. These health recommendations are made based on the best-quality evidence that scientific research can provide.

Health journalist Paula Goodyer, in an article titled, 'Fad or fact: fashionable diets get a reality check', is quoted as saying 'a new diet is born from a grain of truth, a small study and suddenly a new diet can be created, especially when a celebrity is involved.'

Collaborative Activity

In this article she states that new trends in foods or new diets can be started by linking a particular 'superfood' or health food to a minor health benefit. Disturbingly, some of these claims undermine the validity of well-recognised health messages, such as the importance of including wholegrains in a well-balanced diet. What may have been pure speculation can soon become 'fact' if the celebrity's book becomes a best-seller. The final stage in this fiction-to-fact pathway is the development of new products, recipes and recipe books based on the new superfood – and suddenly a new food trend is born!

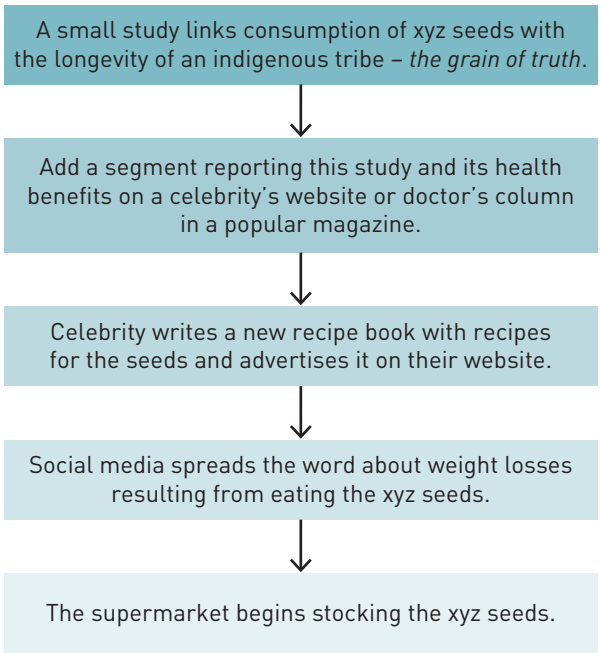


FIGURE 8.4 The pathway to creating a food fad

Practical Activity 8.1

Popular food trend – Kombucha



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Aim: To analyse the sensory properties of kombucha products and determine the reason kombucha has become a popular food trend.

Method

1. Your teacher will provide three different brands of kombucha products for you to taste test. Ensure you taste test the same flavour of kombucha for the best comparative results.
2. Record the results of your sensory analysis in the table below.
3. Use the questions provided below to complete a class survey using an app such as Padlet.

Results

	KOMBUCHA 1	KOMBUCHA 2	KOMBUCHA 3
Appearance			
Aroma			
Flavour			
Texture			
Nine-point scale 1 = dislikes a lot 5 = neutral 9 = likes very much			

RESULTS FROM THE CLASS SURVEY	
How often do you drink kombucha?	
When you drink kombucha is it replacing water as a drink?	
Why do you drink kombucha?	
Do you drink homemade or commercial kombucha?	
Do you read the ingredients and nutrition panel before purchasing and drinking kombucha?	
Other questions?	

Analysis

1. Using the data you have collected, identify which kombucha had the most appealing sensory properties. Justify your answer.
2. Identify a consumer group that the manufacturers of kombucha are aiming their product towards.
3. Compare the labels of the three different types of kombucha. Identify information and marketing terms on the labels that may appeal to a health-conscious person's food values.
4. Based on the results of the class survey and your understanding of how a food trend develops, explain why you think drinking kombucha has become a popular new food trend.

Conclusion

Develop a statement that discusses the reasons why drinking kombucha has become a popular food trend.

RECOGNISING A FAD DIET

Accredited Practising Dieticians (APD) define fad diets as 'any eating plan that promotes results, such as fast weight loss, without scientific evidence to support its claims'. Fad diets are of particular concern as, although they can lead to weight loss in the short term, they are very difficult to maintain.

A fad diet can be identified if:

- it is endorsed by a social media influencer or celebrity sports star
- some foods are severely limited, such as avoiding all carbohydrate foods
- it restricts food consumption to certain food types, such as the soup diet
- it is based on newly discovered foods or miraculous pills that have magical capabilities
- dramatic results are guaranteed with minimal effort, such as potions that 'melt' body fat
- the commercial product is supported by remarkable scientific testimonials
- the diet does not include a regular exercise program.

Remember, if a diet sounds too good to be true, it usually is!



iStock.com/blackCAT

Social media influencers often promote fad diets.

ANALYSING CLAIMS MADE BY WEIGHT-LOSS PROGRAMS

The weight-loss industry is big business and is growing rapidly due to the recent increase in the number of Australians who are overweight or obese. Research by the Garvan Institute of Medical Research in Sydney found that 67 per cent of Australians are overweight or obese, 31 per cent of Australian adults are obese, and 25 per cent of children and adolescents aged 2–17 are overweight or obese. In their Market Research Report in June 2021, Weight Loss Services in Australia reported that 'there is little indication that weight gain in Australia will substantially slow over the next five years, and consumers' propensity to spend money to alleviate weight problems is anticipated to remain high'.

Strategies used by weight-loss diets and nutrient supplement companies

Weight-loss diets and **nutrient supplement** companies use a variety of strategies to promote their products and convince the consumer that they will be healthier and feel better if they use their product.

Some of these strategies include:

- **Exaggeration** – the health benefits of a certain plan or product may be exaggerated to sound more convincing.
- **Lack of evidence** – often these claims are not supported by strong scientific evidence, as research is often carried out on a small number of people or for a short amount of time.
- **Using the 'fear factor' and demonising foods** – a company may promote their products and plans by using the 'fear factor' to demonise certain ingredients or discussing the likely unpleasant outcomes of supposed deficiencies. These deficiencies are often put forward as possible reasons for feeling tired, for example, but are not determined by medical tests. A 'miracle fix' is often presented as the answer to these issues. The words 'natural' versus 'artificial' are used to create negative and positive feelings about foods.
- **Commercial gain v necessity** – when purchasing nutrient supplements, it is important to ask, 'Is the product really necessary, or is it a way for the manufacturers to gain greater profits?'
- **Use of scientific language** – scientific language is often used to add plausibility to health claims. They 'woo' the consumer into feeling they need the product for good health. These claims are often presented in a narrative form in news reportage, making it possible to use convincing terms such as 'could', 'would' or 'maybe'.
- **A feeling of uniqueness** – Consumers often want to feel 'unique' by adopting a certain diet or by avoiding certain foods. They are also sometimes drawn to a product by nostalgia or a desire to return to former times, when food was healthier and diets and supplements were not needed.

Lite n'Easy

There is a vast array of weight-loss programs designed to help consumers lose weight, including WeightWatchers, Jenny Craig, CSIRO Total Wellbeing Diet, Dietlicious and Lite n'Easy. However, it should be remembered that the aim of all of these weight-loss programs is to sell their product to consumers, so it is important to consider their mission statements to improve the health of individuals while also making a profit.

Lite n'Easy is a weight-loss program that provides kilojoule-controlled meals to a person's home. The program is designed for weight loss, weight maintenance and convenience for people who are time poor and too busy to shop or cook. It offers people healthy foods in the right proportions throughout the day, with no meal planning, shopping or preparation necessary. Meals can be chosen to suit a person's lifestyle and budget.

The first step in using Lite n'Easy is to choose the right meal plan, depending on whether the goal is weight loss or convenience. Breakfast and lunches, lunches and dinners, or just dinners can be chosen.

Lite n' Easy have a variety of meal plans, such as the Jump Start Plus which combines intermittent fasting with meals to get the weight loss journey started. Regular Full Meals or dinners only are designed for weight loss or for convenience. These meals are available in 1200 calorie (5200 kilojoule), 1500 calorie (6276 kilojoule), or 1800 calorie (5731 kilojoule), five or seven-day plans.

Dinner only plans are also available for busy people wanting a healthy and convenient alternative on nights when they don't have time to cook. There are over 45 dinners to choose from.

My Choice meals are high-protein, smaller meals designed for older Australians. These meals are specifically designed to meet the nutritional needs of older Australians who find the standard dinners too large. These meals are not designed for weight loss.

The Lite n'Easy website provides consumers with a wide range of information, including how to unpack their order as well as storage and heating instructions. Healthy eating tips are also provided, such as information about portion control and developing healthy eating habits to maintain weight loss throughout life. The website gives consumers important information about how to identify the most suitable plan to achieve their weight goals. Alternately, they can contact the Lite n'Easy consultants, who will help them determine how much energy they should consume for good health, but also to achieve weight loss. The Lite n'Easy Jump Start Plus has a program and app that helps fast-track weight loss success, with weekly weight loss and body measurement tracking. It also contains motivational messages and tips and advice from Lite n' Easy dieticians.

Is there commercial gain?

Lite n'Easy is an Australian-based company that was launched in 1986. Based on the longevity of the company, it is reasonable to presume that they are profitable and that they achieve significant commercial gain from the Lite n'Easy program. The cost of the meal programs is high, particularly when two people purchase the meals. This type of diet plan may well be more expensive than preparing your own meal from scratch using fresh ingredients.

Is this weight-loss program ethical?

Throughout the information provided on the Lite n'Easy website, the energy value referred to is calories, although in the detailed nutritional breakdowns of meals, kilojoules are also included. This can be confusing for consumers, and makes comparisons difficult, as most Australian food labels use kilojoules as the measurement of energy in their nutrition panels.

Before you begin a weight loss program you are asked to fill in a questionnaire, which asks about your gender, age, height, current weight and how much exercise you do. Lite n'Easy then recommends one of three different meal plans – 1200, 1500 or 1800 calories per day, based on your answers.

In a Choice survey, 35 per cent of previous customers found the program expensive and poor value for money. The program became too expensive to keep using on an ongoing basis.

Another ethical issue is that diet plans that supply kilojoule-controlled meals encourage dieters to become dependent on the program, meaning they do not develop the personal skills and knowledge to guide their food choices and maintain their desired weight throughout life. In addition, marketing the plan as a convenient and easy way to lose weight appeals to those consumers who are time poor, rather than encouraging them to evaluate the nutritional properties of the plan. Consumers pass over the responsibility for their weight loss to a paid plan instead of taking ownership of it themselves.

How effective is the program?

The Lite n'Easy program is based on the restriction of energy or the reduction of kilojoules to lose weight, and can be an effective tool in weight loss.

However, the plan can be easily disrupted if a person becomes hungry and resorts to additional high-energy snacks. Eating out is also difficult – it is unlikely that restaurants would agree to a diner bringing their own meal!

Maintenance of weight loss can become a problem as the person has not been taught to select foods that will enable weight loss, so they can easily revert to old habits. The program encourages healthy eating, but unless people learn to choose healthy foods and prepare meals themselves, these lessons are often not effectively learnt. In the Choice survey, 40 per cent of consumers found it difficult to maintain their weight loss after stopping the program, as there was no nutrition education provided to assist with maintaining a healthy weight and lifestyle.

Meal-replacement shakes

Meal-replacement shakes are a low-kilojoule drink that is used to replace up to two meals a day and is consumed in addition to one regular healthy meal each day. Meal-replacement shakes are designed to keep the person feeling full without consuming a large quantity of kilojoules. The shakes usually contain a combination of fibre, proteins, vitamins and minerals and other additives in a flavoured milk- or water-based drink.

People who have failed at other attempts to lose weight may turn to meal-replacement shakes as a last resort. Other consumers use them because they are tasty and convenient. The shake powders are easy to pack in a work bag and are easy to prepare, as they only need to be mixed with water and shaken.



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Meal-replacement shakes can easily be prepared by mixing the shake powder with water.

Impromy produces Flexi meal-replacement shakes in collaboration with the CSIRO. These shakes are used as part of a new personalised Flexi Meal Plan for weight loss. The shakes contain a high-grade protein, a fibre blend and vitamins and minerals for optimum health, and to help the person feel fuller for longer. They come in four flavours: French vanilla, strawberries and cream, iced coffee and double choc. The shakes come in packs containing twelve sachets, and each sachet is mixed with milk, or a milk alternative, and shaken for 30 seconds.

These meal-replacement shakes form part of the Flexi meal plan. Each day of the plan includes free foods as well as Flexi shakes, and one day is set aside to enjoy favourite foods.

A cookbook has been developed by a dietician to assist with recipes for meals, particularly for 'control' days. Flexi members have access to a member portal that offers digital weight-loss consultations and develops an individualised weight loss program, which can be modified as you progress through the program.

Is there commercial gain?

These shakes are expensive and usually come in packs of 12, to last for several weeks at a time. Some of these products have celebrity endorsements, and this form of advertising will add to the cost of the products. It is important to judge the cost of this diet plan by calculating what you would spend on lunch each day – if lunch costs $12 a day, and the cost of purchasing shakes for a week is $36, then diet shakes may be economical.



Matt Golding, The Age

Activity 8.2

Product analysis of a meal-replacement shake as a weight loss product

Aim

To analyse one meal-replacement program to assess the validity of the claims made by the company and compare the weight-loss program with the recommendations of the Australian Dietary Guidelines.

Method

1. Choose a meal-replacement shake program such as Impromy, Man Shake, Lady Shake, Fat Blaster, Celebrity slim, Opti slim or another option.
2. Access the website for your chosen product and determine how the program works, using the questions in the table below to guide your analysis.
3. Make up the shake according to the directions on the packet and undertake a sensory evaluation of the product.

Results

Name of meal-replacement shake	
Recognition of a credible source	
Product website	
Evidence-based information	
Is the program based on scientific, evidence-based information?	
How does the program work?	
Is the program used in conjunction with healthy eating and exercise?	
Accurate analysis of data	
Does the diet offer rapid weight loss rather than steady, sustainable weight loss?	
Has the promotional material used scientific language, small print or before and after photos?	
Have you identified any adverse health outcomes from following the diet?	
Review the packaging and labelling of the product. Are any product guarantees or persuasive promises made on the packaging?	
Sensory analysis	
Appearance	
Aroma	
Flavour	
Texture	

Analysis

1. Explain whether sufficient information is provided on the company website or in the product information to allow consumers to accurately assess the validity of the information.
2. Based on your results of the accurate analysis of data, has the company provided consumers with sufficient information to make an informed decision about whether the product will help them achieve their weight-loss aims? Justify your answer.
3. Based only on the sensory evaluation, could you use this weight loss meal-replacement shake to replace one or two meals a day for two weeks? Explain why or why not.

Conclusion

Based on your assessment of the validity of the claims made by the company and your sensory analysis, does this weight-loss program support the recommendations of the Australian Dietary Guidelines? Justify your response.

Are meal-replacement shakes ethical?

Most meal-replacement shake products are bought over the counter and do not generally come with any maintenance assistance after weight is lost. As a result, weight is often regained quickly as dieters return to their normal eating behaviour. The Flexi meal-replacement shake offers a member portal, which assists consumers with maintenance as they lose weight. The Flexi product, to its credit, is promoted as part of a healthy diet plan and exercise regime.

Sometimes the additional ingredients found in a product may be difficult to identify and understand, as they are labelled with additive numbers and long technical names. If it is not clear what ingredients are used to produce the product, it may be difficult to evaluate whether the product is ethical.

How effective are meal-replacement shakes?

It is recommended that meal-replacement shakes replace up to two meals a day for 6–8 weeks, and should be used along with a healthy diet and exercise routine. Shakes are only effective for weight loss if used according to the guidelines of the program. However, some people are tempted to use them in addition to regular meals, which may mean that excess energy is consumed and weight loss may not be achieved.

These meal-replacement shakes could just as easily be replaced with a light, healthy meal such as a salad based on vegetables and fruit. A breakfast frittata of mushrooms, spinach, cheese and eggs contains as much protein as a shake, but it also contains other valuable nutrients.

In the initial stages of using a meal-replacement shake program there can be significant weight loss due to the reduction in kilojoules, and this can be very motivating. These products usually contain a high proportion of both soluble and insoluble fibres, which have a filling effect and allow dieters to feel satisfied and remain full between meals. However, the low energy content of meal-replacement shakes may cause dizziness, bad breath and tiredness. Another disadvantage of using shakes is that socialising with friends over shared meals becomes difficult, because there is no need to set a table and take time to relax and share conversation while eating.

Meal-replacement shakes are not the single, instant solution to weight loss. While they do provide a short-term solution, this method is not sustainable. Without choosing, cooking and preparing healthy foods and adopting good portion control, people often end up regaining any weight lost. Although these shakes are used as a meal replacement, nothing replaces the benefits of eating fresh fruits and vegetables, grains, lean meats and dairy foods.

Assessing claims made by nutrient supplement companies

Eating a well-balanced diet based on the five food groups will ensure that most consumers obtain all the essential nutrients needed for good health. However, many people are being lured into feeling that they should also take vitamins and other nutrient supplements to ensure they remain healthy, even though there is no evidence of widespread dietary deficiency among the general population.

A **nutrient supplement** provides concentrated nutrients, usually vitamins and minerals, that may not otherwise be consumed in sufficient quantities.

A study by Roy Morgan Research in April 2019 reported that over 8.3 million Australians buy vitamin and mineral supplements. Another study published in the Australian and New Zealand Journal of Public Health found that almost 20 per cent of all Australians and New Zealanders are consuming over-the-counter vitamins as part of their daily routine, often without seeking any specific medical advice about the benefits of doing so.

It is important to remember that some people are strongly advised to take a nutrient supplement at particular times in life. For example, women planning a pregnancy must increase their consumption of folic acid, to reduce the likelihood of their child having spina bifida. Similarly, people who are at risk of developing osteoporosis are strongly advised to take high doses of vitamin D.

Apart from vitamin supplements, many consumers are now being encouraged to use protein powders and dietary supplements that help to promote relaxation and sleep. Supplements high in antioxidants or omega-3 fatty acids are also becoming more popular as they receive support from so-called weight-loss experts. However, there is no scientific evidence to suggest that these products will promote weight loss.

DIETARY SUPPLEMENTS FOR CHILDREN

The trend towards using dietary supplements is particularly evident among parents of young children. Some parents find it difficult to get their child to eat a wide range of foods, particularly vegetables and meat, and so become concerned that they are not obtaining all the nutrients they need to sustain their growth and development.

Blackmores Superkids Immune Chewables

Dietary supplements specifically marketed towards children are emerging in response to parents' concerns, and, like weight-loss products, these products need to be carefully evaluated. Blackmores Superkids Immune Chewables are chewable tablets that are promoted as containing a range of essential vitamins to help support kids' immune health. These citrus-flavoured vitamins contain no added sugar and are free of artificial colours, flavours and sweeteners. The Blackmores website does state that vitamin supplements should not be used as a replacement for a balanced diet in children.



Mark Fergus Photography

Blackmores Superkids Immune Chewables

Commercial gain

Blackmores is one of the most trusted supplement companies in Australia. While the recommended dose for a child is only one pastille a day, and therefore seems relatively inexpensive, dietary supplements such as Superkids Immune Chewables do provide a significant commercial gain for the company. It could be argued that the gummies are expensive given that any additional nutrients supplied by them, particularly in the case of water-soluble vitamins, are not utilised. This is because the body does not retain water-soluble vitamins if they are consumed in excess of the daily requirement, and so any additional intake is excreted.

Is this product ethical?

There is no doubt that most children would be happy to take one gummy a day because they are flavoured and coloured like a lolly. This nutrient supplement will satisfy some parents' concerns if their children are fussy eaters or have suffered a period of ill health. The product seems to emphasise that they are 99.9 per cent sugar free, with no artificial colours and flavours, and are a delicious option to support children's health and development. However, these nutrients can all be obtained by encouraging the child to eat a wide variety of foods, as can be seen in the table below.

If parents follow the Australian Dietary Guideline 2: 'Enjoy a wide variety of nutritious foods from these five food groups every day such as fruit,

NUTRIENT/INGREDIENT	FUNCTION	NATURAL FOOD SOURCES
Ascorbic acid (vitamin C)	Vitamin C is a water-soluble antioxidant nutrient used for many body processes	Good sources – capsicum, blackcurrants, oranges and strawberries
Zinc	Zinc is essential for every living body cell 300 enzymes need zinc for healthy functioning	Meat, eggs, seafood, oysters, whole grains and seeds
Vitamin A	Vitamin A is a fat-soluble antioxidant used for a large number of biological processes	Red meat, eggs and dairy products
Vitamin D	Vitamin D is a fat-soluble vitamin that regulates calcium and phosphate metabolism for bone health and maintenance	Most children obtain sufficient Vitamin D from sunlight

vegetables, lean meat, dairy and whole grain cereals', supplements are unnecessary, because children obtain all the active ingredients in the gummies from their diet. One orange and a half cup of capsicum will supply all the vitamin C required for a day. Building healthy eating habits will support good health and immunity and establish healthy eating behaviours for life.

Is the product effective?

The nutrients contained in the gummies will no doubt supply valuable active ingredients with a range of vitamins and minerals. There is also nutritional evidence to support the role of each of the active ingredients and their functions in the body. However, the human body is unable to store the water-soluble vitamins such as vitamin C, so this supplement is likely to provide more of these nutrients than can be used at one time.

Understanding the Text

11 What is the difference between a fad diet and a food fad? Explain why fad diets may put a person's health and wellbeing at risk.

12 Explain why following a fad diet can be confusing for consumers. Use examples to support your answer.

13 Compare and contrast the evidence used to support health recommendations provided by health programs and that used to support a fad diet.

14 Identify three ways you can recognise a fad diet.

15 Draw up a diagram to highlight the strategies used by some weight-loss companies in promoting their products.

16 Prepare a SWOT (strengths, weaknesses, opportunities, threats) analysis of the Lite n'Easy weight-loss program.

Strengths	Weaknesses
Opportunities	**Threats**

17 Prepare a PMI (plus, minus, interesting) chart on the value of using meal-replacement shakes to lose weight.

PLUS	MINUS	INTERESTING

18 Research shows that sales of over-the-counter vitamin and mineral supplements are increasing. What explanation do you think could account for this trend?

19 Outline why some parents give their children a vitamin supplement. In your view, is this necessary? Justify your answer.

20 Write up a menu for a child's lunch that would provide a good source of vitamin C, zinc and vitamin A.

Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

Analysing information

Prepare a PMI chart (plus, minus interesting) on the Lite n'Easy weight-loss program.

Worksheet

PMI CHART – LITE N'EASY WEIGHT-LOSS PROGRAM		
Plus	**Minus**	**Interesting**

EXAMINATION-STYLE QUESTIONS

Question 1 (10 marks)

The following statement encourages consumers to adopt Dr. Siegal's cookie diet.

> Created by renowned physician, author, and weight-loss expert Dr. Sanford Siegal, Dr. Siegal's COOKIE DIET is a proven, three-step plan that has helped more than a half million people lose weight since 1975. It's a safe, fast, and affordable approach to weight loss and weight maintenance that hundreds of doctors throughout North America have used to help their patients lose weight. The cookies are all-natural, Kosher, and vegetarian, and people find them very tasty.
>
> Dr. Siegal's time-tested concept is simple: Stick to a diet of 1,000 to 1,200 calories a day, of which about 500 come from Dr. Siegal's COOKIE DIET hunger-controlling snacks and 500 to 700 from a generous meal. On 1,000 to 1,200 calories, everyone loses weight. There are no failures at that caloric level.
>
> Source: Guide To Dr. Siegal's Weight-Loss Plan, Cookie Diet Australia

Analyse the issues relating to Dr. Siegal's cookie diet. Your response should include discussion of:

- the principles of research used in the development of the Australian Dietary Guidelines
- criteria used when assessing claims made by this weight-loss company, including commercial gain, ethics and the effectiveness of the product
- the nutritional efficacy of this fad diet
- a list of recommendations you would give to someone considering following this diet.



Answers
Examination-style questions

Resources
Preparing for exams support

Question 2 (6 marks)

Kombucha is a food trend that has increased in popularity in recent years. Read the following extract presented by the Mayo Clinic, a major health and wellbeing organisation located in the USA. Identify three criteria to use when assessing food information and use these criteria to evaluate the validity of the information presented by the Mayo Clinic.

> What is kombucha tea? Does it have any health benefits?
>
> Answer from Brent A. Bauer, M.D.
>
> Kombucha tea is a fermented drink made with tea, sugar, bacteria and yeast … containing vinegar, B vitamins and a number of other chemical compounds.
>
> Proponents claim kombucha tea helps prevent and manage serious health conditions, from blood pressure to cancer. These claims are not backed by science. Limited evidence suggests kombucha tea may offer benefits similar to probiotic supplements, including promoting a healthy immune system and preventing constipation. At present, however, valid medical studies of kombucha tea's role in human health are very limited – and there are risks to consider.
>
> There have been reports of adverse effects, such as stomach upset, infections and allergic reactions in kombucha tea drinkers. Kombucha tea is often brewed in homes under nonsterile conditions, making contamination likely. When improperly manufactured ceramic pots have been used for brewing, lead poisoning has occurred – the acids in the tea can leach lead from the ceramic glaze.
>
> In short, there isn't enough evidence that kombucha tea delivers on its health claims. At the same time, several cases of harm have been reported. Therefore, the prudent approach is to avoid kombucha tea until more definitive information is available.
>
> Used with permission of Mayo Foundation for Medical Education and Research, all rights reserved.

Fragrant lentil, carrot and sweet potato soup

The flavour of this delicious lentil, carrot and sweet potato soup is achieved by using a wide variety of spices associated with the cuisines of northern India, Pakistan and Afghanistan. Garam masala, one of the key ingredients used in this recipe, is described as a warming and comforting spice. When used in combination with other spices such as ginger and chilli, it adds a depth of flavour to this recipe. This curry-style soup makes a substantial meal, ideal for a winter lunch.

400 grams sweet potato, peeled
1 large carrot
1 stick celery
1 tablespoon olive oil
1 teaspoon curry powder
1 teaspoon ground turmeric
½ teaspoon cumin seeds
½ teaspoon yellow mustard seeds
½ teaspoon ground garam masala
¼ teaspoon chilli flakes
½ tablespoon (20 grams) fresh ginger, grated
2 cloves garlic, crushed
1 teaspoon honey
½ brown onion, finely diced
½ cup (100 grams) red lentils
200 grams tinned crushed tomatoes
3 cups vegetable stock or water
1 teaspoon salt
ground pepper, to taste
1 lemon, grated zest only

TO SERVE

plain yoghurt and coriander sprigs

METHOD

1. Dice the sweet potato, carrot and celery into 1 centimetre dice.
2. Heat the oil in a large saucepan and all the spices, ginger, garlic and honey.
3. Sauté gently for 2 minutes, until fragrant.
4. Add the diced onion and stir until well-coated in the spice mixture. Sauté gently for 2 minutes.
5. Add the diced sweet potato, carrot and celery and stir to combine.
6. Add the lentils, tomatoes and stock, season with salt and pepper and bring to the boil.
7. Reduce the heat and cover with a tight-fitting lid, then simmer gently for 30 minutes. Stir occasionally during cooking to prevent the lentils from sticking to the bottom of the saucepan.
8. Add a little extra stock or water if necessary, and pepper to taste.
9. Add the lemon zest and stir well.
10. Serve topped with a spoonful of plain yoghurt and a sprig of coriander.

SERVES 2

EVALUATION

1 Describe the sensory properties of the fragrant lentil, carrot and sweet potato soup – appearance, aroma, flavour and texture – and comment on the overall appeal of the dish.
2 Classify the ingredients of the fragrant lentil, carrot and sweet potato soup using the Australian Guide to Healthy Eating.
3 Explain how well this soup recipe meets the guidelines of this food selection model.
4 Explain why, according the Australian Dietary Guidelines, it is important to include a variety of vegetables in the diet.
5 Plan a meal for a young adult that includes the fragrant lentil, carrot and sweet potato soup and includes all the food groups in the Australian Guide to Healthy Eating.



Mark Fergus Photography

Pasta, zucchini and chicken roll-ups

Pasta is one of the most popular foods eaten by people of all ages around the world. It is an inexpensive ingredient that is very versatile, and its bland flavour means it can be combined with a wide variety of ingredients to suit almost any taste. This recipe for pasta, zucchini and chicken roll-ups is a variation on the traditional cannelloni recipe.

TOMATO SAUCE

1 tablespoon olive oil
½ red onion, finely diced
4 medium mushrooms, sliced
1 clove garlic, crushed
400 grams canned diced tomatoes
1 tablespoon basil, finely chopped
extra basil leaves, for serving

FILLING

1 medium to large zucchini
1 cup baby spinach leaves
¼ red capsicum, finely diced
250 grams minced chicken
125 grams (½ cup) ricotta
1 tablespoon basil, finely chopped
salt and freshly ground pepper, to taste
2 fresh lasagne sheets
50 grams (⅓ cup) tasty cheese, grated
1 tablespoon parmesan cheese

METHOD

Making the tomato sauce

1 Grease an ovenproof dish approximately 18–20 centimetres square. Preheat oven to 200 °C.
2 Place the oil in a medium saucepan and heat over medium heat. Add the onion and cook until softened, but not browned.
3 Add the mushrooms and cook for a further 3–4 minutes, until softened. Add the garlic, and cook for another minute.
4 Add the diced tomatoes and simmer for 15 minutes, until thickened, then add the chopped basil. Place the tomato sauce in the base of the ovenproof dish.

Making the filling

1 Peel the zucchini into ribbons using a vegetable peeler, or use a sharp knife to slice into very fine slices.
2 Place the spinach leaves in a bowl and cover with boiling water. Blanch for 30 seconds, drain and refresh under cold water and drain again. Chop the spinach leaves finely.
3 Combine the chopped spinach, diced red capsicum, chicken mince, ricotta and chopped basil in a bowl. Season with salt and ground pepper; mix well.
4 Cut the lasagne sheets in half to make four pasta squares. Lay the zucchini ribbons on top of each lasagne square. Spread ¼ of the chicken and ricotta mixture on top of the zucchini ribbons, then roll up each sheet to enclose the filling.

Assembling and cooking the pasta roll-ups

1 Cut each roll into three pieces and place each piece in the sauce with the cut side up.
2 Combine the tasty and parmesan cheeses and sprinkle over the top of the rolls. Cover with foil and bake in the preheated oven for 20 minutes.
3 Remove the foil and bake for a further 20 minutes, until golden brown.
4 Serve garnished with extra basil leaves.

SERVES 2

EVALUATION

1 Describe the sensory properties of the pasta, zucchini and chicken roll-ups – appearance, aroma, flavour and texture – and comment on the overall appeal of the dish.
2 Classify the ingredients of the pasta, zucchini and chicken roll-ups using the Australian Guide to Healthy Eating.
3 Explain how well this recipe meets the recommendations of this food selection model.
4 Create a promotional statement to persuade adolescents to consume one portion of a protein food included in the Australian Guide to Healthy Eating instead of a protein drink.
5 Outline two other ingredient combinations that could be suitable alternatives to the chicken filling in the pasta roll-ups. One should be suitable for people who follow a vegetarian diet.



Mark Fergus Photography

Moroccan lamb hotpot

Moroccan cooking usually includes a variety of spices to create dishes that have a rich, full flavour. To achieve the best flavour, use whole spice seeds and toast them for several minutes to develop their flavour before grinding finely to add to your dish. The Moroccan lamb hotpot recipe includes ingredients from every food group and therefore provides a wide variety of nutrients. The lamb is low in fat and an excellent source of protein. The potatoes, carrot, zucchini and onion are all a source of dietary fibre, vitamins and minerals. The dried apricots add a small amount of sugar to the recipe, while the almonds add to the protein content of the dish.

MOROCCAN SPICE MIX

1 tablespoon cumin seeds
2 teaspoons coriander seeds
2 teaspoons paprika
1 teaspoon fenugreek seeds
¼ teaspoon chilli flakes

MOROCCAN LAMB HOTPOT

250 grams lamb leg steaks
2 potatoes
1 small carrot
1 zucchini
1 tablespoon oil
1 onion, finely diced
2 cloves garlic, crushed
2 tablespoons tomato paste
500 millilitres vegetable stock
¼ cup cracked wheat or burghul
¼ cup dried apricots
¼ cup blanched almonds
small handful coriander, chopped
¼ teaspoon salt, approximately

METHOD

Preparing the Moroccan spice mix

1. To prepare the Moroccan spice mix, heat all the spices in a dry frying pan over a low heat until the flavours are aromatic – approximately 30 seconds.
2. Grind the spices together in a mortar with a pestle, or in a spice grinder, until they form a fine powder.

Preparing the Moroccan lamb hotpot

1. Chop the lamb steaks into 2-centimetre cubes.
2. Place the lamb in a bowl and toss with the Moroccan spice mix. Set aside.
3. Peel the potatoes and carrot.
4. Cut the potatoes, carrot and zucchini into even-sized pieces, approximately 2 centimetres in size. Set the zucchini aside.
5. Heat the oil in the pan, add the diced lamb and stir over a high heat until browned.
6. Add the finely diced onion and crushed garlic. Sauté until lightly browned.
7. Add the potatoes and carrot and continue to stir over a medium heat for approximately 1 minute.
8. Add the tomato paste, stock, cracked wheat (or burghul), apricots and almonds.
9. Simmer gently for 30 minutes or until the lamb is tender. Stir occasionally to prevent the mixture from sticking to the bottom of the pan.
10. Add the chopped zucchini and coriander about 5 minutes before serving. Add salt to taste.

SERVES 2

EVALUATION

1 Describe the sensory properties of the Moroccan lamb hotpot – appearance, aroma, flavour and texture – and comment on the overall appeal of the dish.
2 Explain why, according the Australian Dietary Guidelines, it is important to include a protein ingredient such as meat in the diet.
3 List some alternative ingredients to lamb steaks that could be used in this recipe.
4 Classify the ingredients of the Moroccan lamb hotpot using the Australian Guide to Healthy Eating.
5 Explain how well this recipe meets Dietary Guideline 2: Enjoy a wide variety of nutritious food from the five food groups every day.



Mark Fergus Photography

THE WAYS WE DEVELOP FOOD EDUCATION



9

FOOD KNOWLEDGE AND SKILLS

HEALTH AND NUTRITION CONTENT CLAIMS IN FOOD PRODUCTS

NUTRITION CONTENT



HEALTH CLAIMS



PRACTICAL WAYS TO APPLY HEALTHY EATING RECOMMENDATIONS*



* From the Australian Dietary Guidelines and the Australian Guide to Healthy Eating

KEY TERMS

biomarker a measurable biological parameter that is predictive of the risk of a serious disease when present at an abnormal level in the human body

general-level health claim a nutrient or substance in a food and its effect on a health function

health claim a relationship between a food and health, rather than a statement of content

high-level health claim 'a nutrient or substance in a food and its relationship to a serious disease or to a biomarker of a serious disease'*

nutrition content claim a claim made about the presence or absence of certain nutritional properties of food

Resources
Study Design
links
Infographics
Flashcards

*Source: Food Standards Australia New Zealand

Contexts in which we learn food knowledge and skills

We develop our skills and knowledge about food in many ways. Our earliest knowledge about food is learnt within our immediate family and our extended family network. Depending on family circumstances, we may learn about food through childcare facilities or kindergarten programs. School health programs and Food Studies classes provide a more formal setting for food education. The Kitchen Garden Program that operates in many primary schools, for example, teaches young children about the importance of eating fresh food for good health.

Federal and state governments play a key role in educating Australians of all ages about the importance of good nutrition, such as through higher education programs, where tertiary institutions train food industry professionals and dietitians. Federal and state governments also work with non-government agencies, such as the Australian Nutrition Foundation, the Heart Foundation and Diabetes Australia, to provide a wide range of easily accessible nutrition information for consumers.

The Victorian Government is also partnering with local governments across the state in a program called the VicHealth Local Government Partnership: Young people leading healthier communities. The aim of this program is 'to address local factors that directly affect the daily lives of children and young people and their opportunities for health and wellbeing.' It includes information on:

- promoting healthy food policy in council practice
- embedding healthy food options in policy and council-owned and operated places
- protecting community from harmful food and drink industries.

Source: *VicHealth Local Government Partnership: Young People Leading Healthier Communities*, VicHealth

Food websites are also an important vehicle for learning about food. They provide a range of video clips and recipes that enable consumers to learn new food preparation techniques. News reports about healthy eating are often found in food and health magazines, newspapers, television programs or on many of the social media platforms.

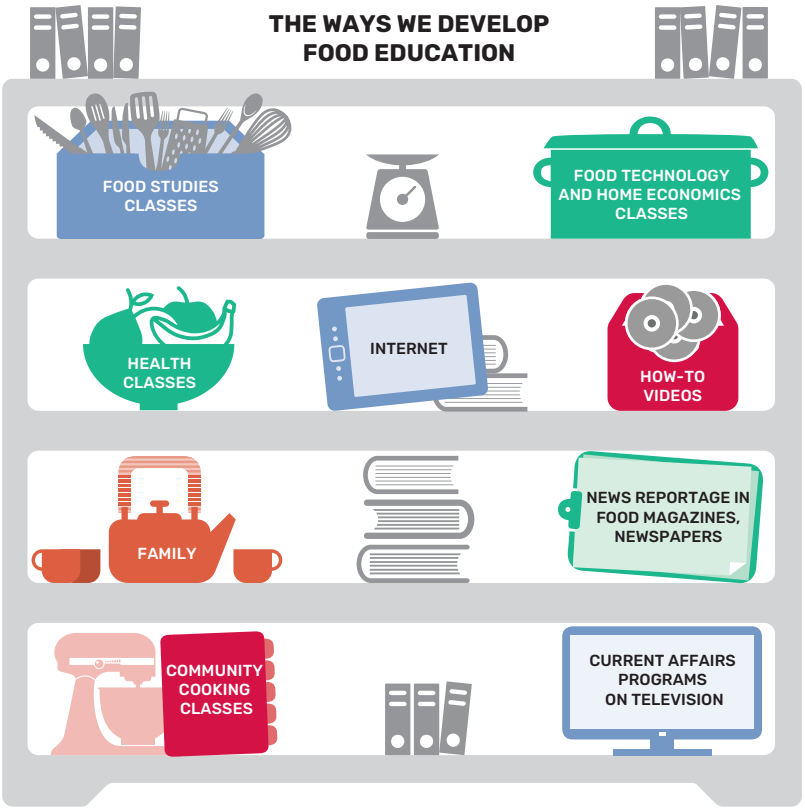


FIGURE 9.1 The ways we develop food education

Australian health information platforms

Australian consumers gain access to health information through a variety of platforms including websites, social media and printed material. Government, non-government health organisations and individuals use these platforms to provide a wide variety of important resources about food and healthy eating. The Eat for Health Program, the CSIRO, Nutrition Australia, the Victorian Aboriginal Health Service, Diabetes Australia, the Victorian Better Health Channel and Foodwatch are some of the most well-respected and trusted organisations that provide accessible information about health and wellbeing.



Reproduced with the permission of The Australian Nutrition Foundation Inc.

Nutrition Australia's Try for 5 campaign encourages Australians to eat the recommended five serves of vegetables a day.

NUTRITION AUSTRALIA

Nutrition Australia is an independent, member organisation that aims to promote the health and wellbeing of all Australians by encouraging them to make informed food choices. Nutrition Australia provides a wide range of resources, such as healthy eating programs for children and adults of all ages, as well as a vast array of nutrition-related fact sheets. All of the information and activities provided by Nutrition Australia are based on scientific principles and knowledge related to human nutrition and food science.

Try for 5 campaign

One of the key annual events organised by Nutrition Australia is their 'Try for 5' campaign, which is run as part of Nutrition Week. Try for 5 is an annual campaign developed to raise health awareness and encourage Australians to eat the recommended five serves of vegetables a day. The campaign presented a collection of vegetable-focused recipes, veg tips and information to inspire the consumption of vegetables. People were encouraged to 'cook it, shoot it, and share it'.

Nutrition Australia state that the purpose of the Try For 5 campaign is 'to inspire Australians to enjoy vegetables through highlighting the fun and creative ways Australians can incorporate veg into their day. With only 7 per cent of adults and 5 per cent of children eating the recommended serves of vegetables each day, Nutrition Australia created the campaign to raise awareness of the benefits of eating vegetables.'

CSIRO – TASTE & LEARN

Taste & Learn is a school-based program that uses a range of activities to give children knowledge and improve their willingness to eat vegetables. This program was developed by the CSIRO, Australia's leading national science agency and member of the Fruit & Vegetable Consortium. The program is provided free to primary schools and uses simple, hands-on lesson plans aligned with the Australian curriculum. Children are offered a variety of vegetables to taste on numerous occasions, and lessons focus on making vegetables fun and enjoyable. This program can be enhanced by the addition of hands-on practical experience in the kitchen and the development of food preparation skills.



© CSIRO

Taste & Learn helps children learn about vegetables.

THE LIVELIGHTER® CAMPAIGN

LiveLighter® is a program developed by the Western Australian Department of Health in conjunction with the Heart Foundation WA and Cancer Council WA. The program aims to encourage adults and families to lead healthier lifestyles, and to make changes to what they eat and drink and how much they exercise.

The LiveLighter® website includes a wide range of resources that encourage individuals to think about their health and the long-term consequences of not following a healthy lifestyle.

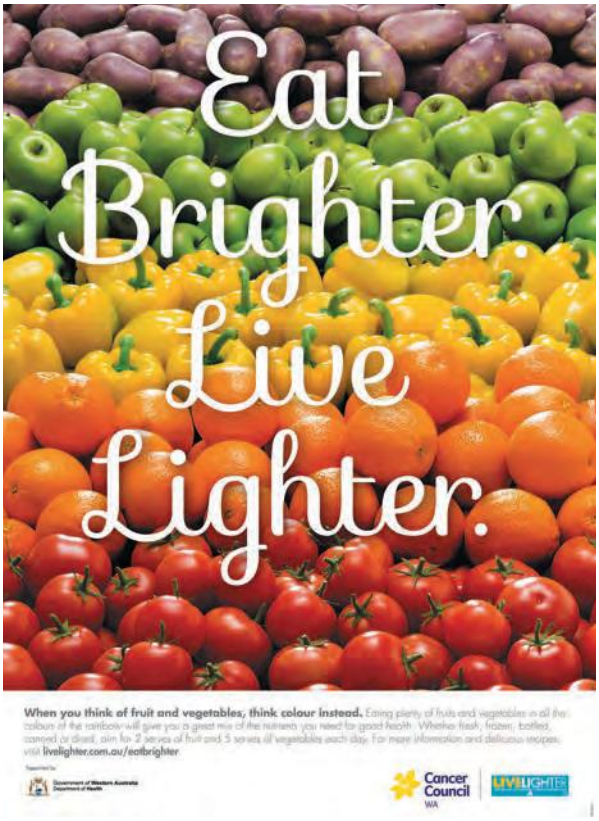
LiveLighter® © State of Western Australia, reproduced with permission.

The LiveLighter® campaign informs Australians about how to lead healthier lifestyles.



FIGURE 9.2 Individuals can access a vast array of facts about improving their health on the LiveLighter® website.

Under the tab 'Weight and health', the campaign highlights research demonstrating the strong links between carrying extra weight and the risk of developing particular types of cancers. It provides resources such as simple tips to eat well and move more. Facts about toxic fat or visceral fat – fat that is stored deep inside the body that produces chemicals that can be damaging to our body – emphasise the dangers of excess weight and its link to certain cancers, type 2 diabetes and heart disease. Under the 'Fruit and veg' tab, individuals can also access information on 'Eat brighter' – strategies to encourage them to consume more fruit and vegetables – as well as information for families and parents to encourage healthy eating.

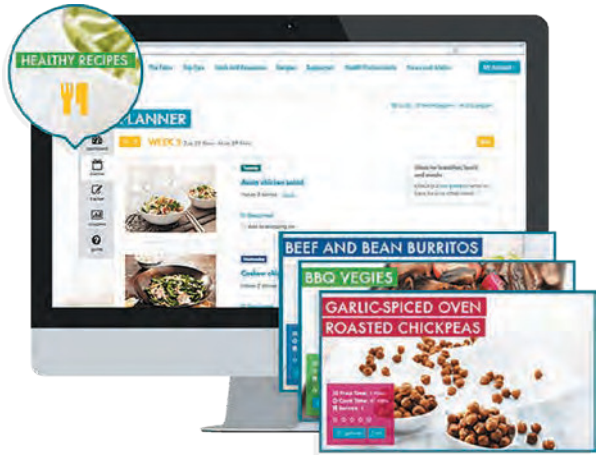


LiveLighter® © State of Western Australia, reproduced with permission.

'Eat brighter' is a strategy to encourage individuals to increase their consumption of fruit and vegetables.

Planning

The Healthy Meal Plan helps individuals take the first step towards a healthier future. People who sign up are able to access information about healthy recipes and planning meals. Participants are provided with a range of meal plans based on the Australian Dietary Guidelines, which can be tailored to suit individual needs.



LiveLighter® © State of Western Australia, reproduced with permission.

LiveLighter® provide a variety of healthy recipes as a feature of their meal plans.

The tab 'Top tips for a Healthy Lifestyle' provides material on a range of topics, including healthy eating basics such as how to manage portion sizes. Other valuable tips for leading a healthy lifestyle include eating healthy snacks, limiting fat consumption and cutting back on salt.

Calculate your risk

A vast array of resources are provided on the website to help people determine any nutritional risks their lifestyle may expose them to. Information on the website allows people to calculate their Body Mass Index (BMI), to determine if they are in the healthy weight range or if their weight is putting them at risk of a number of health problems. The 'Junk Food Calculator' enables people to calculate the quantity of junk foods they eat in a typical week.

Physical activity calculator

The LiveLighter® website also provides a physical activity calculator so that individuals can assess if they are participating in sufficient light, moderate and intense activity to meet Australia's Physical Activity and Sedentary Behaviour Guidelines.

Avoid sugary drinks

Information is presented about the kilojoule content of sugary drinks. A sugary drinks calculator is available to calculate how much sugar and energy is derived from the drinks consumed.

Recommendations are made to drink water and avoid drinks such as fruit drinks, cordials, sports drinks, energy drinks and flavoured milk. To reinforce this information, the website provides a comparison between water and soft drink.



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Plain water = 0 sugar; a 600 mL soft drink = 16 teaspoons sugar = 3 kilometre run



LiveLighter® © State of Western Australia, reproduced with permission.

A comparison of the number of teaspoons of sugar in different drinks



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Plan for exercise and healthy snacks

LiveLighter® Menu App campaign

In 2021 LiveLighter® produced a new campaign, Menu App. The campaign's call to action was *Don't treat junk food as everyday food*. This campaign targeted the consumption of takeaway foods, which were once considered an occasional treat but are now being eaten more regularly. Meal delivery apps have made unhealthy food and drink more accessible than ever, particularly as working from home became more common during the COVID-19 lockdowns. Roy Morgan research conducted in Western Australia in 2021 showed that the proportion of people using food delivery services has risen from 35 per cent in the first quarter of 2019 to 43 per cent in the first quarter of 2021. The research also found that young adults ordered online at least once a week, and one in three upsized their meal.



LiveLighter® © State of Western Australia, reproduced with permission.

The Recipe Finder App provides recipes for healthy alternatives to fast-food dishes.

The Menu App campaign was designed to encourage people to consume less junk food and to raise their awareness of the link between junk food, weight gain and an increased risk of cancer. The Recipe Finder App offers healthy versions of fast-food favourites that can be made at home. Users can also sign up for a meal planner and download a takeaway recipe book or find hints on how to snack smarter.

FOODWATCH

Foodwatch, a nutrition website founded by accredited nutritionist, blogger and award-winning author Catherine Saxelby, provides a broad range of information to help consumers (particularly women) maintain a healthy weight and to make healthy eating easy. The Foodwatch website helps readers gain food knowledge about a broad range of health and nutrition topics, including:

- health issues
- food facts – additives and labels; carbs, sugars and fibres; and super foods
- healthy weight loss
- cooking.

The information on the website is authoritative, accurate, informative and easily accessible, and an excellent source for individuals to gain food knowledge and skills.

Catherine Saxelby's
Foodwatch
Nutrition know-how for busy women

© Foodwatch

Foodwatch provides a broad range of information to help individuals maintain a healthy weight.

Using food labels to compare, select and prepare food

Food labels provide a wide range of information to help consumers make healthier and safer food choices and plan and prepare nutritious meals for their families. Labels provide information about the nutrient content of the food, and the proportions of these nutrients, making it easy to compare products. Food labels warn consumers about food allergens and food expiry, and give helpful information on how to store, prepare and cook the food.

FOODSWITCH

FoodSwitch is a popular phone app developed by the George Institute for Global Health and Bupa Australia. Using the app, consumers can scan the barcode of food products to find out what is in the food they are buying and see suggestions for healthier alternatives.

The app also contains information about the Health Star Ratings of a product. Each product is rated for its total fat, saturated fat, sugar and salt content. The traffic light ratings show if the product is low (green), medium (amber) or high (red) in these ingredients, based on widely accepted nutritional standards.

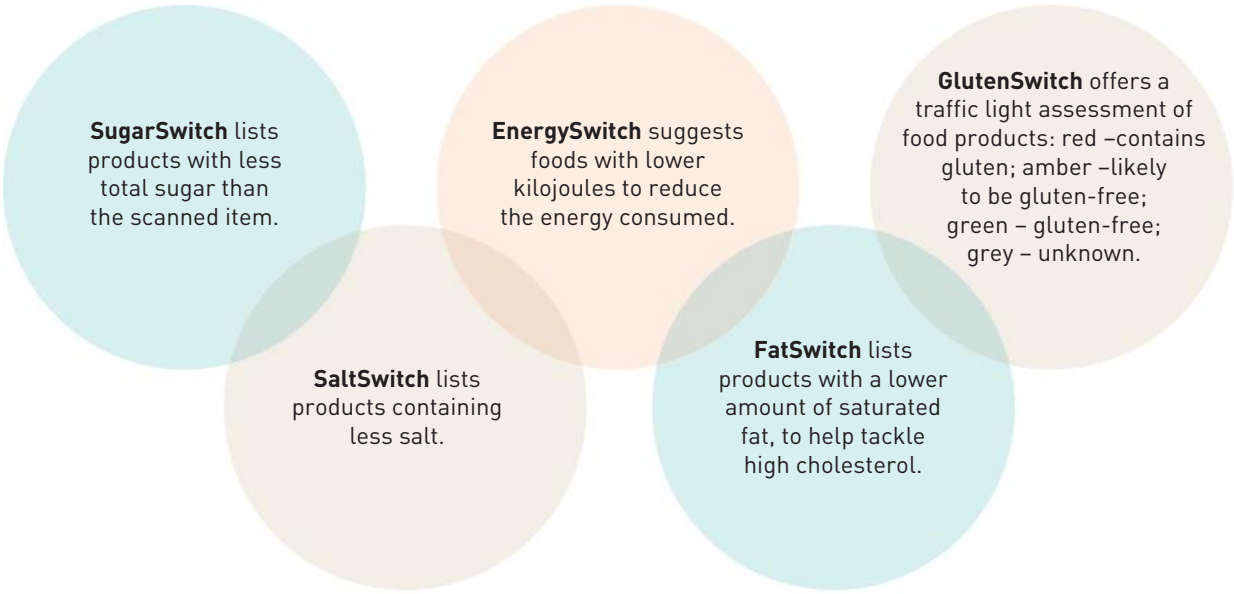
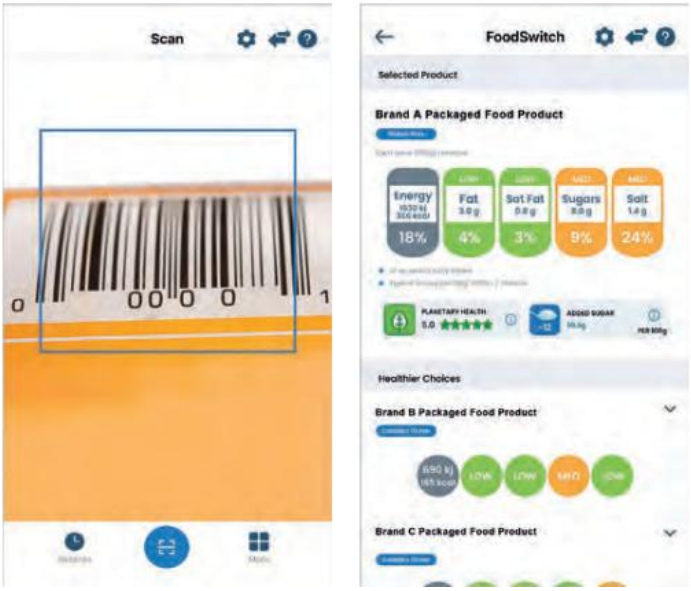


FIGURE 9.3 The FoodSwitch app helps shoppers select healthier products from the supermarket.



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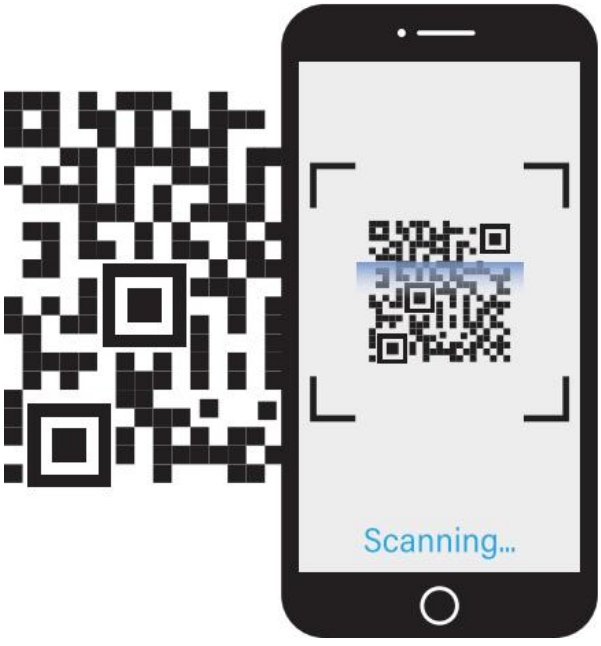
The FoodSwitch app helps shoppers gain knowledge about food products before deciding to purchase them.

USING QR CODES TO COMPARE, SELECT AND PREPARE FOOD

Quick response or QR codes are a type of barcode that can store, and then share, vast quantities of information about products or services. QR codes are becoming a more popular feature on food labels as they provide additional information about the product that won't fit on the packaging. This form of technology is easily scannable using a smartphone, and is very convenient for shoppers.

When the QR code is scanned, the consumer can access the manufacturer's or grower's website and gain additional information about the food. Some growers and producers link the code to a short video that gives a story about the product, including how it is grown. The code may also provide information on how to serve the food as part of a healthy meal, or may provide a recipe page suggesting different ways to use the food. The code may include essential health and safety information, such as the best-before or use-by date, along with the weight and price of the product.

Since the outbreak of COVID-19, consumers have become more familiar with QR codes and the need to 'check in' when visiting a store. Major supermarkets are now capitalising on this form of technology for marketing, and QR codes are now appearing on customers' receipts. This form of marketing might provide a new recipe or meal to try, which is easy to download in readiness for the next trip to the supermarket.



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QR codes can help shoppers gain knowledge about food products.

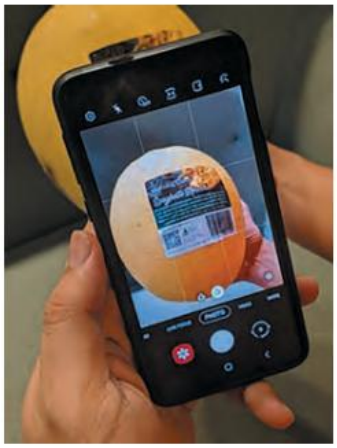


Alamy Stock Photo/Aleksey Popov

QR codes are appearing on supermarket receipts and provide a link to recipes and products.

Morning Glory Farms

A Western Australian fruit and vegetable grower, Morning Glory Farms, is one of the first primary producers to include a QR code on their produce. Working in partnership with DiMuto, a tech-based trade solutions platform, Morning Glory Farms are including a QR code on their spaghetti squash. The code links to product information including recipes, videos showing how to cook the spaghetti squash, and company details. Farm owner Bevan Eatts has said, 'the QR code is a way to digitalise the product, and when the code is scanned, it takes you to a landing page, which gives the ability to engage with the end consumer, run competitions, tell people about our farm, how we grow the produce and what its health benefits are. It's all promotional activities with our consumers and that gives us a tool to educate people.'



Morning Glory Farms

Morning Glory Farms use a QR code on their spaghetti squash to show how this vegetable can be used in recipes.

Source: 'The Australian vegetable grower capitalising on blockchain technology to boost business practices', Fresh Plaz

Understanding the Text

1 Draw up a diagram like the one below to summarise the ways that individuals develop food knowledge and skills.

Toddlers and preschool children	Primary school children	Adolescents and young adults

2 Outline why Nutrition Australia promote their Try for 5 campaign as a major focus during National Nutrition Week.

3 Taste & Learn is a school-based program that aims to improve children's willingness to eat vegetables. In your opinion, how likely is it that this program will succeed? Justify your answer.

4 Outline the main aims of the LiveLighter campaign.

5 What is toxic fat and why is it detrimental to good health?

6 Use the sugary drinks calculator on the LiveLighter website (https://livelighter.com.au/sugarydrinks/calculator) to calculate the sugar and energy contained in the sugary drinks you consume. Discuss your findings.

7 Access the 'latest posts' tab on Catherine Saxelby's Foodwatch website. Review one recent post and outline the key messages the post presents.

8 Outline the impact that COVID-19 restrictions have had on the use of food delivery services and people's eating habits.

9 Explain how the Food Switch app enables consumers to gain knowledge, and why it would be a useful tool when shopping.

10 Draw up a mind map highlighting the advantages to food manufacturers of including a QR code on their food labels.



Answers
Understanding the Text

Nutrition content claims and health claims

Nutrition content claims and health claims on food labels are another way consumers can gain knowledge about processed food products. Standard 1.2.7 of the Australian and New Zealand Food Standards Code sets out requirements for making nutrition content and health claims about food. This Standard legislates what can be stated in advertising claims and marketing terms that are included on food packaging and in food advertising.

The Standard ensures consumers and health professionals can have confidence that health claims are well supported by scientific evidence, and this in turn helps consumers gain knowledge and make informed and safe food choices. It also ensures that nutrition content claims meet the criteria set out in the standards.

Nutrition content claims

- Claims about the content of certain nutrients or substances in a food

Health claims

- General-level health claims
- High-level health claims

FIGURE 9.4 Nutrition content claims and health claims help consumers gain knowledge about food.

NUTRITION CONTENT CLAIMS

According to the Food Standards Australia New Zealand, a **nutrition content claim** is a claim about certain nutrients or substances in a food, such as claiming that a product is low in fat, or is a good source of calcium or fibre.

Before making these claims, a food manufacturing company must make sure its product meets the criteria set out in the Standard. For example, if claiming that the product is a good source of calcium, the food will need to contain more than the amount of calcium specified in the Standard. Comparative claims are sometimes made by companies, comparing the nutrition content of their product, either directly or indirectly, with another brand, using words such as such as 'reduced', 'increased' or 'light'. In these cases, the company must identify the reference food and show the difference between the amount in their food and in the reference food.



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The label on this yoghurt claims it has no added sugar. It is an example of a nutrition content claim.

Examples of criteria for nutrition content claims are:

- no added sugar – the product must not contain any added sugar, but it may contain natural sugars
- reduced fats or salt – the product should have at least a 25 per cent reduction from the original or traditional product
- low fat – the product must contain less than 35 per cent fat for solid foods, and less than 1.55 per cent fat for liquid foods
- fat free – the product must contain less than 0.15 per cent fat
- a product labelled 'a good source of' must contain no less than 25 per cent of the recommended daily intake.

HEALTH CLAIMS

A **health claim** refers to a relationship being claimed between a food and health, rather than a statement of content. There are two types of health claims – general-level health claims and high-level health claims.

General-level health claims

General-level health claims refer to a nutrient or substance in a food and its effect on a health function. An example of a general health claim is 'calcium is good for bones and teeth'. There are 200 pre-approved claims set out in Schedule 3 of the Standard. A business can also self-substantiate a food–health relationship, in accordance with the Standard.

General-level health claims must be supported by scientific evidence. This must occur regardless of whether the claim is pre-approved by Food Standards Australia New Zealand (FSANZ) or substantiated by a food business putting its own claim forward. Health claims are only permitted on foods that meet certain nutrient content. For example, health claims are not allowed on foods that are high in saturated fat, sugar or salt.



Mark Fergus Photography

A comparative nutrition content claim – 65% less saturated fat than butter.



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Weet-Bix – 'cholesterol lowering' is an example of a general-level health claim.

HIGH-LEVEL HEALTH CLAIMS

A **high-level health claim** refers to a nutrient or a substance in food and its relationship to a serious disease or biomarker of a serious disease. A **biomarker** is a measurable biological parameter that indicates the risk of a serious disease when it is present at an abnormal level in the human body. Its effect could be on a biochemical, functional or physiological process, on growth and development, on physical or mental performance, or a disease or condition. Only those claims based on pre-approval from FSANZ can be used. There are currently 13 pre-approved food–health relationships for high-level health claims listed in the standard. Examples of some of the permitted high-level claims include 'diets high in calcium may reduce the risk of osteoporosis in people 65 years and over', and 'folic acid reduces the risk of foetal neural tube defects'. An example of a biomarker health claim is 'phytosterols reduce blood cholesterol.'

Practical Activity 9.1

Nutritional and product analysis of products that contain nutrition content claims and health claims.







Mark Fergus Photography

Aim: To compare the nutritional properties of three similar products such as table spreads, that each contain nutrition content claims and health claims.

Method

Locate the nutrition panels for each of these spreads and complete the table below.

	FLORA ORIGINAL	FLORA SALT-REDUCED	FLORA PROACTIV
Nutrient content per 100 grams			
Energy			
Protein			
Fat – Total			
Fat – Saturated			
Carbohydrate – Total			
Sodium			
Identify the nutrition content claim or health claim			

Analysis

1. Compare the nutrition content of the three products. Was there a difference in the amount of any of the nutrients? Discuss the similarities and differences between the nutrient content of the three products.
2. What impact could the nutrition content of each product have on a consumer's decision about which table spread to purchase?
3. According to the Australian Guide to Healthy Eating, table spreads should only be eaten in small amounts. Based on your analysis of each of these products, which product would you choose if you were to spread a small amount on a sandwich or toast? Justify your response.
4. Explain what a health claim is and why this information may be important to a consumer when selecting food products.

Conclusion

Discuss how comparing the nutritional properties and nutrition content and/or health claims on similar products can assist a consumer in their purchasing decisions.

Applying the Australian Dietary Guidelines in everyday life

As discussed in chapter 2, the Australian Dietary Guidelines and the Australian Guide to Healthy Eating have been developed as a practical guide to enable all Australians to select food for good health.

It is very easy to gain weight. Consuming larger portion sizes than necessary, eating too many snacks or discretionary foods that are high in saturated fat, salt and sugar, or drinking carbonated soft drinks that are high in sugar are all easy traps to fall into. The hard part is changing our everyday food behaviours and habits to reduce and then maintain weight.

Losing weight sounds easy but in reality, it is hard to do. The only way to lose weight is to eat and drink fewer kilojoules than we expend.

USING THE FIVE FOOD GROUPS

Choosing food from the five food groups identified in the Australian Guide to Healthy Eating is the first step to eating well. Foods are grouped according to their type and the contribution they make to our diet. Foods listed in each of the groups are those that are lowest in saturated fats and have little added sugar or salt. It is important to choose foods from each group daily, although it is not necessary to include all the groups at each meal. The Australian Dietary Guidelines also list the number of serves of each group that should be consumed each day for optimum health.

The five food groups

FOOD GROUP	NUMBER OF SERVES
Vegetables	5–6
Fruit	2
Wholegrains	6
Lean meat, poultry, fish, eggs and/or plant-based alternatives	2–3
Milk, yoghurt and cheese – reduced fat	2½

USING A PORTION CONTROL PLATE

The Australian Portion Perfection plate is a practical way to assist Australians who wish to lose weight. It helps consumers judge the amount of food eaten at a meal and to regulate portion size in a visual way. Maintaining effective portion control provides an easy way to regulate the amount of food eaten. It helps consumers adjust the size of their portions, as oversized food portions mean that more kilojoules are taken in than are actually needed, and will lead to weight gain.

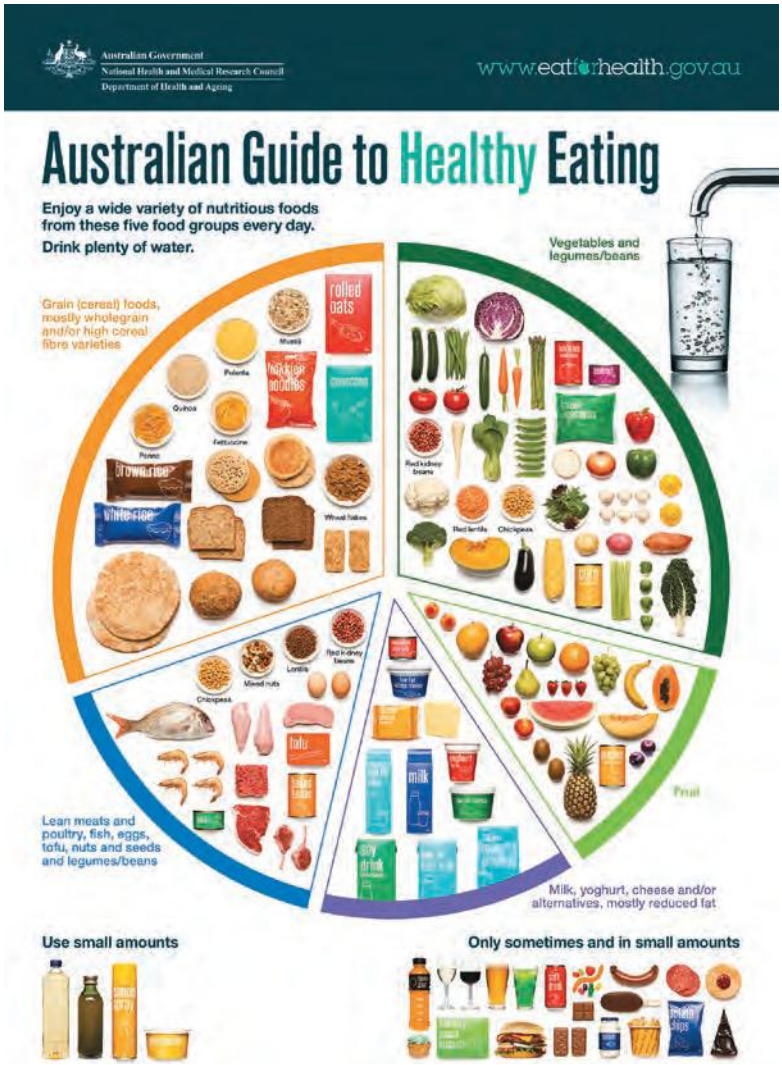
The portion plate is designed to guide the amount of food eaten at a main meal, while also ensuring that the meal contains a balance of nutrients and is controlled in kilojoules. The Australian Portion Perfection bowl gives portion guidance for cereals, soups, stews and desserts.

The plate and the bowl are divided into sections that represent the recommended portions for each food type. Each section has illustrations as a guide to the types of foods in that section. Inspirational words are written around the edge of the plate suggesting ways to enjoy food.



The Australian Portion Perfection plate

The Portion Perfection Plate, courtesy of Great Ideas in Nutrition www.greatideas.net.au



National Health and Medical Research Council

The five food groups make up the central plate in the Australian Guide to Healthy Eating.

PLANNING AHEAD

One of the most practical ways to integrate the Australian Dietary Guidelines and the Australian Guide to Healthy Eating into everyday food behaviours is to plan daily and even weekly meals, based on the five food groups. This gives you a plan to follow so that you are not tempted to choose foods that are considered discretionary. Planning for snacks also keeps you from overeating later on in the day.

Use a simple chart like the one below, based on the five food groups, to help you plan your meals. Ensure that you include the appropriate number of serves from each food group across the day. Remember to include snacks in your daily plan.

IMPROVING EVERYDAY FOOD BEHAVIOURS AND HABITS

Tip 1: Prepare more of your own meals at home rather than eating out or using a food delivery service. Planning and cooking your own meals allows you to determine what ingredients are included.

Tip 2: Plan ahead so that you are well prepared for the day or the week to come. Planning ahead makes shopping for food easier, and stops you from being tempted to pick up those very tasty snacks!

Tip 3: When planning meals, select vegetables of a wide variety of colours and types – these will help you feel fuller for longer. Vegetables should make up one third of a meal plate, or half, if someone is trying to lose weight.

FOOD GROUP	NUMBER OF SERVES	BREAKFAST	LUNCH	DINNER	SNACKS
Vegetables	5–6				
Fruit	2				
Wholegrains	6				
Lean meat and poultry, fish, eggs and/or plant-based alternatives	2½–3				
Milk, yoghurt and cheese – reduced fat	2½				

Tip 4: Add fruit to at least two meals or use in desserts or as a swap for discretionary foods. Low-fat milk, cheese or yoghurt can also be used as snacks to replace discretionary foods, helping you to maintain a healthy weight.

Tip 5: Don't be tempted to skip breakfast, thinking this will help you lose weight. Eating breakfast, especially a breakfast based on low-GI foods, will help sustain you until later in the morning and will stop you from reaching for a high-fat, high-sugar snack such as a muesli bar.

Tip 6: Focus on how you feel both while you are eating and after you have finished your meal. A meal that is based on the five food groups as recommended in the Australian Guide to Healthy Eating will include more vegetables and wholegrains and fewer high-fat foods, and will make you feel far better than one that is high in fat or sugar. Eating a meal that is based on discretionary foods that are high in fats, sugar and salt will leave you feeling over-full and uncomfortable, and even quite tired.

Tip 7: Read the labels of products while shopping so that you are aware of the fats, sugars and salt that may be hidden in many processed foods. Remember that alternative names for fat, sugar and salt can be used on food labels, so check carefully. Also remember to examine the kilojoule content of processed foods and to compare products. Make sure you compare the amount per 100 grams rather than per serving to get an accurate comparison.

Tip 8: Drink plenty of water to keep your body hydrated. Being dehydrated can leave you lacking in energy and therefore feeling tired and listless. This is when you are more likely to make poor food choices and to reach for a high-energy snack.

Tip 9: It is better to reduce the number of snacks you eat and to try not to eat discretionary foods as often, rather than removing them from your diet altogether. Banning certain foods may increase their desirability and lead you to 'crave' them. An occasional or smaller treat is preferable to bingeing on foods that you have been denied.

Tip 10: Get support – it is easier to stick to a healthy eating plan if others are doing it with you.

REDUCING THE CONSUMPTION OF FAT, SALT AND SUGAR

The Australian Dietary Guideline 3 recommends 'Limit intake of foods containing saturated fats, added salt, added sugar and alcohol'. When planning meals, it is important to limit the intake of saturated fat, added sugar and added salt. Reducing these even by small amounts reduces the risk of serious disease such as type 2 diabetes, heart disease, stroke, high blood pressure, some cancers and kidney disease, and makes weight management easier.

Practical ways to reduce the consumption of saturated fat

As well as selecting foods based on the five food groups, modifying traditional recipes and altering the cooking techniques used in preparing meals can help in maintaining a healthy weight.

- Increase your intake of vegetables and salads as a part of main meals, as these are high in fibre and low in fat.
- Choose lean meats whenever possible, and replace meat with fish for 2–3 meals a week if possible. Fish is high in healthy omega-3 fatty acids that can improve heart, brain and eye health.
- Trim the visible fat from meat and remove the skin from poultry.



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Prepare meals that contain monounsaturated fats rather than butter

- Avoid frying and roasting foods where possible, and instead try grilling, steaming, stir-frying or microwaving.
- Make cakes, biscuits and slices with a low-fat spread instead of butter, and only use the egg white rather than the egg yolk where possible.
- Use a non-stick wok or frying pan, and only grease lightly for shallow frying or stir-frying.
- Try cooking in olive oil, which contains monounsaturated fatty acids, instead of butter, which is high in saturated fatty acids.
- Avoid using cream as an enriching ingredient in soups and desserts – try a little low-fat yoghurt instead.
- Make salad dressings with low-fat yoghurt, vinegar and herbs.
- Use roasted vegetables as a topping on pizza instead of ham, salami or extra cheese.
- Spread sandwiches with a low-fat cream cheese spread or a low-fat vegetable dip, rather than butter or margarine, then top with a low-fat filling such as tinned tuna and salad vegetables.
- Snack on fruit and vegetables such as apples, oranges, celery and carrots, instead of fatty and sugary snacks like sweet biscuits, doughnuts, pastries, potato crisps and muesli bars.

Practical ways to reduce the consumption of sugar

- Start by slowly reducing your sugar intake – cut down on the amount of sugar you add to tea and coffee and avoid adding sugar to breakfast cereals.
- Cut down on the number of carbonated drinks you consume. Have one can of soft drink or sports drink a day, rather than two or three. It won't be long before you will be able to cut them out of your diet altogether. Drink plenty of tap water instead – it's free!
- Share a cake, muffin or biscuit with someone so you are not tempted to eat the whole thing yourself. Often the only snacks available in a cafe are those that are high in sugar and fat, and they are usually so large they can easily be shared.
- Serve only one scoop of ice-cream for dessert rather than two, and top it with a few strawberries or blueberries rather than a high-sugar syrup.
- Read labels carefully when shopping, as many foods that are labelled 'low fat' or 'reduced fat' are often high in sugar to improve their flavour.
- Cut up celery, carrot and cucumber sticks and keep them in the refrigerator so you have some fresh, healthy vegetables to snack on instead of reaching for a biscuit, cake or muffin.
- Download the FoodSwitch app so when you go shopping you can scan items and examine how much sugar the product contains, making it easier to choose healthier alternatives.



iStock.com/murmurbear

Choose celery and carrot sticks as snacks, rather than cakes or muffins.

Practical ways to reduce the consumption of salt

- Try adding fresh herbs such as parsley, oregano, thyme or coriander to enhance the flavour of meals, or use freshly ground black pepper instead of salt. Garlic, the rind and juice of lemons, and cayenne pepper are all tasty flavouring ingredients that can be used instead of salt.
- Remember to plan your meals before shopping so you can substitute foods high in salt such as bacon or ham with other alternatives. Lightly sautéed mushrooms are a great alternative to bacon, and are delicious with an egg on toast for breakfast or brunch.
- Reduce the amount of processed meats such as ham or salami that you use in sandwiches. Try using a can of low-salt tuna in a salad sandwich instead.
- Cut back on packaged or processed foods that are high in salt. Salt is often hidden in products such as packet soups and sauces, pies, sausage rolls, sausages, pizzas and pre-prepared meals. Try to reduce your consumption of snack foods such as potato chips and savoury biscuits, which are also very high in salt.
- Read the food labels of products when shopping. The sodium content is listed on the label and will help you compare similar products, enabling you to select one with a lower salt content.
- Download an app such as FoodSwitch to help you select foods that are low in salt when you are shopping. This app contains a SaltSwitch function that allows you to scan the barcode of products to identify their salt content. This information is presented in a very simple traffic-light format, with foods that are low in salt having a green light and those with a high salt content having a red light. This app also provides shoppers with a list of low-salt alternatives if these products are available.
- Push the salt shaker to the back of the cupboard and don't put it on the table when you are having a meal!



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Reduce your intake of snack foods that are high in salt, such as potato crisps.

Understanding the Text

11 What is a nutrition content claim? Give two examples of nutrition content claims.

12 What is a comparative nutrition content claim? Outline the evidence the manufacturer would need to provide to be allowed to make this claim.

13 Explain the meaning of the term 'health claim'. Include an example of a health claim in your answer.

14 What is a high-level health claim and how does it differ from a general-level health claim?

15 Outline the safeguards that FSANZ has put in place governing the use of high-level health claims.

16 Outline the way most people gain weight.

17 Explain how foods in the five food groups are categorised.

18 Draw up a mind map of what you consider to be the top six practical tips to improve food behaviours.

19 Explain why reducing your intake of saturated fat, added sugar and salt is important for good health.

20 Outline four strategies to use to reduce the amount of saturated fats, sugar and salt in your diet.

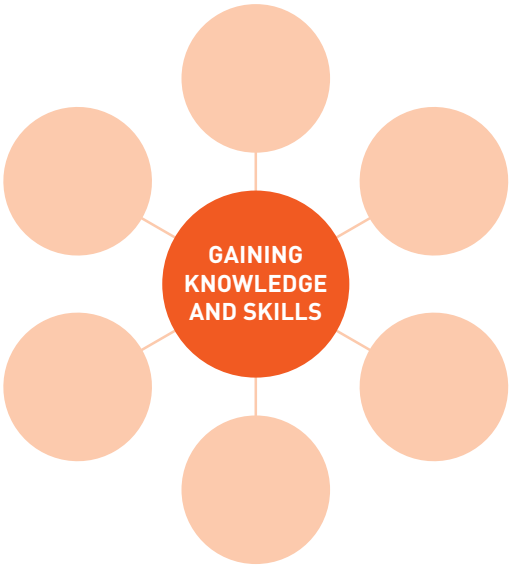
Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

Applying knowledge

Complete the following diagram to demonstrate the ways in which we gain food knowledge and skills during our life.



Analysing information

Prepare a PMI chart (plus, minus interesting) on the Try for 5 campaign.

PMI CHART – TRY FOR 5 CAMPAIGN		
Plus	Minus	Interesting

Evaluating concepts

Compare the health benefits and effectiveness of a community health project such as the LiveLighter campaign with a nutrition website such as Foodwatch.

EXAMINATION-STYLE QUESTIONS

Answers
Examination-style questions

Resources
Preparing for exams support

Question 1 (8 marks)

Food labels carry vital information to help consumers make informed choices about the foods they eat. Nutrition content claims and health claims are often used as an advertising strategy to increase the product's appeal to consumers. These claims must meet the guidelines set out in the Food Standards Code (Standard 1.2.7).

Sanitarium has included a health claim on the packaging of their Cholesterol Lowering Weet-Bix.



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a What is a nutrition content claim? [2 marks]

b Explain the difference between a general-level health claim and a high-level health claim. [4 marks]

c Outline two pieces of information Sanitarium would need to satisfy before they could include this health claim when advertising their Cholesterol Lowering Weet-Bix. [2 marks]

Question 2 (8 marks)

a Based on the recommendations of the Australian Guide to Healthy Eating, describe **three** strategies a young person could use to maintain a healthy weight. [6 marks]

b Explain how the Australian Guide to Healthy Eating could be used to assist a family in planning their daily food intake. [2 marks]

Question 3 (6 marks)

'Knowledge is the key to health and wellbeing.'

Use this statement to explain how individuals develop food knowledge and skills at all stages of their life, and the way this influences their health and wellbeing.

Spicy chicken satay skewers

Satay skewers are a popular street food found in many countries across South-East Asia. The combination of spices that make up the satay flavour are thought to have originated in the Indonesian island of Java. Today, satay skewers are popular in almost every part of South-East Asia, including Malaysia, Singapore, Thailand and the Philippines. Meat is marinated in the satay sauce and then threaded onto bamboo skewers before being grilled, traditionally over an open fire. In this recipe, chicken is marinated in the satay sauce, but other meats such as lamb, pork and beef are also used to make a delicious finger food. The skewers can be served with white rice or Asian slaw.

---

1 stem lemongrass
2 teaspoons ground cumin
1 brown shallot, chopped
1 tablespoon kecap manis
1 garlic, sliced
2 teaspoons fish sauce
1 fresh red chilli, sliced with seeds
2 tablespoon brown sugar
30 grams fresh ginger, peeled and sliced thinly
1 tablespoon vegetable oil
¼ teaspoon turmeric
4 chicken thigh fillets, skin removed
1 tablespoon ground coriander

METHOD

1 Soak six small wooden skewers in cold water.
2 Remove the tough outer leaves of the lemongrass; use the white centre section only. Chop finely.
3 Combine all the ingredients except the chicken in a food processor and process to form a thin paste. Transfer to a bowl suitable for marinating chicken.
4 Slice the chicken thigh fillets into thin strips, remembering to cut across the grain.
5 Combine the marinade and chicken strips, cover and refrigerate for 20–30 minutes.
6 Preheat grill to high.
7 Thread the marinaded chicken onto the skewers – do not overload the skewers.
8 Cook on grill for 10 minutes, turning as required. Baste with the leftover marinade during cooking.
9 Serve with white rice (page 232) or Asian slaw (page 188).

Note: Remove the seeds from the chilli to reduce the heat of the marinade.

SERVES 2

EVALUATION

1 Describe the sensory properties – appearance, aroma, flavour, texture – of the spicy chicken satay skewers.
2 Outline the health benefits of grilling rather than pan frying the satay sticks.
3 Classify the ingredients used in spicy chicken satay skewers on a diagram of the Australian Guide to Healthy Eating.
4 Use the data from question 3 to evaluate the nutritional value of the meal according to the guidelines of this food selection model.
5 'Eat brighter' is a strategy to encourage individuals to increase their consumption of fruit and vegetables. Taking this strategy into account, devise a dinner menu which includes the spicy chicken satay skewers and rice, to meet the recommendations of the Australian Guide to Healthy Eating.



Mark Fergus Photography

Cooking grains

A variety of grains including rice, quinoa and freekeh can be cooked using the rapid boil and/or the absorption method. Both methods can be used to cook all varieties of rice, including wholegrain, basmati, jasmine, black rice or wild rice. Rice and other grains are ideal to serve as an accompaniment to recipes such as curry, marinaded meats and stir-fries. Quinoa, freekeh and farro are also cooked by the absorption method, and are highly nutritious grains that can be included as an ingredient in a variety of savoury dishes.

PLAIN RICE (RAPID BOIL)

4 cups boiling water

⅔ cup long-grain rice

METHOD

1. Bring the water to the boil.
2. Stir in the long-grain rice.
3. Boil uncovered and rapidly for 12–15 minutes.
4. Test to see if the rice is tender by tasting a grain.
5. Drain in a strainer and serve.

SERVES 2

PLAIN RICE (ABSORPTION)

1 ⅓ cups water

⅔ cup long-grain rice

METHOD

1. Bring the water to the boil.
2. Add long-grain rice and stir gently with a fork to separate the grains.
3. Place lid on the saucepan, lower the heat and simmer 12–15 minutes. Do not lift the lid during cooking.
4. Remove from heat. Keep covered with the lid and allow to stand for 5 minutes, then toss with a fork.

SERVES 2

Variation: If cooking black rice by either the rapid boil or absorption method, increase the cooking time to 35 minutes.

CRACKED FREEKEH

½ cup cracked freekeh

¾ cup water

METHOD

1. Place the freekeh and water in a small saucepan with a tight-fitting lid.
2. Bring to the boil, then reduce the heat to low and simmer 20–22 minutes, until the water is absorbed and the grains are tender.
3. Allow to stand for 5 minutes, then stir gently with a fork to separate the grains.

SERVES 2

QUINOA

½ cup quinoa

1 cup water

METHOD

1. Place the quinoa in a strainer and thoroughly rinse under running water.
2. Place the strained quinoa and water in a small saucepan, cover with a lid and bring to the boil.
3. Simmer over a low heat for 10–12 minutes, until the water is absorbed. Do not lift the lid during cooking.
4. Allow to stand for 5 minutes, then stir gently with a fork to separate the grains.

SERVES 2

EVALUATION

1 Explain why it is important to leave the lid on when cooking rice, freekeh or quinoa using the absorption method.
2 Why is it necessary to allow grains to stand for 5 minutes before serving when using the absorption method?
3 Why does the rice increase in size once it has been cooked?
4 Describe how you can tell if rice is cooked when using the rapid boil method of cooking.
5 Explain why Dietary Guideline 2 recommends that foods from the grain food group should mostly be wholegrain rather than refined.



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San choy bow

San choy bow is thought to have originated in the Guangzhou region in south-central China. This tasty snack is made by wrapping a mixture of spicy minced meat and crunchy vegetables in a lettuce leaf. Traditionally, the meat filling is served at the table with the lettuce leaves alongside. Everyone then serves themselves by spooning some of the filling into the lettuce cup and then wrapping it into a roll to eat. Warning – eating them can be a bit messy!

crisp baby cos lettuce leaves
1 dried lap cheong Chinese-style sausage
1 tablespoon vegetable oil
150 grams minced pork
4 shitake or button mushrooms, finely diced
100 grams (½ cup) water chestnuts, sliced
½ long red chilli, finely diced
1 spring onion, finely sliced
2 tablespoons Shaoxing wine
¼ cup chicken stock
1 tablespoon soy sauce
2 tablespoons oyster sauce
½ cup bean shoots
1 tablespoon coriander, finely chopped
salt and pepper

METHOD

1 Wash the lettuce leaves thoroughly and dry on paper towel. Trim the base of the leaves if necessary so that they form neat cups. Refrigerate until you are ready to serve.
2 Half-fill the saucepan base or a wok with water. Bring to the boil, then reduce the heat to a simmer.
3 Line the top section of a bamboo steamer or perforated saucepan with baking paper. Use a skewer to make holes in the paper to allow the steam to penetrate, then place the dried lap cheong sausage on the paper and steam for 10 minutes.
4 Remove the lap cheong from the steamer and allow to cool, then cut into a fine dice.
5 Heat 1 tablespoon of the vegetable oil in a wok over medium–high heat. Add the minced pork and stir constantly with a wooden spoon until the meat is well browned and crumbly in texture; approximately 5 minutes.
6 Add the diced lap cheong sausage, diced mushrooms, water chestnuts, red chilli and spring onion and stir-fry for one minute.
7 Add the Shaoxing wine, chicken stock, soy sauce and oyster sauce and stir to combine. Cook over a moderately high heat for approximately 5–6 minutes, until the liquid is reduced and the sauce has thickened.
9 Add the bean shoots and coriander and stir to combine. Season to taste with salt and pepper.

To serve

Place the pork filling in a bowl and serve accompanied by the crisp cos lettuce leaves.

SERVES 2

EVALUATION

1 Describe the sensory properties of the san choy bow – appearance, aroma, flavour and texture.
2 Classify the ingredients used in the san choy bow on a diagram of the Australian Guide to Healthy Eating.
3 Use the data from question 2 to evaluate the nutritional value of the meal according to the guidelines of this food selection model.
4 Justify why, according to the nutritional rationale of the Australian Dietary Guidelines, it is important to limit the consumption of foods high in salt.
5 Explain why the san choy bow would be an ideal recipe to be included in the Taste & Learn program delivered to primary schools.



Mark Fergus Photography

Sweet bread plait

This sweet bread plait is made up of a number of delicious components – a soft, sweet bread dough, a layer of creamy custard and a moist apple and sultana filling. While, like other breads, this recipe is a good source of carbohydrates, it contains a small amount of saturated fat found in the butter. The apple and custard filling provides some vitamin C from the apples, as well as a small amount of calcium and protein in the milk. The sultanas are a source of sugar, so it would be wise to only consume a sweet bread product such as this occasionally.

YEAST DOUGH

2 cups bread flour
1 teaspoon salt
1 teaspoon bread improver
1 tablespoon sugar
1 tablespoon dried yeast
140 millilitres milk
50 grams butter
1 egg, beaten

APPLE AND CUSTARD FILLING

½ cup (100 grams) pie apples
2 tablespoons sultanas
⅛ teaspoon ground cinnamon
25 grams butter
2 tablespoons flour
125 millilitres milk
1½ tablespoons sugar
1 egg yolk
½ teaspoon vanilla essence

METHOD

Making the yeast dough

1 Preheat oven to 210 °C.
2 Sift dry ingredients into a large bowl.
3 In a small saucepan, heat the milk and butter until the butter has just melted – do not boil.
4 Add the warmed milk and butter and beaten egg to the dry ingredients. Mix well to make a soft dough.
5 Cover with cling wrap and leave in a warm place to double in size.

Making the apple and custard filling

1 Mix apple, sultanas and cinnamon, and set aside.
2 Melt the butter in a small saucepan over low heat, then stir in the flour and cook for 30 seconds.
3 Remove from heat and gradually stir in the milk. Return to the heat and bring to the boil, stirring constantly. Cook for 1 minute.
4 Remove from heat and stir in the sugar, egg yolk and vanilla essence. Allow to cool.

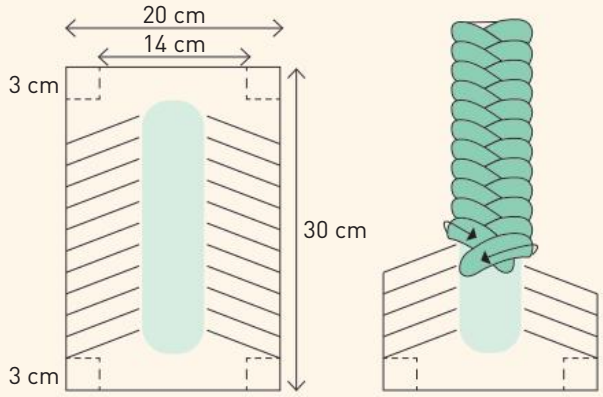
Making the sweet bread plait

1 Turn the yeast dough onto a lightly floured board and knead until smooth.
2 Roll the dough out into a rectangle 30 × 20 centimetres and approximately 0.5 centimetres thick. Line an oven tray with baking paper and place the dough on the lined tray.
3 Refer to the diagrams before filling and cutting the dough.
4 Spread the apple and custard filling along the length of the dough, leaving a border of approximately 7 centimetres on either side.
5 Make diagonal cuts about 2.5 centimetres apart, as shown in the diagram, using kitchen scissors. Make sure you have the same number of cuts on each side.
6 Plait the dough by folding alternate strips of dough over the filling.
7 Brush with egg glaze and prove for 10 minutes.
8 Bake at 210 °C for 5 minutes, then reduce to 190 °C and bake for another 20 minutes.

SERVES 4–6

EVALUATION

1 Describe the sensory properties of the two elements of the sweet bread plait – the sweet bread and the custard filling – appearance, aroma, flavour and texture.
2 List some other fruit that could be used in the filling instead of apples.
3 Classify the ingredients used in the sweet bread plait on a diagram of the Australian Guide to Healthy Eating.
4 Use the data from question 3 to evaluate the nutritional value of the product according to the guidelines of this food selection model.
5 Tip 1 of practical ways to apply the Australian Dietary Guidelines in everyday life is to prepare more of your own meals and snacks at home. Discuss why making the sweet bread plait at home is a better choice than purchasing a similar product from the supermarket or bakery.





Mark Fergus Photography

How to plait the sweet bread plait

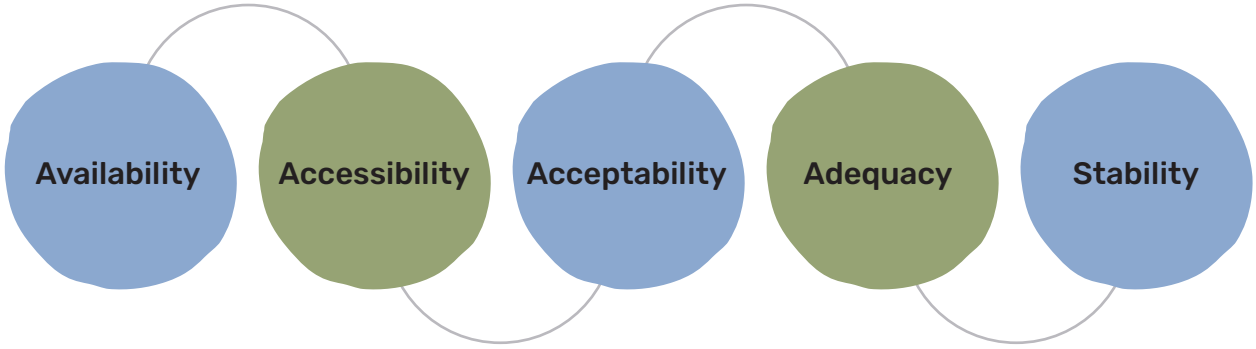
CAUSES OF FOOD INSECURITY IN AUSTRALIA



- Lack of financial resources prevents people on low incomes from purchasing adequate nutritious food
- Global pandemic increased the number of people who sought support from food rescue organisations
- Geographical isolation creates difficulty for people living in remote regions to access affordable healthy food
- Lack of knowledge about nutritious diets and how to select, purchase and prepare nutritious meals
- Lack of private transport or access to reliable public tranport makes accessing healthy food difficult



FOOD SECURITY MODEL



SOLUTIONS TO FOOD INSECURITY

Improving food distribution



Improving food literacy



Improving mechanisation for small-scale farmers



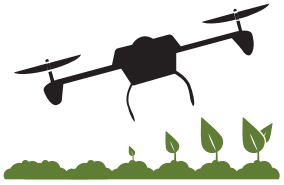
Access to community gardens



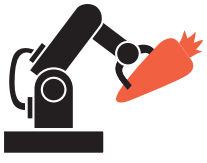
Use of mobile technologies



Use of drones



Agricultural robots



Genetic modification



10

FOOD SECURITY



FOOD SECURITY

exists when all people at all times have physical, social and economic access to sufficient, safe and nutritious food to meet dietary needs for an active and healthy life.



FOOD SOVEREIGNTY

challenges the control of the food supply by large corporations and allows the community to access culturally appropriate food by having control over the way food is produced, traded and consumed.



FOOD CITIZENSHIP

involves individuals participating in and making informed choices at all stages of the food system such as sustainability, ethics or health.

KEY TERMS

food citizenship involves individuals participating in, and making informed choices about, issues such as sustainability, ethics or health in any stage of the food system

food gatekeepers the members of the household who make decisions about the food that is purchased and consumed

food insecurity when people do not have adequate physical, social or economic access to food

food security when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life

food sovereignty challenges the control of the food system and food supply by large corporations, and returns the decision-making to farmers and individuals who produce and consume food, in order to ensure it is produced ethically and sustainably

gene technology a process that alters the genetic material of plants or animals by duplicating, removing or inserting one or more new genes to improve its characteristics

Resources
Study Design
links
Infographics
Flashcards

Feeding an increasing global population

The continuing growth of the world's population places enormous demands on global food supplies. In 2021, the United Nations Department of Economic and Social Affairs reported that there were more than 7.875 billion people on the planet. This figure is projected to increase to approximately 8.6 billion by 2030, and 9.8 billion by 2050. Most of this 2.1 billion population growth will occur in the less-developed regions of the world, particularly in Africa and Asia.

One of the key challenges facing the world is ensuring that everyone has access to sufficient safe and nutritious food. Between 2005 and 2019, the number of people who do not have a secure food supply had begun to slowly decline. However, during 2020 and 2021, the COVID-19 pandemic led to a significant increase in the number of people facing food insecurity, and today almost 800 million people across the globe do not have sufficient food to eat.

Activity 10.1

The world cannot cope with another two billion people by 2050

Read the article that follows, then answer these questions:

1. Evaluate the validity of the news article by assessing the source, purpose, context, presentation of evidence and language used. Alternatively use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this news article. See pages 193–94 for additional information on completing a CRAAP test.
2. Outline the reasons SPA National President Ms Jenny Goldie suggests that the world cannot cope with another 2 billion people by 2050.
3. Explain the impact of the projected population growth on the populations of the world's poorest countries.
4. Describe the impact an increasing world population will have on environmental sustainability.
5. Outline the way in which population growth in Australia will impact on food security.
6. Explain how, by purchasing environmentally sustainable food products, consumers are demonstrating food citizenship.
7. Ms Jenny Goldie argues that 'If we are to curb biodiversity loss and mitigate climate change while lifting two billion people out of poverty, then we must address both the number of people and their behaviours.' Do you agree with this statement? Justify your answer.

THE WORLD CANNOT COPE WITH ANOTHER TWO BILLION PEOPLE BY 2050

On World Population Day 2021 (July 11), Sustainable Population Australia (SPA) says the world cannot cope with another two billion people by mid-century.

The UN says global population will grow from 7.7 billion to 9.7 billion by 2050.

SPA National President Ms Jenny Goldie says the world is already overpopulated and another two billion will plunge ever more people into hunger and poverty, while exacerbating the sixth mass extinction that is already upon us.

'The world grows by 83 million people a year, or by 1.1 per cent,' says Ms Goldie. '83 million is the current population of Germany. Such growth is clearly not sustainable. Already the human ecological footprint is 170 per cent of Earth's renewable biocapacity and the boundaries of key planetary processes are being exceeded.

'As the secretary-general of the United Nations, Antonio Guterras, has warned, "humanity is waging war on nature. This is suicidal. Making peace with nature is the defining task of the 21st century. It must be the top, top priority for everyone, everywhere." Achieving this will require zero population growth or less, not 1.1 per cent.

'Globally, most of the projected population growth will happen in the poorest countries, deepening their poverty and making them vulnerable to hunger and violent conflicts. Farm sizes are shrinking and in the burgeoning cities, infrastructure and job creation can't keep pace with the growth.

'Meeting their needs for food and shelter often means forests are cut down, destroying the habitats of other species and sometimes, in turn, causing the very loss of those species.

'Nine years ago, at the London Family Planning Summit, rich countries including Australia pledged increased funding for family planning services. Only a fraction of these resources was delivered, and Australia was among the first to renege. Now, due to Covid-19, some countries are withdrawing their aid just when it is needed most. Australia's foreign aid cuts must be reversed urgently.

'It is population growth, however, in the wealthier countries such as Australia that is of most concern for climate change,' says Ms Goldie. 'Here, high levels of fossil fuel use causes climate change and the associated extreme weather events such as the recent heatwave in northwestern US and Canada.'

Ms Goldie says that if we are to have any hope of staying below 1.5C degrees of warming, then greenhouse gas emissions must be cut in half globally by 2030. Every increase in population makes this harder.

'The recent joint report by the Intergovernmental Panel on Climate Change (IPCC) and the Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services (IPBES) said that biodiversity loss and climate change are both driven by human economic activities and mutually reinforce each other. Neither will be successfully resolved unless both are tackled together.

'If we are to curb biodiversity loss and mitigate climate change while lifting two billion people out of poverty, then we must address both the number of people and their behaviours,' says Ms Goldie. 'Somehow, we have to provide for the basic human needs of everyone on the planet while not destroying ecosystems and the life-supporting services they provide.'

Sustainable Population Australia

What is food security?

A 2010 report by the Prime Minister's Science, Engineering and Innovations Council, titled 'Australia and Food Security in a Changing World', defines **food security** as 'when all people at all times have physical and economic access to sufficient, safe and nutritious food to meet dietary needs and food preferences for an active and healthy life'.

The aim of a food security model is to address the issues of availability, accessibility, acceptability, adequacy and stability through current food practices.

There are millions of people who live each day undernourished and not knowing how they can feed themselves and their children. The vast majority of people who are food insecure live in developing countries, where approximately 14 per cent of the population is undernourished. However, food insecurity is also a concern for many Australians, with the Foodbank Australia Hunger 2021 report stating that '1.2 million children are living in food insecure households.' Their report also states that 'more than one in six Australian adults can be categorised as

Availability
- Sufficient supply of food for all people at all times

Accessibility
- Physical and economic access to food at all times, including equality of access to food

Acceptability
- Access to culturally acceptable food that is produced and obtained in ways that do not compromise people's dignity, self-respect or human rights

Adequacy
- Access to food that is nutritious, safe and produced in environmentally sustainable ways

Stability
- Reliability of food supply

FIGURE 10.1 Five key pillars to food security

severely food insecure.' According to the United Nations Food and Agriculture Organization (FAO), these people are facing **food insecurity**, a state that 'exists when people do not have adequate physical, social or economic access to food'.

CAUSES OF GLOBAL FOOD INSECURITY

Many experts agree that the planet produces enough food to feed the world's population. So why do so many people lack food security?

The answer is complex and involves a range of interrelated factors, including extreme weather events and climate change, war and displacement of populations, unstable global food markets, food wastage, high levels of poverty, a lack of investment in agriculture and land degradation.

- **Poverty:** In 2020 approximately 9.3 per cent of the world's population lived on just $1.90 per day, and 40 per cent lived below the poverty line of $5.50 per day. The high cost of food means many people cannot afford more than one meal a day.
- **Global pandemic:** The COVID-19 pandemic increased the number of people suffering from food insecurity by more than 132 million. An inability to work and a lack of income meant many people could not afford to purchase food.
- **Climate shocks:** Drought, floods, cyclones and typhoons have increased in frequency and intensity as a consequence of climate change, severely damaging crops and impacting on agricultural production.
- **Food wastage:** 17 per cent of all food produced across the globe, or approximately 931 million tonnes, is lost or wasted annually. Food waste occurs throughout the food system – in households (61 per cent), food service (26 per cent) and food retail (13 per cent).
- **Biological hazards:** A mouse plague in regional NSW in 2021 devastated crops, costing farmers millions of dollars. Locust infestation across east Africa, the Arabian Peninsula and India in 2019–2021 wiped out crops and threatened the food supply. Other pests and disease, including armyworm, fruit flies, banana diseases, cassava diseases and wheat rusts, can also devastate crops.
- **Armed conflict:** Armed conflict such as the war in Ukraine prevents rural communities from growing crops, limiting their food supply and disrupting the sale of food through international markets.

CAUSES OF FOOD INSECURITY IN AUSTRALIA

Collaborative Activity

Although food security is well understood to be a major concern in many developing nations, it is also an issue that impacts on the lives of many Australians. According to a 2020 report by the Australian Institute of Family Studies titled 'Understanding food insecurity in Australia', 'estimates suggest that between 4 and 13 per cent of the general population are food insecure; and 22 to 32 per cent of the Indigenous population, depending on location.'

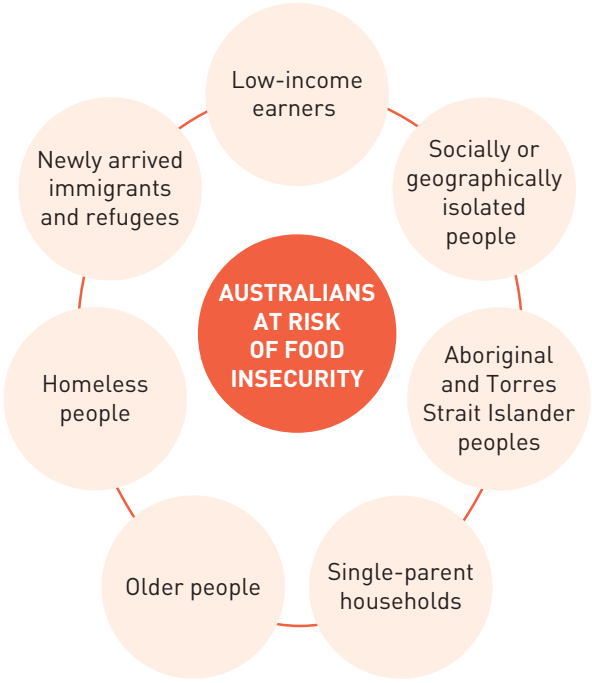


FIGURE 10.2 Australians at risk of food insecurity

There are many similarities between the causes of global food insecurity and the causes of the food insecurity affecting many Australians. Food waste, especially of highly perishable foods including vegetables, fruit, dairy products and meat, which are the basis of a healthy diet, are wasted at all stages of the food system. Some of this food is 'rescued' by charitable organisations and distributed to people in need. However, the high cost of production and the use of resources that are ultimately wasted all add to the price consumers are asked to pay, which for many is beyond their limited income.

Australia's food security problem

At least **one million** Australians **can't afford** to buy enough food



Climate change and **pandemic** are disrupting the food system



There will be more frequent **shocks** to our food supply



Less land, water and other **natural resources** are available to grow food



Food prices will continue to **rise**



More Australians will be **unable** to buy enough food in future



More people are becoming **dependent** on emergency food relief



Emergency food relief **is not** a long term solution



Australians need **dignified** access to nutritious food



We need a **food resilience plan** to ensure **everyone has enough food** in a world of shocks and stresses

LORD MAYOR'S CHARITABLE FOUNDATION

fvas.unimelb.edu.au/research/projects/foodprint-melbourne

THE UNIVERSITY OF MELBOURNE

The Foodprint Melbourne project, University of Melbourne

Climate shocks, particularly drought, floods and cyclones, can also have an impact on the availability and price of food. Cyclones in northern Queensland in 2011 and again in 2021 wiped out banana plantations and affected the availability and cost of Australian bananas. The reduced availability of this nutritious fruit, often used as a snack food for children, meant that the price of bananas became too expensive for many families.

Lack of financial resources

Prevents people on low incomes and those relying on government support, such as the unemployed and single parents, from purchasing adequate nutritious food at an affordable price. These people must spend a greater proportion of their disposable income to buy healthy food.

Global pandemic

Foodbank Australia reported that during 2020, the COVID-19 pandemic resulted in an increase in the number of people who sought food relief, from 15 per cent of those who were food insecure to 31 per cent. People who worked on casual contracts, particularly young people, and international students also became food insecure as a result of the COVID-19 pandemic.

Geographical isolation

People who live in remote areas, including Indigenous communities, may have difficulty accessing affordable healthy food. The cost of transporting healthy food to remote regions is expensive, and these costs are passed on to food consumers, many of whom may have limited financial resources.

Lack of knowledge

A lack of knowledge about nutritious diets and how to select, purchase and prepare nutritious meals can lead to food insecurity. Often the only accessible foods that people on a low income can afford are low-cost, energy-dense foods that have little nutritional value and can lead to overweight and obesity.

Access to healthy food

A lack of private transport or limited access to reliable public transport may force individuals to depend on small shops with a limited, but more expensive range of healthy food, rather than travelling to larger retail hubs where major supermarkets are located. In many areas, it may be easier to access affordable, energy dense takeaway food that is of low nutritional quality than to purchase healthy, good-quality, fresh food.

FIGURE 10.3 Causes of food insecurity in Australia

Practical Activity 10.2

Design brief: To plan a meal for four people to raise awareness of food security issues in Australia

Background information

Charities and organisations such as The Oaktree Foundation, World Vision, Freedom from Hunger and The Ration Challenge all work to raise awareness and funds to help reduce poverty and hunger and improve food security. Many schools undertake fundraisers by giving up food for a weekend or living on a set of rations or on a budget



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for up to five days. These campaigns help students to develop a greater awareness of the issues of food insecurity and poverty in Australia and around the world.

Design brief

Work in small groups to plan and produce a meal that costs no more than $10 for four people, or $2.50 per person. The meal must be nutritionally sound and based on the principles of the Australian Guide to Healthy Eating, and must have appealing sensory properties. The meal must also take no longer than 90 minutes to prepare and cook.

1. Identify the specifications in the design brief.
2. Develop four evaluation criteria questions to assess the success of your low-cost meal.

Investigating

Research suitable ingredient and meal ideas for a low-cost meal based on the information in the design brief. The Oaktree Foundation, World Vision, Freedom from Hunger, The Ration Challenge and supermarket websites will be a good starting point for this task.

Generating

1. Develop three recipe ideas for a low-cost main meal.
2. Discuss how well each option meets the specifications in the brief.
3. Identify your preferred option and justify your choice.

Planning and managing

Complete a food order.

Producing

1. Produce the meal, following all safety and hygiene procedures.
2. Plate your meal up and present it as part of a class banquet.
3. As a group, explain your dish to the class. Taste test the recipes prepared by the other members of the class.

Evaluation

Evaluate the success of your meal based on your previously developed criteria questions.

Note: If timing is an issue, students may plan the task but not produce the meal. Their ideas can still be evaluated by the class.

Solutions to food insecurity

Achieving food security is a challenge facing all nations across the globe. A Food and Agriculture Organization (FAO) report has found that food production worldwide must increase by 70 per cent by 2050 if we are to meet the food and nutrition needs of a growing population. This increased need for food must be met in a time when agricultural production is faced with numerous threats brought about by climate change, including increased land and sea temperatures, drought, flood, desertification and salination.

INNOVATIONS AND TECHNOLOGY

One of the five key pillars of Australia's food security model, 'Australia and Food Security in a Changing World', is availability; that is, the supply of sufficient food for all people at all times. Scientists, both on the international and local stage, are researching and developing new technologies to address the key issue of food supply.

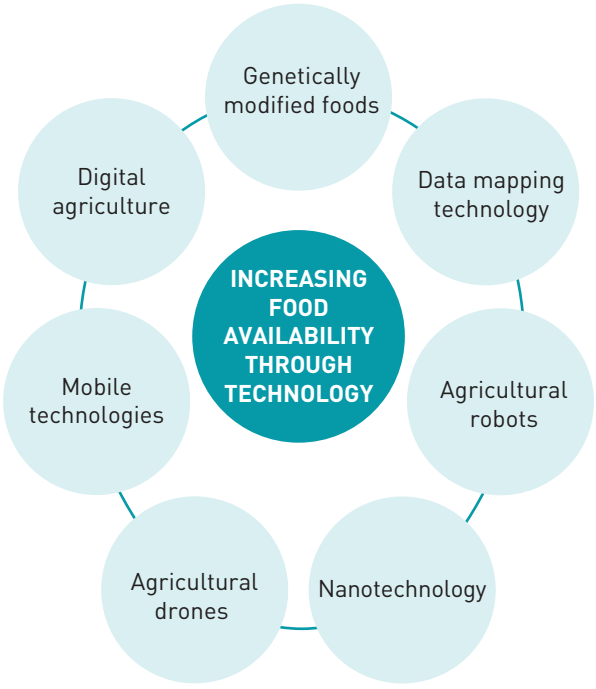


FIGURE 10.4 Technological innovations to increase food availability and food security

GENETIC MODIFICATION TECHNOLOGY

Gene technology or genetic modification is a process that alters the genetic material of a plant or animal by duplicating, removing or inserting one or more new genes to improve its characteristics. Biotechnology or gene technology is being developed to improve food security. Gene technology offers numerous benefits:

- It can increase the nutritional content of some foods; for example, increasing the pro-vitamin A levels in golden rice and golden bananas will help overcome the vitamin A deficiency that leads to blindness.
- GM crops designed to provide a higher yield may mean that a greater production per hectare of land is possible, improving food availability and food security.
- Some plants may be designed to be tolerant to drought or high-salt soils, or to be resistant to extreme cold, enabling farmers to grow crops in soils that were previously infertile or unsuitable for farming. Producing drought-resistant or high-yielding crops can benefit Australian farmers, enabling them to grow crops on previously unproductive land or in a hotter and drier climate as a result of climate change.
- Some vegetables have been genetically modified so that they have a longer shelf life, meaning less food is wasted. For example, the enzyme that is responsible for ripening in tomatoes is altered to slow down the ripening process, so GM tomatoes remain firm for longer and have much less water, making them easier to transport. This means that Australian growers have more time to get their produce to market, and the food is more shelf-stable in retail outlets, leading to less food waste.

Genetically modified food crops, particularly canola, soybeans and corn, are grown throughout the world. In Australia, the Office of the Gene Technology Regulator has approved the use of herbicide-resistant GM canola to be grown commercially in Australia. Today, approximately 21 per cent of all canola grown in Australia is genetically modified to be resistant to the herbicides glyphosate and/or glufosinate. Research in Australia into the production of genetically modified bananas, barley, ryegrass, mustard, sugarcane and wheat is also being undertaken, and field trials of these crops are in progress.

Cow peas

Agricultural biotechnology is seen as the key to food security in Africa. Cow peas, a legume crop that is grown widely in semiarid regions in Africa, are a food commonly grown and eaten in Nigeria. They are the main source of dietary protein and essential minerals, such as iron, for low-income families. However, the cow peas are often attacked by a borer pest that can destroy up to 80 per cent of a farmer's crop. A genetically modified cow pea, the 'Pod Borer Resistant Cowpea', which is resistant to the borer, was developed by an international team, led by the African Agriculture Technology Council (AATF) in partnership with Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO). The first generation of the genetically modified cow pea was released in Nigeria in December 2019. Trial plantings of the genetically modified cow pea have shown an increase in crop production of between 20 and 100 per cent.

In May 2022, the CSIRO announced it was undertaking research into the development of a second generation of Pod Borer Resistant Cowpea. The second generation of the GM cow pea will carry two or more Bt (*Bacillus thuringiensis*) genes – this gene produces a toxin that deters many insect pests. The aim of the latest development in GM cow peas is to avoid the development of resistance in the borer insect populations and to produce a cow pea with long-lasting resistance. Field trials of the second generation GM cow pea have been undertaken in Nigeria, Ghana and Burkina Faso. Planting the second generation GM cow pea will increase west African farmers' incomes and help them to achieve food security.



Alamy Stock Photo/Jake Lyell

Cow peas

Golden bananas

Bananas are an important fruit crop in many parts of the world. In rural Uganda, cooking bananas, a staple food in Ugandans' daily diet, are picked green and then steamed before being eaten. However, while Ugandan bananas are high in starch, they are low in vitamin A.

Australian scientists have been at the forefront of new gene technology to overcome food insecurity in Uganda and other African nations. The Queensland University of Technology (QUT) has used genetic modification to develop and produce a banana with improved nutritional properties by being biofortified with pro-vitamin A. Research undertaken by QUT and supported by the Bill and Melinda Gates Foundation identified and selected specific banana genes that could be used to produce a banana high in pro-vitamin A. The research team at QUT used the genes of bananas naturally high in pro-vitamin A, found in Papua New Guinea, and inserted them into Cavendish bananas. Their research produced a golden-orange fleshed banana high in pro-vitamin A. The genes from these bananas have been inserted into Ugandan bananas and are being used in field trials, in an effort to reduce the incidence of vitamin A deficiency in Ugandan children and to improve food security.



Queensland University of Technology

Golden bananas that are high in pro-vitamin A have a bright golden-orange flesh.

Drought-resistant wheat

Research in Australia by CSIRO biotechnology scientists has identified genes in some overseas wheats that can be grown in hotter and drier climates, a discovery that could help wheat farmers adapt to climate change. Wheat is the major cereal crop grown in Australia and a key crop in ensuring Australia's food sovereignty. Australian farmers produce in excess of 25 million tonnes of wheat annually, and account for approximately 3.5 per cent of global wheat production. However, reduced rainfall and increasing soil temperatures as a result of climate change across much of Australia's wheat belt, particularly in Western Australia and New South Wales, are threatening the viability and future of wheat production. Records show that rainfall during the critical wheat sowing period in autumn has diminished, while rainfall in the summer months has increased.

CSIRO scientists have used gene technology to develop a new wheat strain that has a longer coleoptile – the sheath protecting the young shoot tip of wheat as it emerges from the ground – so that it can be sown deeper in moist soil following summer rain. Sowing the wheat at a greater depth means the seeds can utilise the retained moisture in the soil, resulting in early germination.

Another concern for wheat farmers is that climate change has led to increased air temperatures during the winter growing period, particularly for farmers in northern Western Australia. The new wheat variety has a shorter growing period, meaning it can be harvested at its peak grain formation, avoiding the higher temperatures. It has also been shown to increase crop yields by approximately 30–40 per cent, adding to the food security of Australians.

Activity 10.3

'Climate change-resistant' apple that can keep its colour and crunch could be grown in Australia

Read the article that follows, then answer these questions:

1. Evaluate the validity of the news article by assessing the source, purpose, context, presentation of evidence and language used. Alternatively, use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this news article. See pages 193–94 for additional information on completing a CRAAP test.
2. Explain the impact that climate change is having on apple production worldwide.
3. Outline the steps the researchers used to develop the new apple variety.

4 Explain how the development of an apple that can be grown in hot, dry conditions can help address food insecurity.

5 Discuss how growing the new variety of apple in Australia will improve our food sovereignty.

'CLIMATE CHANGE-RESISTANT' APPLE THAT CAN KEEP ITS COLOUR AND CRUNCH COULD BE GROWN IN AUSTRALIA

The world's first climate change resistant apple has been 18 years in the making.

An apple touted as the first in the world to be resistant to climate change could be grown in Australia as early as next year.

The apple, known as HOT84A1, has been bred to withstand the world's hottest and driest conditions and is the result of 18 years' work between researchers in Spain and New Zealand.

New Zealand-headquartered T&G Global officially launched the fruit and said it was important the industry found ways to continue to grow fruit in a changing climate.

'In hotter drier climates typically, apples don't get that lovely red colour and they also don't get that crispy crunch which makes them so nice to eat,' said Peter Landon-Lane, T&G's director of innovation and technical.

'Apples have a huge amount of natural genetic diversity so to get an apple that holds in hotter, drier climates it's been about 18 years to create an overnight success.'

Mr Landon-Lane said with a warming climate, both countries found they had a common problem of how to get apples to grow well in hot, dry regions and that Spain was a perfect place for their first trial.

'In northern Spain the temperatures can get up to 45 degrees and that's pretty hot to get an apple with good red colour and a good crisp crunch,' he said.

'The trees also need to have good tolerance to drought.'

Researchers started with about 10,000 seedlings, also needing to combine attributes like pest and disease resistance, good size fruit and good shelf life.



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Climate change is impacting apple production in Australia, especially as conditions become hotter and drier.

Over 18 years those seedlings were whittled down to about 10.

'What you're trying to do is get all of the traits of interest in a particular tree that produces consistent, good fruit,' Mr Landon-Lane said.

'We've all become a lot more aware of the challenges of climate change and so innovation in terms of new and improved genetics is part of a continuous innovation process.

'Here we are still able to produce good, healthy, nutritious food despite those challenges.'

The variety is in quarantine in Australia and Mr Landon-Lane said he hoped growers would be able to trial the hot apple as early as next year.

The company is still looking for a commercial name for the red, hot apple, once it can be sold in supermarkets.

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DATA MAPPING TECHNOLOGY

Since 2019 Australian farmers have had access to new data mapping technology called the 'Rural Intelligence Platform'. The technology was developed by the CSIRO in conjunction with a rural technology start-up, Digital Agriculture Services (DAS).

The CSIRO states that 'the platform uses satellite imagery to track paddocks and their performance over time. Information from Australia's digital soil map is incorporated and climate information interpreted to show drought, frost, heat stress for livestock and other risks.'

The features of the new data mapping and analytics technology help Australian farmers to improve the productivity on their property in the following ways:

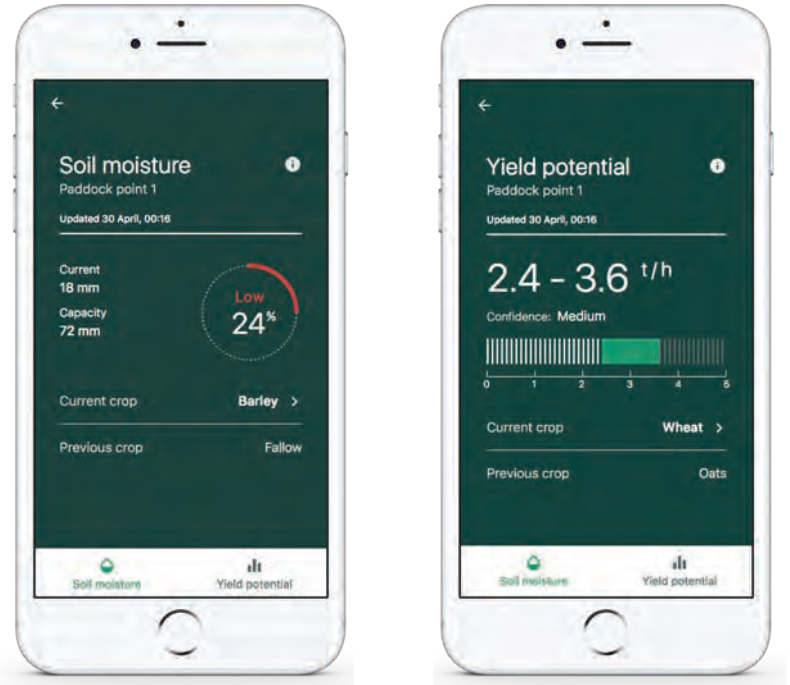
- Global satellite technology in combination with geospatial analytics enables farmers to identify which crops they have growing in particular paddocks, or the crops that are growing in their region. The new technology can identify 17 different types of crops.
- The new platform can identify and classify different soil types on individual farms, giving farmers a greater understanding of the most suitable crops to grow, improving the availability and stability of the crops they produce and enhancing food security.
- Access to comprehensive farm-based data provides farmers with information about the rainfall in their area during any season or over several years, and the amount of water available on their property.
- Farmers can use the technology to evaluate the productivity that their property could achieve, for example, the amount of grain per hectare that could be harvested, improving food availability.

Source: Digital Agriculture Services

AGRICULTURAL ROBOTS

Agricultural robots are being widely used across Australia and throughout the world to improve farm productivity and address food insecurity. They achieve this by improving food access and availability and the stability and reliability of the food supply. These machines are small, driverless tractors fitted with sensors that are able to perform specific tasks on a farm. Software programs linked to sensors enable the robots to navigate through an orchard or field to detect and spray weeds, or to use microwave technology to destroy weeds. Agricultural robots are also developed to apply fertiliser to trees or crops, and to prune fruit trees.

Small agricultural robots use LED lights, sensors, and cameras similar to those used in facial recognition technology to detect when fruit such as apples, citrus fruit, mangoes and strawberries are at peak colour development, weight and size, indicating that they are ripe and ready to harvest. Other applications that



© CSIRO

Australian farmers use data mapping technology to improve on-farm productivity.

are being trialled and used in Australia include using the robots to harvest vegetables such as lettuce and capsicum.

Due to their small size and lower cost than traditional large farm machinery, some farmers are able to purchase several agricultural robots to use simultaneously in a field, improving productivity. Their light weight means that they have less impact on the soil as they move through the crops, reducing soil compaction. This improves crop health, reducing root damage and enabling better nutrient and water take-up by the plants.

In Australia, agricultural robots are being used to overcome a shortage of skilled farm labour in some areas, particularly during the critical harvest period.

Case study

SwarmFarm Robotics

In 2012, grain farmers Andrew and Jocie Bate, based in Emerald, Queensland, established their company SwarmFarm to create autonomous agricultural systems that would ensure efficient sustainable practices. SwarmFarm partnered with the Queensland University of Technology (QUT) and the University of Sydney's Australian Centre for Field Robotics to develop robotic technology that could be used in the agricultural sector. Today, SwarmFarm design and build a wide range of small, autonomous robots that will increase farm productivity and enhance sustainability in the farming sector.

SwarmFarm

SwarmFarm was established to create autonomous agricultural systems to be used in the farming sector.

Innovative technology

- The robots can be controlled by an iPad or smartphone app or computer, and programmed to operate in 'fleets' or 'swarms' to increase productivity.
- The robots are fitted with autonomous navigation sensors that use a 360° camera, enabling it to detect and avoid obstacles and to create a map of the environment. This allows the robot to navigate through complex intersections and to recognise obstacles that may be stationary or fixed and those that are moving.
- The agricultural robots are completely autonomous – sensors enable them to navigate their own way around the property. They are able to work 24 hours a day, 7 days a week when required, and can take themselves back to their shed when the task is complete.
- They are able to produce data maps of hotspots of weeds and seeds to enable easy eradication.
- Their small size and light weight ensures they cause little soil compaction.
- They are suited to a wide range of applications and used as a platform to carry smart technology around the field to meet the challenges faced by individual farmers. For example, they can be fitted with a herbicide tank and spray arm to distribute herbicides to eradicate weeds. Other applications include sowing or planting and fertilising crops.
- Orchardists use small agricultural robots to slash the grass between fruit trees, reducing the use of herbicides.



SwarmFarm

The robots are small and lightweight, so they cause little soil compaction.

Ensuring sustainable agriculture

- The robotic machines are small and nimble and therefore have little impact on the soil, preventing soil compaction and ensuring improved plant health.
- Using precision agriculture, the robots are able to identify individual plants and apply fertiliser if necessary to improve plant health.
- Infrared lights attached to the robots enable them to target and spray individual weeds while they are small, rather than allowing them to become much larger, when they would use up valuable soil moisture.
- Research has shown that by targeting individual weeds, rather than using a blanket spraying approach of the whole paddock, only 2 per cent of the crop needs to be sprayed with weedicide. This targeted approach to weed eradication also prevents the possibility of 'wind drift' of chemicals into nearby waterways.
- Microwave technology can also be attached to a weed sensor at the back of the robot to control herbicide-resistant weed pests such as gorse seed and bulbs. Many organic farmers are also turning to this type of technology.
- The use of this type of targeted technology ensures that the amount of agricultural chemicals used on a property is minimised and prevents the development of chemical resistance by weeds, reducing the impact on the environment and improving sustainability.
- Queensland sugarcane growers are using SwarmFarm robots to target individual weeds rather than using broadacre spraying. This minimises the amount of pesticide being applied to the crops and prevents any runoff from entering nearby waterways and contaminating the Great Barrier Reef.



SwarmFarm

Agricultural robots can be fitted with a herbicide tank and spray arm to spray and eradicate individual weeds.

Questions

Read the case study 'SwarmFarm Robotics' and answer the questions that follow:

1 Explain the reason grain farmers Andrew and Jocie Bate established their company SwarmFarm.

2 Prepare a PMI (plus, minus, interesting) chart on the value of using autonomous agricultural systems to improve food security in Australia.

SWARMFARM ROBOTICS		
Plus	Minus	Interesting

Automating fruit orchards

Fruit such as apples, oranges, pears and stone fruit have traditionally been picked by hand. However, harvesting fruit provides many challenges for orchardists – it is very labour intensive, must be completed within a very short seasonal window when the fruit is ripe, and is often hampered by inclement weather.

Ripe Robotics, a new Australian start-up company, is designing, programming and building robots to help orchardists pick apples, oranges and stone fruit. In 2021 the robot underwent trials in the Goulburn Valley, where the developing technology was tested in apple orchards. The robot uses cameras to scan and map the trees to detect where fruit is growing. An arm of the robot contains a soft suction attachment that plucks the apples from the tree, minimising damage to the fruit.

The robots are able to pick fruit more quickly and more accurately than human pickers can, and cause little damage or waste, increasing farm productivity. Sophisticated artificial intelligence connected to the

cloud enables the orchardist to track the progress of the robots, whether they are on their property or off-site.

During the COVID-19 pandemic, farmers were unable to use overseas seasonal workers as fruit pickers, leaving them short-staffed. As a result, much of their fruit could not be harvested and went to waste. Once the technology is further refined, the fruit-picking robot will improve food security by reducing farm wastage and increasing farm productivity, thereby improving the availability and stability of the fruit supply to Australian and international markets.



Australian Centre for Field Robotics, University of Sydney

Robots are designed to sense flowers and fruit on trees, and are able to determine if fruit can be harvested.

NANOTECHNOLOGY

Many agricultural scientists see the development of nanotechnology as a possible pathway to sustainable food production, and therefore to improving food security.

The Australian Institute for Biotechnology and Nanotechnology at the University of Queensland is undertaking research into nanotechnology and its role in addressing agricultural challenges associated with an increase in the Australian and global population, climate change and food security. Using nanotechnology will enable the agricultural sector to increase the amount of food produced, even as the amount of land available for production decreases, while also ensuring that soil health is maintained.

Nanotechnology uses nanomaterials – tiny chemical substances or materials that are approximately one millionth of a millimetre in size – 100 000 times smaller than the diameter of a human hair.

In Australia, nanotechnology is being developed in conjunction with precision agriculture using agricultural robots, to enable farmers to target individual plants with specific nutrients or herbicides. This technology is becoming increasingly important in agricultural production both globally and within Australia as a means of improving food availability and ensuring food security. Trials are underway to determine the effectiveness of nanotechnology when used in conjunction with precision agriculture. Some advantages of nanotechnology being explored are:

- Nanofertilisers will boost soil health, ensuring plants are more resilient to variations in climate and pest infestation.
- Nanofertilisers, which release the nutrients very slowly in comparison with traditional fertilisers, can be applied to individual plants. This increases the nutrients absorbed by the plant and minimises the amount of fertiliser that could leach into and contaminate groundwater supplies. It is anticipated that the use of nanofertilisers will improve crop quality and yields and be a valuable tool in addressing food insecurity.
- Nanoherbicides are being developed to manage weeds, especially perennial weeds that appear every year, and those weed seed banks that are present on the surface of the soil. The control of weeds using nanoherbicides will improve crop health and crop yields.
- Agricultural scientists believe nanopesticides and nanoherbicides can be used to target and control specific pests and weeds when applied using precision agriculture. The application of nanoparticles is able to be tightly controlled, and as they are applied in much smaller quantities than traditional pesticides and herbicides, their use will reduce environmental pollution.
- Research has shown that the use of nanofertilisers and nanoherbicides will enable the crop to use the nutrients more efficiently, will reduce the amount of agricultural chemicals that need to be applied to the crop, and will reduce any soil toxicity caused by the overuse of agricultural chemicals.



Shutterstock.com/Budimir Jevtic

Nanotechnology enables scientists to create plants with specific nutrients or growth characteristics for farmers to grow improved food crops.

AGRICULTURAL DRONES

The development of drones, or unmanned aviation vehicles, is a form of precision agriculture that is transforming the agricultural industry both within Australia and across the globe. Today these flying robots are used for a vast range of tasks that could not even have been imagined a few decades ago. Australian grain farmers have equipped drones with cameras, allowing them to conduct aerial surveys of their crops, taking images to:

- evaluate the health of the crop and any diseases or pests that are present on the plants or in the fields. Farmers can then accurately determine the amount of fertiliser and pesticide to use and accurately release the required chemicals
- target the use of chemical fertilisers and pesticides to specific plants, assisting farmers to reduce run-off and the pollution of local waterways
- detect any problems with irrigation systems and to identify crops that are facing water stress
- track changes to the crops daily or weekly if farmers need additional data to optimise crop health or productivity.

Orchardists are also using drones to provide data on the number and health of their trees or vines and are using this data to predict their crop yield.

As drones are relatively quiet and are unlikely to startle animals, livestock farmers are beginning to use drones to provide data on their herd count or to identify animals that may be injured or that have died. Drones can also alert farmers to any new lambs, calves or kids that have been born and can be used to monitor their health. Drones can also provide livestock farmers with information about how much or how little pasture has been grazed so that they can move the animals to fresh pasture as necessary.

Farmers are also using drones to monitor their dams so that they can quickly identify any leaks or breaches in the dam wall to prevent loss of essential water supplies.



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Drones can target agricultural fertilisers and pesticides to specific plants.

MOBILE TECHNOLOGIES

Some of the fastest and most effective forms of technology being used to transform agricultural production, both within Australia and in developing countries, are mobile digital devices. Australian farmers are using digital devices such as smartphones, mobile computers, personal navigation devices and wearable computers to help them access and share the latest agricultural information. Farmers are able to access a wide variety of information that will enhance the productivity of their crops or livestock and improve food availability and access to a broad range of food products, thereby enhancing food security.

The use of digital devices allows farmers to access:

- data from weather stations to alert them of current and predicted weather conditions. For example, they can access data on the likelihood of unseasonably heavy rain or high temperatures that could lead to flooding or drought and impact on their crop or livestock production.
- agricultural services that can provide them with up-to-date seed prices, planting guidelines and recommended harvest times
- data from the CSIRO, which provides wheat farmers with a forecast of the likely annual wheat harvest for a given year. The CSIRO's 'Wheatcast™' forecast can be accessed through a smartphone or iPad and is based on information from the Bureau of Meteorology including daily rainfall, temperature and solar radiation. Data about the soil profile such as its water balance and nitrogen content also form part of the wheat forecast.
- a wide range of smartphone apps to assist them to manage both their on-farm activities and the sale and delivery of their produce.

DIGITAL AGRICULTURE

Using augmented reality to improve aquaculture

The CSIRO, through their Digiscape Future Science Platform, is developing augmented reality technology that will enable aquaculture prawn farmers to monitor their water quality and improve the growing conditions for their shellfish.

Prawns are an important protein source for many communities across the globe and play a crucial role in food security for these population groups.

Good water quality is one of the key requirements for prawns to thrive and grow. For prawn farmers to be able to produce good quality stock, they must be able to establish whether water conditions change from being healthy to threatening the viability of their prawns.

Testing of the new augmented reality technology is being undertaken by the CSIRO in conjunction with a prawn farm operator in Ayr near Townsville in northern Queensland, Pacific Reef Fisheries Pty Ltd. Staff at the prawn aquaculture facility use state-of-the-art augmented reality glasses while walking around and managing their ponds. This enables them to develop an understanding of key water quality conditions such as the amount of dissolved oxygen present in the water, whether the pH is at the desirable level or if the water is cloudy, opaque or contains more suspended matter such as excess feed or faecal matter than is desirable.

The new augmented reality technology will enable prawn farmers both within Australia and across the globe to determine the amount of feed required and to manage the health of their prawn stocks. This will safeguard the viability of the prawn aquaculture industry into the future and ensure this essential source of protein is available and accessible to communities across the globe, thereby improving food security.



Alamy Stock Photo/Sergio Azenha

Augmented reality is improving the production of prawns in aquaculture farms.

Smart livestock ear tags

The CSIRO has worked with agricultural technology (Agtech) company, Ceres Tag, to develop a 'smart' ear tag that can be used to track and monitor cattle, sheep and other livestock. The smart ear tag works on the same principles as a smart watch. Smart ear tags have revolutionised the livestock industry. They last the lifetime of the animal and are powered via a battery and integrated solar panels. They will improve food availability and accessibility and therefore food security both within Australia and across the globe by improving the sustainability of the livestock industry.

Smart ear tags:

- are directly linked to satellites and allow farmers to access data from each animal via the Internet of Things (IoT)
- use geolocation so that livestock can be tracked remotely. Livestock farmers in outback Australia and other remote regions of the world are able to track the location of their stock through the ear tag and the Internet of Things rather than using helicopters to track stock over thousands of hectares.
- include the facility to record the animal's speed. The advantage for livestock farmers is that they can be alerted if there is any unusual pattern in the animal's activity. For example, an animal that is ill or about to give birth may move much more slowly than normal. This information allows the farmer to intervene if necessary, improving the health outcome for the animal. The geolocation facility can also alert farmers to stock theft; stock that has been stolen is usually transported by truck and the increase in the animal's speed (from walking pace) will alert the farmer to the theft.
- monitor the health, fertility and the food intake and nutrition of the animals and enable farmers to use the data to assess and improve the overall health of their herd.



Getty Images/Vicki Smith

Smart ear tags enable livestock farmers to track their animals remotely.

Understanding the Text

Answers
Understanding the Text

1 What is the predicted increase in the world's population by 2050? Explain the key challenge that will result from this population increase.
2 Identify the five pillars of food security and outline why each is an important factor in supporting a secure food supply.
3 Explain why a lack of financial resources and a lack of knowledge are factors that can lead to food insecurity for some Australians.
4 Draw up a mind map to highlight the ways genetic modification will improve food security across the globe. Explain how the development of both golden bananas and drought-resistant wheat will enable Australians and people living in some African countries to improve their food security.
5 What is meant by the term 'data mapping' and how will it help Australian farmers improve their productivity?
6 Discuss the advantages to Australian farmers of using agricultural robots to improve food security. Include an example to support your answer.
7 Explain how the use of nanotechnology can improve food security. Give examples to support your answer.

Worksheet

8 Prepare a PMI (plus, minus, interesting) chart on the use of drones in agriculture.

DRONES IN AGRICULTURE		
Plus	Minus	Interesting

9 Explain why the use of smartphones is considered to be an essential tool for Australian farmers.
10 Explain how augmented reality is helping to improve aquaculture.

Improved equity in food access and distribution

Gaining access to affordable nutritious food is a problem for many Australians who are financially insecure, as it is for people living in poverty throughout the world. However, according to a report titled 'The State of Food Security and Nutrition in the World 2021' by the Food and Agriculture Organization (FAO) of the United Nations, the COVID-19 pandemic saw the number of people affected by hunger across the globe increase by approximately 1.5 per cent. They state that 'nearly one in three people in the world (2.37 billion) did not have access to adequate food in 2020 – that's an increase of almost 320 million people in just one year.'

FAO identifies 'access' as one of the key pillars of food security. This means that individuals should have both the physical and economic means to access the food they need for a nutritious diet. It also underpins the requirement that nutritious food should be equally available to all people at all times.

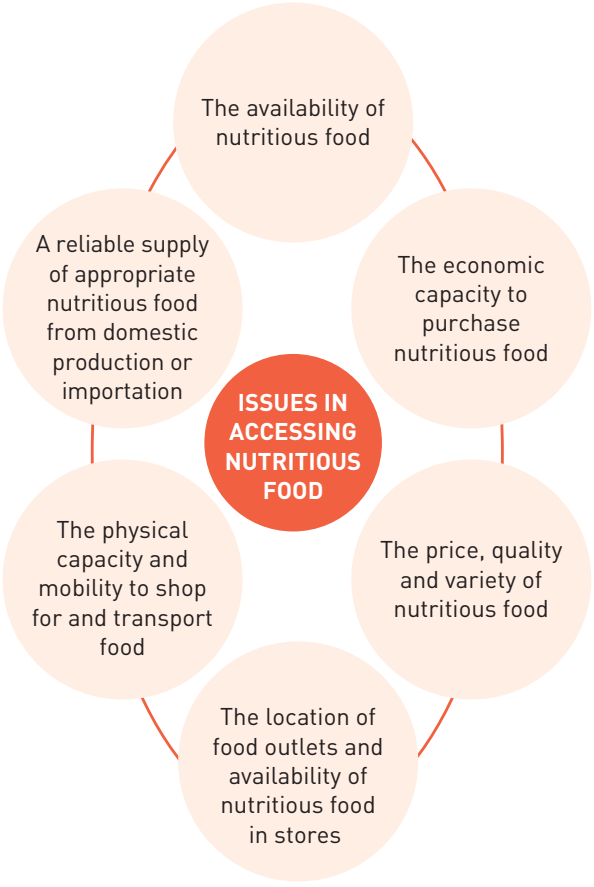


FIGURE 10.5 A number of issues affect an individual's ability to access nutritious food.

Improving food access and distribution for Australians

At least 4 per cent of the Australian population is at risk of food insecurity at any time. The main reasons so many people are unable to access sufficient nutritious food are a lack of a secure and adequate income, and a lack of food and nutrition literacy. However, an array of strategies are being developed and implemented to ensure Australian individuals and families have greater access to safe, secure, affordable and nutritious food.

ENHANCING FOOD SECURITY AND FOOD ACCESS THROUGH EDUCATION

Food security is not just about having access to enough food to satisfy hunger, but also having access to highly nutritious food that is the basis of a healthy diet.

People who have a limited income and are financially insecure have an increased risk of food insecurity. Research has shown that this group of people are also at greatest risk of being overweight or obese.

People who are financially insecure inevitably look for ways they can reduce their financial expenditure, and one simple way is to purchase less-expensive foods. Foods that are inexpensive are usually those that are energy dense but nutrient poor, and people who overconsume these foods risk becoming overweight or obese. Energy dense foods that contain a high proportion of fat and sugar are highly palatable and cheap to produce. Their low price and high energy value, along with their sensory appeal, make them very desirable, especially when alternative foods such as fresh fruit, vegetables, dairy products or meat and fish are expensive and out of financial reach.

One possible solution to this dilemma is through education. Improving the food literacy of the members of the household who choose the food that is purchased and consumed – the **food gatekeepers** of the household – is important to improving access to nutritious food.

The advantages of food literacy education

Providing food education will improve individuals' and families' access to nutritious food in many ways. It will:

- increase their knowledge about the types of food that make up a healthy diet based on the recommendations of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating
- enable them to understand the difference between healthy and unhealthy food choices and the impact this has on overall health and wellbeing
- provide them with knowledge about appropriate portion sizes so they can control the amount of food served and consumed at a meal, rather than relying on the manufacturer's suggested serving size
- enable food gatekeepers to understand the types of affordable, nutrient dense, healthy foods to look for when shopping
- provide them with a knowledge of how to read and understand food labels so they can compare food products when shopping and make healthier food choices
- increase the consumption of nutrient-dense fresh fruit and vegetables that are the basis of a healthy diet
- reduce the consumption of energy-dense fast foods that can lead to unhealthy weight gain
- learn basic food preparation and cooking techniques that will give them the confidence to plan and prepare their own delicious, low-cost nutrient-dense meals, rather than relying on energy-dense pre-prepared or takeaway foods
- educate them on the importance of purchasing and cooking foods that are in season. Seasonal foods are cheaper to purchase and will therefore have less impact on the family food budget, giving them greater access to more nutritious foods.
- enable parents and caregivers to teach their children about healthy food choices and to model healthy food behaviours so that children can develop lifelong healthy eating habits
- give them the knowledge they need to make decisions that affect their food sovereignty, enabling them to make their own choices about the food they eat, rather than being dependent on the food provided by large corporations.

Accessing food literacy education

There are many avenues for the delivery of food literacy programs in the community. These programs enable individuals and families to develop the knowledge and skills they need to improve their access to nutritious food and ensure food security.

Primary and secondary schools provide a variety of programs for young people to learn about nutrition and how to consume a healthy diet based on the Eat for Health program and the Australian Guide to Healthy Eating. School kitchen garden programs are another important source of food education, as they teach young students about the value of growing fresh fruit and vegetables for health and wellbeing. These programs help children develop an appreciation of new food flavours and textures and share these with other family members.

Adult learning programs in local neighbourhood centres – often targeted towards immigrants and refugees – provide community-based programs on, for example, how to shop for food in an unfamiliar environment such as a supermarket, or how to cook on a limited budget.

Another pathway to improve food literacy is to encourage social media 'influencers' to produce and stream videos showing how to prepare low-cost nutritious meals from scratch, rather than purchasing more expensive pre-prepared foods. A wide variety of apps also provide ideas for nutritious, easy to prepare, family meals. Many of these apps give a detailed shopping list and step-by-step video instructions to guide the cook in preparing the meal.

Websites such as Nutrition Australia, Catherine Saxelby's Foodwatch and the Victorian Government's Better Health Channel all provide important information about how to select nutritious food for a healthy lifestyle. The Australian Government's Health Star Rating program is a simple visual tool that will improve the food literacy of Australian consumers, enabling them to understand the fat, salt and sugar content of foods at a glance.



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Food literacy programs provide the knowledge and skills to improve access to nutritious food.

IMPROVING FOOD ACCESS THROUGH SCHOOL BREAKFAST CLUBS

Many low-income families across Australia find it difficult to provide sufficient food to feed their family each week. Single-parent households, families where the caregiver is unable to find employment, or those who are newly vulnerable, having lost employment as a result of the COVID-19 lockdowns, are at real risk of being food insecure as they have little access to nutritious food.

School breakfast clubs are one strategy developed by Foodbank Australia and Australian state governments to help school communities provide a breakfast program for vulnerable children. Research has shown that children who go to school hungry are less able to concentrate in class and to learn effectively. Having access to a nutritious breakfast enhances the student's overall health and wellbeing and sets them up for greater success in their learning. Breakfast clubs also provide students with the opportunity to learn about food and nutrition and the importance of eating a healthy breakfast.

Foodbank Victoria, in partnership with the Victorian Government, supports more than 1000 government primary, secondary, P–12 and specialist schools to deliver a school breakfast club program. Children who participate in the breakfast club have access to a wide range of food including apples, oranges, fruit cups, long-life milk and cereal. Some schools also provide toast and honey or vegemite for students.

Research has found that children who are at risk of missing out on breakfast are also likely to go without lunch. This is of major concern during school holidays, when children are away from school and do not have access to the breakfast club. In an effort to ensure vulnerable children have access to nutritious food throughout the year, Foodbank Victoria, with the support of the Victorian Government, provides lunch and 'take-home school holiday supply packs' for children at risk of food insecurity. Another initiative is to provide a five-week program of cooking classes to selected schools, so that students and their families can learn how to safely cook and prepare nutritious meals.



Foodbank Victoria

School breakfast clubs give students access to a nutritious breakfast.

IMPROVING FOOD ACCESS FOR ABORIGINAL COMMUNITIES IN THE NORTHERN TERRITORY

For residents living in remote communities in the Northern Territory, accessing fresh produce is often difficult, as the food needs to be freighted in from interstate. Transporting food long distances is very expensive and increases the price the local community must pay for the food. The freshness of the food is also affected, and it is often of lower quality than the food available in larger regional areas. However, an innovative program called Food Ladder has been developed to enable people living in rural and remote communities to grow their own fresh produce, increasing their access to fresh nutritious food and ensuring they have sovereignty over the food supply.

Katherine, a regional town 300 kilometres south-east of Darwin, was the first Australian site to be established by Food Ladder. This social enterprise organisation supports remote and regional communities to purchase hydroponic greenhouses so they can grow their own fruit and vegetables. Food Ladder worked in conjunction with the Katherine Indigenous Women's Association and Katherine Town Council to establish a substantial hydroponic greenhouse, a seedlings greenhouse and a community garden. The Food Ladder project provides local school students, TAFE students and members of the local community with education and training in horticultural practices and nutrition education. Having access to the greenhouse project and the expertise of horticultural teachers, educators and business advisers enables these communities to greatly improve their access to fresh nutritious food, and to establish food sovereignty over the food supply.

It can be very challenging to grow fresh produce in some remote communities, given the often extreme weather conditions they experience. The greenhouses developed by Food Ladder are designed to withstand all types of weather. Since its inception, Food Ladder has helped the local Katherine community establish produce markets where they can sell much of the fresh fruit, vegetables and indigenous bush foods they grow. Members of the local community can also purchase boxes of fresh produce, or they can simply pick and eat some of the fresh fruit growing on the foraging wall. The program also supports cooking and nutrition workshops to help local children and adults understand how to select and prepare nutritious meals.

Food Ladder has also established greenhouse sites in other Northern Territory communities, including Tennant Creek and the Alekarenge School in the Ali Curung Community. In Western Australia, a Food Ladder program has been established in Leonora, a remote town 830 kilometres north-east of Perth. Other Food Ladder programs have been established in conjunction with schools in Tasmania. Food Ladder reports that just one Food Ladder system is 'able to supplement the diets of up to 250 people with locally grown, fresh produce'.



Food Ladder

Food Ladder greenhouses enable people in remote communities to grow their own fresh produce.

Activity 10.4

Cost of food in remote areas under scrutiny

Read the article that follows, then answer these questions:

1. Evaluate the validity of the news article by assessing the source, purpose, context, presentation of evidence and language used. Alternatively, use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this news article. See pages 193–94 for additional information on completing a CRAAP test.
2. Outline the reasons for the establishment of the Federal Parliamentary inquiry into the cost of food and groceries in remote Indigenous communities.
3. Explain the impact of the projected population growth on the populations of the poorest countries.
4. Discuss the reasons why food security is a problem for many Aboriginal and Torres Strait Islander communities.
5. Outline the key findings and recommendations of the Federal Parliamentary inquiry into food pricing and food security in remote Indigenous communities.
6. Explain why, according to Julian Leeser, food security is a constant concern for remote Aboriginal and Torres Strait Islander communities.

COST OF FOOD IN REMOTE AREAS UNDER SCRUTINY

The rising costs of food and groceries in remote Indigenous communities should be probed by the consumer watchdog to bring down prices, a bipartisan parliamentary report has urged.

The inquiry was instigated by the Federal Parliament in May following reports of an iceberg lettuce priced at $7.89 and a jar of coffee selling for $55 in stores across Cape York and the Torres Strait Islands.

The Halls Creek IGA in WA struggled to source goods to supply a number of remote Aboriginal communities during the pandemic because of panic buying in the cities.

But the Indigenous Affairs Committee report did not find evidence of systemic price-gouging taking place in remote community stores.

Food security issues have long plagued remote Aboriginal and Torres Strait Island communities with the supply of quality and affordable food often unstable because of poor infrastructure and the high costs of living and operating stores remotely.

Most remote community stores also operate in a difficult trading environment and cannot purchase at volumes that allow them to negotiate for better wholesale prices while the supply chains for food, particularly perishable food, into remote areas are costly, are often severely affected by seasonal weather conditions.

It is the third time the issue in remote Australia has been examined in the past decade with the report noting none of the inquiries had resolved the concerns about food prices and food security that have been expressed.

The committee found complaints concerning food pricing needed to be examined by a body that is equipped to do the thorough, forensic examination that will satisfy the public.

It recommended several measures including for the Australian Competition and Consumer Commission to conduct a market study of prices at remote community stores.

The market study would aim to highlight ways competition could be increased and prices could come down, the report said. Improving the complaints process, laws to stop price gouging and the impact of rebates would also be considered by the proposed study.

In addition it wants real-time price monitoring, better governance training at the local level to help bolster public confidence, a national licensing scheme and inspection of remote community stores.

The committee also recommended the federal government support local food production in remote communities and other regulations to encourage the greater use of locally sourced food.

It called for the introduction of a remote community competitive grants program, with a focus on access and continuity of power, improving cold and dry storage in communities and supporting local food production schemes such as mobile abattoirs, fishing enterprises and community gardens.

Committee chair, Liberal MP Julian Leeser, said security issues for remote Aboriginal and Torres Strait Islander communities was not new.

'For many people living remotely, food security is a constant concern. The supply of quality and affordable food is often unstable due to poor infrastructure, seasonal changes and the high costs of living.'

'It became clear that these stories reflected a persisting disquiet regarding the supply of affordable, nutritious, quality food in many remote Aboriginal and Torres Strait Islander communities.'

'Consumer watchdog must monitor Indigenous food and grocery prices: report', Rob Harris, *Sydney Morning Herald*, 8 December 2020. The use of this work has been licensed by Copyright Agency except as permitted by the Copyright Act, you must not re-use this work without the permission of the copyright owner or Copyright Agency.

COMMUNITY GARDENS IMPROVING ACCESS TO FOOD

Community gardens are spaces within a neighbourhood where residents can grow fruit and vegetables for their family and other members of the local community to enjoy. They are usually developed on public land and can be found anywhere there is open space, such as a local park or garden, in school grounds, adjacent to the local sports field or in the grounds of a religious facility. Community gardens have been established in large cities and small country towns in every state in Australia. In Victoria alone there are more than 400 community gardens. Community gardens can take many forms.

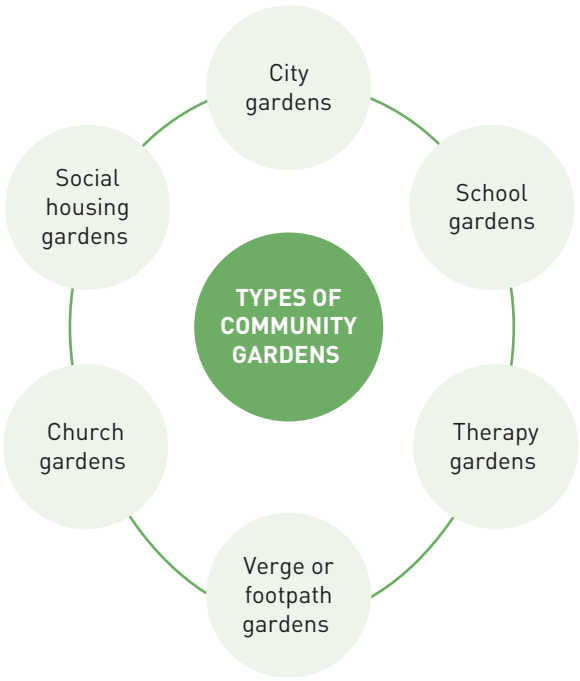


FIGURE 10.6 Community gardens give members of a neighbourhood access to nutritious fresh produce.

Many community gardens allow individual members to have their own garden plot where they can grow their favourite vegetables or foods, and those that are appropriate to their culture. Community gardens also give individuals greater access to fresh nutritious food at a low cost, improving their food security. They can share any additional produce with friends and neighbours or exchange the food they harvest with another gardener for other varieties of fruit and vegetables. Growing their own food also encourages members to eat seasonal food, and minimises food waste as members only pick, cook and eat what they need.

These community gardens not only improve the access members have to fresh produce but also provide food sovereignty, allowing members to have greater control over their food supply.

Community garden organisations such as Community Gardens Australia (CGA), Sustainable Gardening Australia (SGA) and Cultivating Community all offer a wide range of assistance to community members to establish and run their community garden. They provide, for example, access to websites that contain 'how to' information sheets, workshops (both physical and virtual) and masterclasses and forums on various topics.

The Victorian Government provides funding to Cultivating Community, an organisation established to develop community gardens on public housing estates. Cultivating Community states that these community gardens enable low income and migrant communities 'to access healthy, affordable, and culturally appropriate food'.

They also provide education programs for children through their school garden program and after-school cooking classes. These programs enable children to develop a greater understanding of how to grow food sustainably and the importance of eating well. Members of the Cultivating Community program also develop a greater understanding of how, through growing their own food, they can contribute to environmental sustainability by minimising food waste, composting vegetable and fruit waste and reducing the 'food miles' their fruit and vegetables travel.



Cultivating Community, www.cultivatingcommunity.org.au

Cultivating Community has developed community gardens on public housing estates so that residents can have greater access to nutritious fresh produce.

Activity 10.5

Hallowed ground revived feeds the masses

Read the article that follows, then answer these questions:

1. Evaluate the validity of the news article by assessing the source, purpose, context, presentation of evidence and language used. Alternatively, use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this news article. See pages 193–94 for additional information on completing a CRAAP test.
2. Describe what Oakhill Food Justice Farm intend to do with the land surrounding St Mary's Anglican church in Preston, Victoria.
3. Outline how the site was developed and the type of produce they grow there.
4. Explain how this site will become an educational and learning centre and the types of skills participants will develop.
5. Outline the benefits of community gardening or urban farming to:
   - the environment
   - individuals involved in community gardening.
6. Discuss the way in which this community garden will impact on food access, food sovereignty and food security.

THE GREEN SHOOTS OF CITY GARDENING: THE OLD MELBOURNE CHURCH YARD BECOMING A FERTILE FARM



Fairfax Syndication/Justin McManus

Charlie Brennan (left), Kelly Donati and Nick Rose at St Mary's Anglican in Preston, where they are turning the church yard into an urban farm.

Behind an old church in the heart of Preston in Melbourne's north, a remarkable transformation is taking place.

For years the vicarage at the back of St Mary's Anglican church lay empty, the house growing mould inside, the garden overgrown with weeds and overrun with vermin. Now a team of urban agriculture farmers are turning the site into a fertile food garden, growing vegetables for disadvantaged people in surrounding suburbs and the volunteers who will work there.

Called Oakhill Food Justice Farm, it is another project from Sustain, a Melbourne-based not-for-profit organisation specialising in designing and building sustainable and healthy food systems. It is headed by executive director Nick Rose and founding chair Kelly Donati, lecturer of food studies at William Angliss Institute.

'Around the world there are 800 million people growing food in cities, some involved in projects like this,' says Rose. 'Twenty per cent of food around the globe is grown in urban agriculture. It is something we were once very adept at, but a skill Australians are rapidly losing.'

Brennan and his team are building raised garden beds from wood and tin salvaged from the church yard. Swiss chard, cabbage, celery, mustard greens and rocket seedlings are ready to plant.

'We could have leafy greens ready to feed people in a matter of weeks,' says Dr Brennan. 'This will be an educational site where people can learn food growing skills and composting. The farm will also be mirrored [on a website] where people can learn about what we are doing here and observe the transformation remotely.'

Dr Donati grows her own food on an urban farm in Melbourne's inner west on a block of land owned by a developer. The developer has handed the property to the community in return for concessions on land tax.

'The benefits are astounding,' she says. 'I have seen the enrichment of the environment, and the return of insect diversity and lizards. With our compost, we have saved over a tonne of food waste from ending up in landfill. Plus, we get to eat really fresh, highly nutrient-dense food that is delicious.'

Dr Donati says urban agriculture is not just about food – 'it's much bigger than that'. A recent survey of 9000 Australians conducted by Sustain revealed that gardening, particularly backyard vegetable gardening, benefits people in many ways.

The survey also describes how Australians gain much pleasure from eating vegetables they grew or giving them to neighbours, saving and sharing seed, and learning food gardening tips from older generations.

'The green shoots of city gardening: the old Melbourne church yard becoming a fertile farm', Richard Cornish, *Good Food*, 27 September, 2021.
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Australia's role in improving food access and distribution across the globe

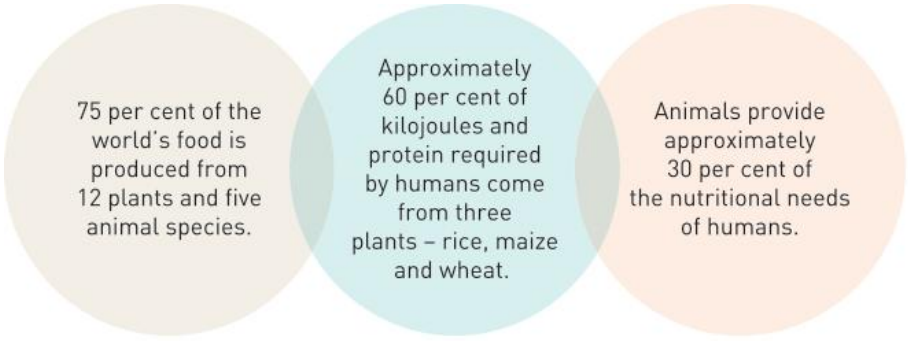
In May 2021 the CSIRO, along with international partners, launched its 'Innovative Food Systems Solutions portal: Healthy diets for all on a healthy planet'. The CSIRO envisages that this portal will enable a broad range of researchers, food producers, policy makers and other organisations to explore solutions to current global food systems. Their aim is 'to ensure sustainable and resilient food systems that provide affordable, safe and nutritious diets for the growing global population on a healthy planet'.

One pathway to ensure sustainable food systems and to increase food security for the most vulnerable populations is to encourage all people across the globe, including Australians, to reduce their consumption of meat and move to a more plant-based diet.

CROPS AS A SUSTAINABLE FOOD SOURCE

Many people both within Australia and across the globe consume a plant-based diet that provides for their nutritional needs, particularly if meat is not available or is very expensive. Other, often more affluent communities, consume a significant amount of meat on a regular basis. However, data from the United Nations' Food and Agriculture Organization shows that the number of plants and animals used as a food source globally has shrunk over recent decades. Today, the majority of the world's food needs are supplied by a very limited number of plant crops, and only 30 per cent are supplied by animals. As a consequence, the food security and access to food for many people across the globe is at risk.

Although animals provide only 30 per cent of our nutrient needs, animal husbandry takes up 77 per cent of the total land available for farming across the world. According to the Department of Agriculture, Water and the Environment (AWE), 'the area of grazing land operated by beef cattle/sheep businesses was estimated to be more than 336 million hectares; over 40 per cent of the total area of Australia'. Land is not only required to graze cattle; a significant amount of land is also required to grow the crops used to feed animals.



Weblink
Food and Agriculture Organisation of the United Nations

FIGURE 10.7 Sources of the world's food supply

Source: Adapted from United Nations Food and Agriculture Organization, 'What is Agrobiodiversity?'

Some experts propose that one way of increasing access to food would be by focusing world food production on agricultural crops, rather than on livestock production.

Some of the arguments in support of this suggestion are that crops:

- can produce a greater yield per hectare and could feed more people than livestock production can, therefore providing a larger volume of food and being able to feed a greater number of people
- can be produced in a shorter period of time than meat from animals can, improving reliability and access to food for many communities
- require fewer natural resources such as water and land than the production of animals for food, improving food productivity and environmental sustainability
- are cheaper to produce, harvest and transport in comparison with livestock, ensuring small-scale farming communities access to a reliable and cheap food source
- produce fewer greenhouse gas emissions during their production, and therefore have less impact on the environment than animal production.

THE AUSTRALIAN CENTRE FOR INTERNATIONAL AGRICULTURAL RESEARCH

For more than three decades, Australia, through the Australian Centre for International Agricultural Research (ACIAR), has worked to improve food security in many regions across the globe. ACIAR is a specialist research and development agency funded by the Australian government. It works in partnership with other international organisations to assist farmers in many developing countries to enhance their agricultural productivity in order to improve their food security. ACIAR states that it 'seeks to promote more productive and sustainable agricultural systems for the benefit of developing countries and Australia'.

The Australian Centre for International Agricultural Research connects Australian research scientists with their colleagues in developing countries and funds projects in four key regions – the Pacific, East and South-East Asia, South Asia and Eastern and Southern Africa.

The Australian continent covers arid, semi-arid, temperate and tropical conditions and our agricultural scientists and researchers are able to utilise the knowledge they have gained in Australian conditions and apply it to many international locations that face many of the same conditions.

ACIAR is involved in supporting partner countries to address food security through a range of research areas.

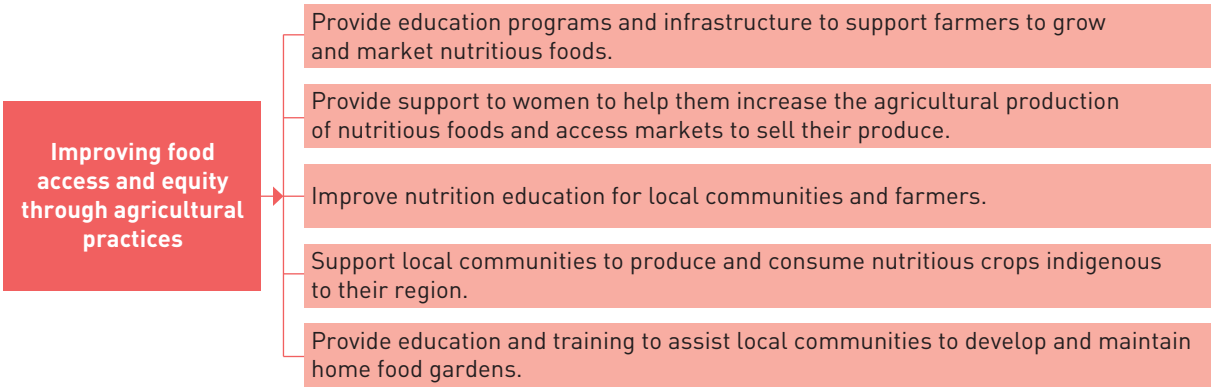


FIGURE 10.8 Strategies to improve food access for small-scale farming communities

Source: Adapted from Food Systems Dashboard – Diets and Nutrition, https://foodsystemsdashboard.org/42-food-policies-and-actions

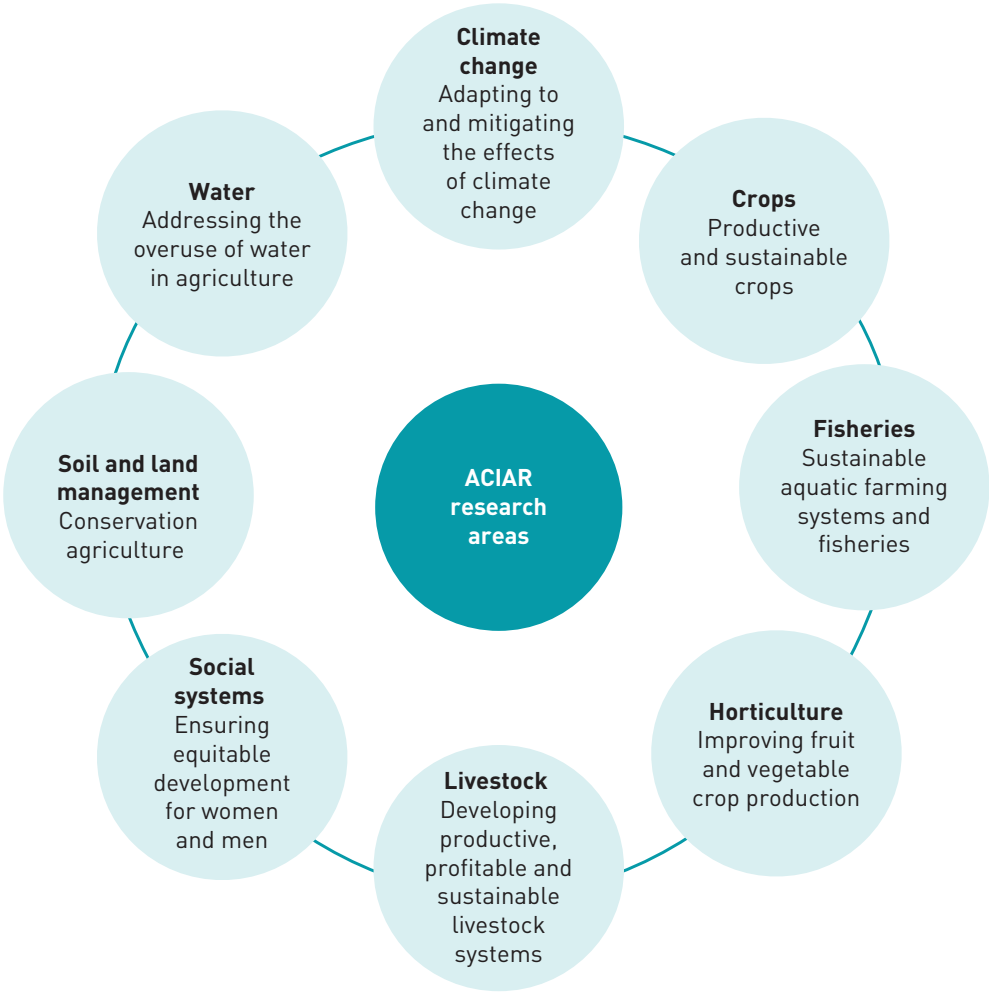


FIGURE 10.9 ACIAR is addressing food security across the globe through a range of research areas.

Enhancing food security by empowering women

Across the globe, women form the backbone of small-scale agriculture. According to the United Nations Food and Agriculture Organization, approximately 61 per cent of women in developing countries work in the agricultural sector. According to UN Women, an organisation within the United Nations, 'On average, women make up about 43 percent of the agricultural labour force in developing countries.'

For many women in developing countries, life in rural communities is very difficult. As a result of cultural and religious beliefs that are the basis of community life, girls do not have the same access to education as boys, which limits their opportunities in life.

As well as working on the farm, women in developing countries are expected to support their family by collecting water and gathering firewood, providing for the food needs of their family and undertaking all the domestic chores. Although women are key decision-makers in relation to the wellbeing of their family, many do not have the same rights as men. For example, in some developing economies women cannot own land or hire labour. Without the financial security that land ownership brings, women have less access to credit and the ability to access essential resources, such as purchasing seed, farm tools or the fertilisers and herbicides needed to make their farm productive. The FAO has stated that 'Evidence indicates that if these women had the same access to productive resources as men, they could increase yields on their farms by 20 to 30 percent, raising total agricultural output in these countries by 2.5 to 4 percent. This would reduce the number of hungry people in the world by around 12 to 17 percent.'

One of the most successful developments to help women in Papua New Guinea create a secure future and ensure food security for themselves and their families has been the development of a program with the support of the Australian Centre for International Agricultural Research (ACIAR) called Family Farm Teams (FFT).

Family Farm Teams

Food production in Papua New Guinea (PNG) is largely based on small-scale farming families. In the past, many of these farming families were subsistence farmers who only grew sufficient food to feed their family. Papua New Guinea's rural women are often responsible not only for being the main caregiver for their family, but also for providing much of the labour on their family farm.

The Australian Department of Foreign Affairs and Trade and the Australian Centre for International Agricultural Research jointly funded a new approach to farming within PNG called Family Farm Teams (FFT). The project was developed by the Australian University of Canberra Centre for Sustainable Communities, working with the PNG National Agriculture Research Institute and other organisations within PNG.

The program trains one senior male and one senior female to work together as a family unit to apply the knowledge they gain, such as planning, goal setting and decision making, to their family farm. The FFT program is becoming sought after across PNG as it is improving livelihood and food security for farming families and has also begun to address many of the inequities women have faced in the past. Another key advantage of the program is that it can provide support to farming families regardless of the type of crop they grow; for example, cocoa, sweet potato, bananas, sago, yams, cassava or sugar cane.

According to one participant involved in the Bougainville FFT program, Mrs Pisiai, 'this training can bring about change in families. Especially distribution of labour to ensure no single member of the family, especially women, are overly burdened. For the young people who are also part of the training, these are skills and knowledge that they can learn and hopefully use when they have their own families.'



Alamy Stock Photo/infocusphotos.com

The Family Farm Teams program improves the livelihoods of farming families and helps to address gender inequalities.

Improving mechanisation for small-scale farmers

In sub-Saharan Africa, at least one in four people is at risk of hunger. An even greater number of people living in Asia are at high risk of food insecurity.

One of the key problems facing farmers throughout Africa and Asia is that many are subsistence farmers who have only their own manual labour, and that of their family, to cultivate their crop. The development of new technology such as the two-wheeled tractor has transformed agriculture in many developing economies. These tractors are suited to conservation agriculture and are lightweight and simple to operate and maintain. However, purchasing a tractor that would allow them to increase their efficiency and productivity is often unaffordable for farmers in these regions, given their high cost and the inability of small-scale farmers to access finance.

The Australian Centre for International Agricultural Research (ACIAR), along with Charles Sturt University in NSW, and a wide range of international partners have been involved in a project titled 'Farm mechanisation and conservation agriculture for sustainable intensification (FACASI)'.

In the past, farmers in Sub-Saharan Africa have had little access to machinery that would reduce the drudgery involved in farming. Much of the weeding and threshing required on the farms is done by women who are also required to carry their produce to market in baskets strapped to their head.

The aim of the FACASI project is to enable small-scale farmers in Eastern and Southern Africa to gain greater access to two-wheel tractor-based technologies and to provide them with hands-on skills and knowledge to enable them to adopt the new technology. The new tractors will improve traditional farming practices such as planting and harvesting crops, as well as milling the grain and transporting it to market, improving food availability and food access and improving food security in the region.



iStock.com/mrinalnag

Two-wheeled tractors help to increase farm productivity.



Alamy Stock Photo/Muhammad Mostafigur Rahman

A small-scale farmer using a two-wheeled tractor to till his rice paddy.

Activity 10.6

Aiding food security in Tanzania and Zambia

The Australian International Food Security Centre (AIFSC) has funded a project called 'Strengthening food and nutrition security through family poultry and crop integration in Tanzania and Zambia'. The project was established in response to chronically high rates of undernutrition in sub-Saharan Africa, where between 42 and 45 per cent of children suffer from stunted growth.

Undertake a search of the AIFSC website to locate information about this project, then answer the questions that follow.

1. What is the importance of family poultry in many communities in Tanzania and Zambia?
2. How can improved poultry production assist the nutritional needs of these families?
3. Explain how women have been restricted in their ability to be involved in small-scale farming.
4. What strategies will the program use to meet its aim of reducing childhood malnutrition in the targeted areas?
5. Research another project on the AIFSC or ACIAR website relating to sustainable and productive farming systems. Describe the problem to be overcome and identify the strategies the project managers have used to find solutions to the problem.

IMPROVING FOOD DISTRIBUTION

A safe and reliable food distribution system is a key requirement for a secure food supply. All food producers need access to markets through which they can sell their crops or stock. If there are no markets nearby, or if transportation systems are inadequate, farmers will not be able to get their produce to market to sell, or to purchase basic food commodities. A lack of adequate transport facilities also dramatically compromises the distribution of food aid.

In many developing countries, the road system is the main way farmers get their produce to market. However, many roads are not sealed, and they are often in poor condition. Driving or riding on these dirt or gravel roads makes the journey to market difficult and dangerous for farmers. Road maintenance is expensive, so many rural roads are often poorly maintained. In sub-Saharan Africa, for example, only 34 per cent of roads are paved.

Strategies are being developed to improve the road infrastructure in sub-Saharan Africa so that farmers can get their produce to market and to enable more reliable inter-country trade.

The World Bank

Australia makes a significant financial contribution to the World Bank Group to support sustainable development across the globe and to reduce poverty and improve food security.

The World Bank Development Research group has identified two strategies to improve food distribution across the region:

- Improve and construct major highways that will act as corridors, connecting cities across Africa and enabling easier inter-country trade. The World Bank Development Research group plan will eventually connect 80 major cities across Africa and expand inter-country trade by $250 billion over 15 years, helping to lift many sub-Saharan countries out of poverty.
- Build roads in rural areas that lack basic infrastructure, such as between farms and markets, to allow farmers easier access to local markets, centres or trade and to local consumers. According to the World Food Program, more than 75 per cent of rural farmers have to travel more than two hours to get their produce to market. A lack of cheap, reliable transport is another problem many small landholders face. For many people, the only means of getting to the marketplace is to walk. Having access to a bike with an attached trailer that could be ridden to market on well-maintained local roads would enable the farmer to carry and sell more produce, increasing their income and food security.

Improving market access for Filipino farmers and fishers

The World Bank has worked with many governments throughout Asia, including in the Philippines, to improve food access and distribution in rural areas. The Philippine Rural Development Project, a part of the Department of Agriculture, has worked with local government authorities and farming organisations to increase the productivity of local farmers and fishing communities and to improve their access to markets.

In March 2021, the World Bank reported that the program has supported approximately 372 000 farmers and fishers, 46 per cent of whom are women, providing them with agricultural assets and advice. This has improved the food security and food sovereignty of many Filipino farmers and fishers.

Key outcomes of the program identified by the World Bank include:

- The income of many farming and fishing families has increased by 36 per cent.
- The market value of their produce has increased by 51 per cent.
- More than 1000 kilometres of roads linking farms and markets have been constructed or rehabilitated. This has reduced the time taken for farmers and fishers to travel to market by 33 per cent, and reduced transport costs by 22 per cent.



Alamy Stock Photo/Hemis

New road systems have improved market access for Filipino seaweed farmers.

Bridge building in Vietnam

In many countries, bridge construction is a vital component of road transport infrastructure. In developing countries, smaller communities can be cut off from markets because their only means of moving their produce across large waterways is by barge or ferry. In the Mekong Delta in Vietnam, the Australian Government worked alongside the government of Vietnam to build a new bridge across one of the branches of the Mekong River. The Cao Lanh Bridge, which opened in 2018, links the communities in the Mekong Delta to the rest of South-East Asia and further afield.

The new bridge is a vital part of a major new road transport link and has enormous benefits for the people who live in the Mekong Delta. The Mekong Delta is a vitally important agricultural and aquacultural area, and is often referred to as the 'rice bowl' of Vietnam. The new Cao Lanh Bridge means farmers and fishers in this region have greater access to markets, ensuring greater food security for people in the region. It also improves the access of local people to many social and health services, and will bring significant economic benefits to the region as a whole. The bridge is approximately 2 kilometres long and will allow more than 170 000 road users to cross the Mekong River each day.



Shutterstock.com/Huy Thoai

The Cao Lanh Bridge links communities in the Mekong Delta to the rest of South-East Asia.

Understanding the Text

Answers
Understanding the Text

11 Draw up a mind map to highlight the ways food literacy education helps improve food security.

12 Identify four avenues that are available to Australians to gain food literacy education. Why will a school breakfast club improve food access for some children?

13 Explain how the Food Ladder program established in the Northern Territory town of Katherine helps Aboriginal communities improve their access to fresh food.

14 Discuss the advantages of establishing a community garden to improve access to fresh food. Use examples to support your answer.

15 Explain why the limited number of plants and animals used as a source of food across the globe puts the food security of many people at risk.

16 Outline three key reasons why crops may be a better solution to food security than animal production.

17 Draw up a diagram to demonstrate the barriers to becoming food secure that are confronting women in many developing countries.

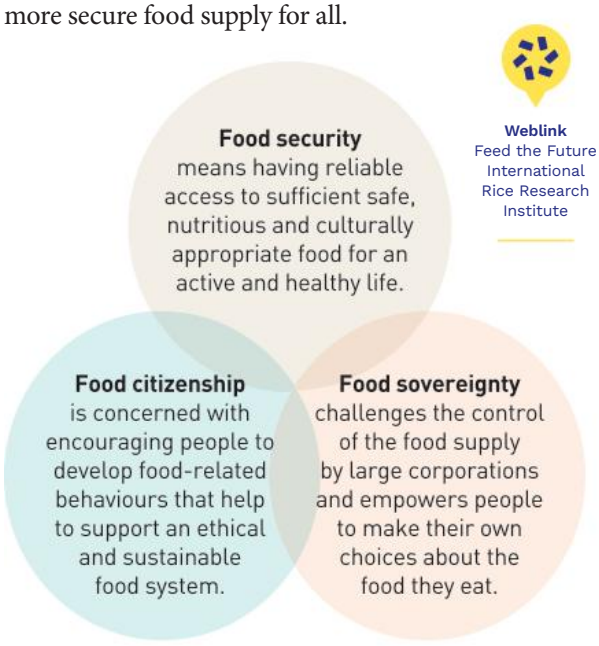
18 Describe the role of the Australian Centre for International Agricultural Research in the development of the Family Farm Teams program in PNG. Discuss the way this program has enabled PNG women to become more food secure.

19 Outline the role Australia has played in the establishment of a program to provide two-wheeled tractors to small-scale farmers. Explain how the tractors are helping these farmers to overcome barriers to food insecurity.

20 Write a paragraph to explain how improving road and bridge infrastructure will improve food distribution and food security. Use examples to support your answer.

Food security, food sovereignty and food citizenship

There is a strong relationship between food security, food sovereignty and food citizenship. The fundamental principle of food security is to guarantee that all people have access to sufficient, safe and nutritious food so that they can lead an active and healthy life. The aim of **food sovereignty** is to ensure that the food security of the population is achieved using systems that are democratic, fair and sustainable. Active **food citizenship** supports the development of food sovereignty and will lead to the establishment of a more secure food supply for all.



Weblink
Feed the Future International Rice Research Institute

FIGURE 10.10 Food security depends on demonstrating our food sovereignty and food citizenship

FOOD SOVEREIGNTY

The concept of food sovereignty was established in 1993 by an international farmers' organisation, La Via Campesina, to campaign for sustainable agriculture based on small-scale family farming. Since that time, the food sovereignty movement has spread across the globe.

Food sovereignty is concerned with addressing the imbalance of economic and political power that exists in the global food system. It is based on the development of a democratic and sustainable food system that includes both citizens and food producers. Food sovereignty also aims to ensure that indigenous populations have the right to re-establish their own food supply in traditional hunting and fishing grounds, and can access fresh food at affordable prices.



Alamy Stock Photo/Pacific Press Media Production Corp.

By supporting small and medium-scale farmers, La Via Campesina helps to promote food sovereignty.

The Australian Food Sovereignty Alliance (AFSA) is a national organisation led by the farming community that is working to develop a food system that is socially just and environmentally sound. The aim of the food sovereignty movement is to enable farmers and individuals to take control of their own food security. The AFSA states that 'Food sovereignty asserts the right of peoples to nourishing and culturally appropriate food produced and distributed in ecologically sound and ethical ways, and their right to collectively determine their own food and agriculture systems.'



Australian Food Sovereignty Alliance

The Australian Food Sovereignty Alliance aims to assist farmers and individuals to take control of their own food security.

Nick Rose, an advocate for food sovereignty in Australia, supports the AFSA definition, stating that fair food systems are those that 'are democratically and collaboratively developed, and that prioritise human health and well-being, and eco-system integrity. These are systems in which the economy is consciously designed to serve people and the environment, not the other way round.'

Food sovereignty challenges the control of the production, processing, distribution, marketing and retailing of our food supply by a few multinational organisations. Multinational organisations aim to increase their market share and to make a profit that can be passed on to their shareholders. Many processed



FIGURE 10.11 Principles of food sovereignty

foods produced by these companies, especially those that are energy dense and high in fat, salt and/or sugar, are cheap to make and widely promoted, ensuring a greater profit margin for the company. The proliferation of these highly processed foods impacts on food security, as many low-income earners feel they have limited access to affordable highly nutritious foods.

Instead, the aim of food sovereignty is to ensure that the farmers who grow and produce our food can make their own decisions about the ethical and sustainable food production practices they use. This approach will ensure that the commercialisation of our food system, one of the basic causes of hunger and poverty, is addressed by putting the control of food production and distribution into the hands of local producers, regenerative farmers and citizens. Asserting food sovereignty is critical to food security, as it can minimise the inequities in the food system and empower individuals to make healthy food choices.

Establishing food sovereignty

By establishing food sovereignty, farmers and community members will be able to develop local food systems that are based on the principles of justice and sustainability, and that give people access to a healthy food supply.

There are many examples across the community that highlight the ways both farming and local community members are expressing their food sovereignty and endeavouring to break the grip large corporations have over our food supply.

- Farmers' markets give farmers direct access to their customers, who are willing to pay a reasonable price for high-quality, fresh produce. Selling directly to their customers means that they are able to bypass the big retailers and get a fair price for their produce.
- Urban farms and community gardens are another demonstration of how a local community can establish their food sovereignty. These gardens ensure that local people have access to a wide variety of fresh fruit and vegetables that they have either grown themselves, or traded with other gardeners, enhancing their food security. These enterprises enable members to be largely self-sufficient, and minimise the need to purchase fresh produce from major supermarkets.
- The home delivery of fresh produce boxes by some organic food producers allows families to purchase high-quality fruit, vegetables, dairy products or meat and eggs directly from the producer. This means they have direct control over their food supply and know who grows the food and where it was grown or produced, again reducing their reliance on large corporations.

The Food Ladder program established in Katherine in the Northern Territory is an example of a local community practising both food sovereignty and food citizenship. By growing much of their own fresh vegetables and fruit, members of the local Indigenous community are becoming self-sufficient. This is a demonstration of their food sovereignty, as they are no longer dependent on large supermarket corporations to supply them with fresh produce. The excess food they grow is sold to the local community, providing them with healthy, nutritious food and improving their food security. Having access to highly nutritious fresh vegetables and fruit will give them the knowledge

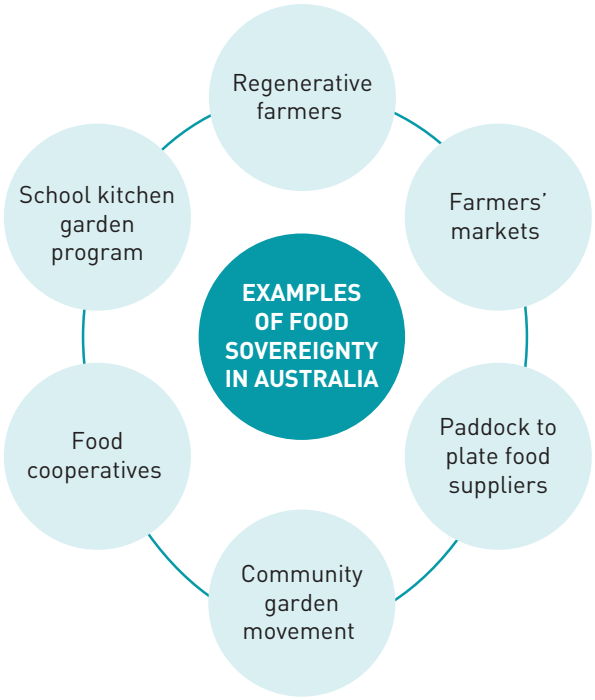


FIGURE 10.12 Examples of food sovereignty in Australia

and skills they need to eat well throughout life. Growing food using sustainable agricultural methods is also a step towards improving the health of the planet.

FOOD CITIZENSHIP

Food citizenship is a developing movement that involves individuals participating in, and making informed choices about issues such as sustainability, ethics or health in any stage of the food system. Food citizenship encourages people not to think of themselves as 'food consumers' but rather, as 'food citizens'. Becoming a food citizen involves active participation in the food system, rather than simply being a consumer. By thinking of themselves as 'citizens', individuals move from being a self-interested consumer of goods to an interested member of the public who can act together with others to change the food system to one that is fair, ethical and sustainable. A movement from people being food consumers to becoming food citizens will ensure there is an increase in the consumption of sustainable and ethically produced food products.

Making a choice about the foods we eat is something we as individuals do every day. The concept of food citizenship means that, while we have some basic rights as consumers, we must also accept some responsibilities. For example, we have the right to a safe food supply and to adequate nutrition from the food we eat. We also have the right to know that food labelling is accurate, so we can trust that the ingredients stated as being in a particular food are correct.

But along with rights come responsibilities. We must ensure that the food we purchase and consume is environmentally sustainable and will maintain the health of the planet. Practising food citizenship may involve, for example, refusing to purchase products made from palm oil because its production requires the clearing of native forests to make way for palm tree plantations, thereby destroying the natural environment. Increasingly, consumers are practising food citizenship by demanding that food packaging is recyclable and that food waste is minimised. Making ethical food choices and supporting the human rights of farmers, for example, through the Fairtrade movement, are ways in which consumers can demonstrate their food citizenship.

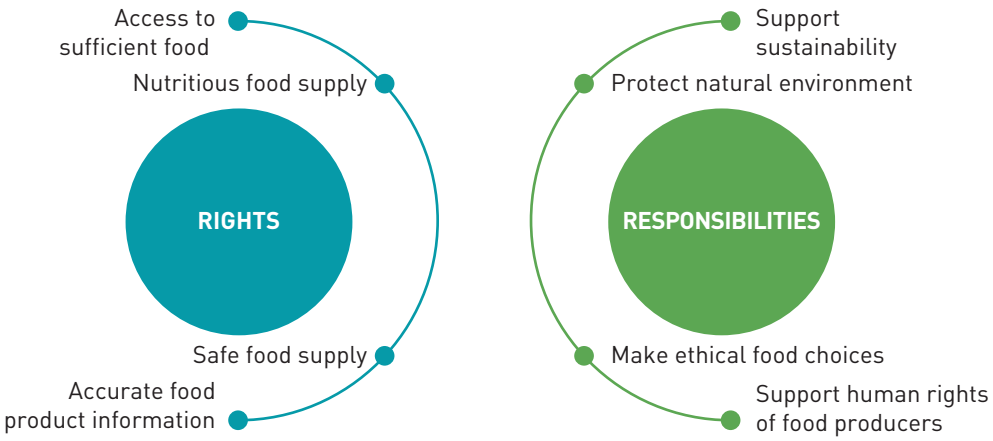


FIGURE 10.13 Rights and responsibilities associated with food citizenship

How to be a good food citizen

Expressing food citizenship – that is, making food choices based on the desire to ensure food is produced ethically and sustainably – can also be a demonstration of food sovereignty. By demonstrating their food citizenship, individuals not only take responsibility for their personal health by consuming a healthy diet, they also act to improve the food supply and therefore health outcomes for others. Being an active food citizen will also ensure the health of the planet. Purchasing food that is produced using environmentally sustainable and ethical methods will ensure that a secure food supply is available for future generations.

Choose sustainably produced food

Food that is organically grown is more environmentally sustainable than food grown using many traditional farming methods, as only organic fertilisers and natural methods are used to reduce insect infestation and control weeds, rather than artificial fertilisers and pesticides. This results in improved soil biodiversity, enabling greater water movement through the soil and increasing nutrient availability, resulting in healthier crop and plant growth. In addition, because chemical run-off into streams does not occur, the waterways are healthier, supporting a greater variety of plant and animal life. Biodiversity on the farm is also enhanced as native vegetation is retained or windbreaks planted, providing homes for wildlife and protection for livestock.

Reduce food waste

As a responsible food citizen, it is important to reduce food waste to protect the natural environment and the health of the planet. Food waste that is sent to landfill generates methane, a greenhouse gas that is linked to global warming. Minimising food waste is also an ethical issue, as all the resources used in the production of the food are wasted, including the nutrients in the soil, the water used to grow the food, and the energy and fertilisers used. A food citizenship approach to minimising food waste is to plan carefully before shopping, buy only the food that is required, store food correctly and use leftovers for another meal.

Support farmers

Another ethical concern for food citizens is that four key supermarket chains – Coles, Woolworths, IGA and Aldi – dominate the supermarket sector in Australia. This concentration has given the supermarket giants considerable buying power and the ability to set the prices they pay to farmers and food manufacturers for their products. Many Australian farmers feel that the supermarket giants force them to accept a price that is barely above the cost of production. As food citizens we should be concerned about the ongoing viability of all Australian farmers, and advocate for them to receive a fair price for their produce. If farmers do not receive a fair price, farming becomes unsustainable. Farmers will be unable to invest in the development of their property by maintaining and improving farm infrastructure, investing in staff training, and making improvements to animal welfare and environmental sustainability.

Purchase Fairtrade products

Purchasing Fairtrade products is an ethical decision that supports the human rights of food producers in many developing countries. This guarantees farmers and workers, particularly those in developing countries, a fair wage for their work. Fairtrade uses organic food production systems, thereby supporting the sustainability of the local environment.



Shutterstock.com/iQoncept

Food citizens can make ethical and environmental decisions to improve the health of people and the planet.

Reduce packaging

Another strategy to demonstrate food citizenship is to purchase products with minimal packaging whenever possible. Taking a basket to the market or farmers' market and avoiding single-use plastic bags is a positive approach. Purchasing meat, poultry

and fish from a local butcher, fishmonger or poultry shop will avoid all of the packaging that comes with these products in the supermarket. Collecting and returning all soft plastic that accumulates from packaged goods to the REDcycle collection bins in major supermarkets will minimise packaging waste and improve environmental sustainability.

Choose ethically produced food

Seeking out and purchasing meat, poultry and eggs that are produced ethically is another way to assert food citizenship. When choosing free-range eggs, check the stocking density of hens per hectare on the carton – the lower the density, the more likely it is that the hens have been treated humanely and have spent time outdoors. Many large-scale industrialised egg producers have stocking densities of 10 000 hens per hectare, with no requirement for the birds to go outdoors. In contrast, many smaller egg producers keep their hens in far more humane conditions, with a stocking density of less than 1500 hens per hectare. If possible, select free-range poultry and pork to ensure these animals are raised in an ethical, humane and sustainable manner. Choosing sustainable seafood will also protect wild fish stocks from overfishing.



Shutterstock.com/haireena

Choosing free-range eggs is an ethical decision many food citizens make.

Avoid palm oil

Consumers are advised to read the labels of food products to avoid those that contain palm oil. Palm oil is widely used in processed food products, as it is an inexpensive form of fat. However, it can be harmful to health, as it is high in saturated fat and has been associated with increased cholesterol and heart disease. The production of palm oil is also environmentally destructive, as native forests in Indonesia and Malaysia are bulldozed to plant the oil palms, causing habitat loss for many endangered species. Although some food manufacturers are reducing the amount of palm oil in their food products, it is important for food citizens to use their market power by refusing to purchase these products.

Eat a plant-based diet

Eating a plant-based diet and cutting back on meat consumption is another way to express food citizenship. Research has shown that meat production has a major impact on the environment, and accounts for a significant amount of greenhouse gas emissions worldwide. A plant-based diet, at least for a part of each week, has also been shown to have significant health benefits.

Choose to 'eat locally'

Choosing to purchase food that has been grown locally is another demonstration of food citizenship. Purchasing foods such as fresh fruit, vegetables, eggs and honey at farmers' markets supports local producers and allows the shopper to connect face-to-face with the farmer who produces their food. Food purchased locally provides many benefits for individual health, as well as for the environment. The food is generally organically grown, and is therefore chemical free. The produce is also freshly picked, and only fruit and vegetables that are in season are available. This ensures that the produce is at its peak flavour and quality. Choosing food that is produced locally minimises the distance or 'food miles' the produce has had to travel, benefiting the environment. This also avoids the greenhouse gas emissions that would have been produced if the food was transported from interstate or overseas.

Advocate for the reformulation of processed food

A key factor in optimising the health of both people and the planet is for food citizens to advocate and take action to achieve change. One of the barriers to ensuring that people have access to an optimal diet for good health is the proliferation of processed food that is high in fat, salt and sugar. As discussed in chapter 9, the food manufacturing industry has used its significant political power to avoid or delay reformulating sugar-sweetened drinks to reduce their sugar content, and to make these products healthier for consumers. Research has shown that reducing the sugar content of sugar-sweetened beverages would improve food security, aid in reducing levels of obesity in the community, and lead to a reduction in cardiovascular disease, stroke, diabetes and some cancers.

The 'Partnership Reformulation Program', established by the federal government in conjunction with leading food manufacturers, commenced in 2020. This program has established voluntary targets for food manufacturers to gradually reduce the amount of sodium, saturated fat and sugar in specific categories of processed foods, including drinks, bread, breakfast cereal, cheese, flavoured milk, savoury snacks and processed meat. The Federal Department of Health argues that 'this will help Australians make healthier choices, while still enjoying the convenience these foods provide.'

However, of significant concern is that the program is voluntary rather than mandatory, and that while there will be some reduction in the salt and sugar content of some products, many will still contain significant proportions of these ingredients. It is therefore important that food citizens lobby the federal government to ensure that the reformulation of products is made mandatory. In addition, food citizens should refuse to purchase these products in an effort to persuade companies to reformulate them.

Advocate for improved food labelling

Food citizens must also advocate for improved food labelling so that shoppers can easily compare the nutrient content of similar products. At present the Health Star Rating system, which provides front-of-pack information on some packaged food products, is a voluntary program. As a consequence, the decision to include this rating is at the discretion of food manufacturers. As it is difficult for some shoppers to read and interpret nutrition and content labels on food, food citizens must advocate for improved food labelling to ensure equal access to accurate food information in order to make healthy food choices.

Understanding the Text

21 Discuss the relationship between food security, food sovereignty and food citizenship.

22 Draw up a mind map of the aims of the food sovereignty movement, both internationally and in Victoria.

23 Explain why a major concern for many people is the control of the food supply by a few multinational organisations.

24 Identify three key principles associated with food sovereignty and explain how they will improve food security.

25 How do farmers' markets enhance the food sovereignty of small-scale farmers?

26 How does the establishment of the Food Ladder program in Katherine improve the food sovereignty and health and wellbeing of the local community?

27 Explain what is meant by the term 'food citizenship'.

28 Discuss why some consumers choose to express their food citizenship by purchasing sustainably and ethically produced food, and explain how this will help improve the health of the planet.

29 Describe two ethical decisions some food consumers might make when purchasing food and explain why these are examples of food citizenship.

30 Explain how advocating for the reformulation of processed foods is an example of food citizenship that will improve the health of the nation.

Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

Worksheet

Applying knowledge

Describe three forms of technology that will enhance food security.

TECHNOLOGY 1	TECHNOLOGY 2	TECHNOLOGY 3

Analysing information

Prepare a SWOT analysis of the use of mobile technologies in agricultural production.

SWOT ANALYSIS OF THE USE OF MOBILE TECHNOLOGIES IN AGRICULTURAL PRODUCTION	
Strengths	Weaknesses
Opportunities	Threats

Evaluating concepts

Write a brief proposal (100–200 words) to submit to the Federal Department of Agriculture, Fisheries and Forestry asking them to subsidise the purchase of agricultural robots by Australian farmers. Your proposal should justify the importance of using agricultural robots to improve food security and food sovereignty.

EXAMINATION-STYLE QUESTIONS

Answers
Examination-style questions

Resources
Preparing for exams support

Question 1 (12 marks)

One of the key challenges facing the world is how to ensure that everyone has access to sufficient safe and nutritious food to lead a healthy life.

a Explain the meaning of the term 'food security'. [2 marks]

b Discuss how the use of nanotechnology and the use of drones in agricultural production, both in Australia and globally, will contribute to food security. [6 marks]

c Justify why the establishment of community gardens by local government authorities will improve food access and food security for many Australian families. [4 marks]

Question 2 (8 marks)

'Food security is not just about having access to enough food to eat to satisfy hunger, but also having access to highly nutritious food that is the basis of a healthy diet.'

Prepare an argument to demonstrate how improving food literacy will enhance food security and food access for many Australian families.

Question 3 (6 marks)

In October 2021, La Via Campesina, an international farmers' organisation campaigning for food sovereignty, declared, 'Our historic task is to ensure that no human being goes hungry.'

Discuss this statement, exploring how food sovereignty can help both Australian families and people across the globe to establish food security.

Dhal

Dhal is a classic Indian dish made from red lentils and spices. Red lentils are a very good source of dietary fibre and a good source of protein, iron and some of the B group vitamins. Red lentils are simmered, and cook more quickly than green lentils. Serving dhal with basmati rice creates a complete vegetarian meal that can be served for breakfast, lunch or dinner.

80 grams red lentils
20 grams fresh ginger, finely grated
1 brown onion, sliced thinly
1 long green chilli, sliced thinly
1 clove garlic, crushed
¼ teaspoon turmeric
½ teaspoon Sri Lankan curry powder
½ cinnamon stick
3 fresh curry leaves
⅔ cup coconut milk
½ cup water
1 tablespoon vegetable oil
½ teaspoon brown mustard seeds
salt
1 tablespoon coconut cream
½ lime, juiced

TO SERVE

sprig fresh coriander
steamed basmati rice
warm roti

METHOD

1 Rinse and drain the red lentils.
2 Keep the grated ginger, sliced onion, green chilli and garlic separate.
3 Set aside ⅔ of the sliced onion, green chilli and crushed garlic.
4 In a medium saucepan, combine the washed lentils, grated ginger, turmeric, curry powder, cinnamon stick, curry leaves, coconut milk, water, and one-third of the sliced onion, chilli and crushed garlic.
5 Bring to a boil, then reduce to simmer. Cover the saucepan and cook for approximately 20 minutes, until the lentils are breaking down. Stir occasionally.
6 Meanwhile, select a small saucepan and add the vegetable oil, and heat for 30 seconds. Over medium heat, add the mustard seeds and the remaining sliced onion, chilli and crushed garlic. Add a large pinch of salt.
7 Sauté until the onions are tender and golden brown. Remove from heat and stir into the lentils when they are ready.
8 Add the coconut cream and the lime juice. Season with salt if required.
9 Serve with fresh coriander, steamed basmati rice and warm roti.

SERVES 1–2

EVALUATION

1 Describe the sensory properties – appearance, aroma, flavour and texture – of the dhal.
2 Classify the ingredients of dhal, steamed basmati rice and roti on a diagram of the Australian Guide to Healthy Eating.
3 After classifying the ingredients, use the data from question 2 to decide how well the meal meets the recommendations of this food selection model.
4 Explain why dhal is one of the food products served as part of most meals in India and other countries in the Indian subcontinent.
5 Explain why increasing the production of plant-based crops such as lentils could contribute to improving global food security.



Mark Fergus Photography

Free-form pumpkin tart with olive oil pastry

Pastry made with olive oil has health benefits over pastry made with butter, because it doesn't contain saturated fats. This pastry has a crisp, crunchy texture and is best eaten when freshly baked and still slightly warm. The baked pumpkin provides an excellent source of vitamin A as well as some vitamin C. The eggs and feta cheese are both excellent sources of protein, and the feta cheese has the additional benefit of providing calcium and vitamin B_{12}. The baked pumpkin and feta cheese filling make this free-form tart an excellent choice for a vegetarian lunch.

OLIVE OIL PASTRY

250 grams flour

¼ teaspoon salt

30 millilitres extra virgin olive oil

125 millilitres cold water

PUMPKIN FILLING

750 grams pumpkin, peeled and diced into 2-centimetre cubes

salt and pepper

1 tablespoon olive oil

15 grams butter

1 leek, thinly sliced

100 grams feta

60 grams grated parmesan cheese

pinch of nutmeg

2 eggs, lightly beaten

¼ cup walnuts, roughly chopped

2 tablespoons beaten egg, for glaze

METHOD

Making the olive oil pastry

1. Pulse the flour and salt in a food processor to combine.
2. With the motor running, pour in the olive oil followed by the cold water and whizz until a ball forms.
3. Turn onto a lightly floured bench and knead just until a smooth ball has formed.
4. Cover with cling wrap and refrigerate for 30 minutes.

Making the pumpkin filling

1. Preheat the oven to 190 °C.
2. Place the cubes of pumpkin, salt and pepper and olive oil in a plastic bag and shake to mix.
3. Place in single layer on an oven tray and cook until the pumpkin is just tender – there should only be a little browning on the edges of the pumpkin. Leave the pumpkin to cool.
4. Melt the butter in a small frying pan and sauté the leek until tender.
5. Place half of the cooked pumpkin in a bowl and lightly mash with a fork. Add the leek, feta and parmesan cheese, nutmeg and beaten eggs. Gently stir in the remaining cooked pumpkin, taking care not to break up the pieces.
6. Roll the pastry into a 34-centimetre circle and place on a lined baking tray.
7. Spoon the pumpkin filling into the centre of the pastry and spread to approximately 14 centimetres in diameter so there will be sufficient pastry to fold up and over the filling. Sprinkle on the chopped walnuts.
8. Pull the edges of the pastry up to form a lid by pleating the pastry, leaving a 4-centimetre hole in the middle.
9. Brush with the egg glaze and bake for 30 minutes.
10. Serve with a bitter leaf salad.

EVALUATION

1 Describe the sensory properties of the two elements of the free-form pumpkin tart with olive oil pastry – the pastry and the filling.
2 Explain why the olive oil pastry would be considered a healthier option than traditional pastry made with butter.
3 Justify why, according to the nutritional rationale of the Australian Dietary Guidelines, pastry products such as this tart should only be eaten sometimes and in small amounts.
4 Evaluate the nutritional properties of the free-form pumpkin tart with olive oil pastry and bitter leaf salad by classifying the ingredients on a diagram of the Australian Guide to Healthy Eating. Comment on how well this meal meets the guidelines of this food selection model.
5 Discuss why farmers who grow vegetable crops such as pumpkins would find using nanotechnology during production beneficial.



Mark Fergus Photography

Moussaka

Moussaka is the Greek variation of lasagne. Traditionally, it is a rich dish, but in this recipe the eggplant is grilled instead of fried, and the sauce for the topping is lighter compared to the traditional cheese sauce. Lean lamb is a good source of protein and iron, and eggplant is high in dietary fibre, vitamins and minerals, and contains essential phytonutrients, which are found in the purple skin. Serving the moussaka with a bitter leaf salad provides a wide range of vitamins and minerals, and provides contrast to the sensory properties of the moussaka.

EGGPLANT AND LAMB SAUCE

1 medium to large eggplant

salt

1 tablespoon olive oil

½ brown onion, diced

2 cloves garlic, finely diced

1 teaspoon chilli flakes

½ teaspoon dried oregano

½ teaspoon ground cinnamon

½ teaspoon paprika

300 grams minced lamb

⅓ cup tomato passata

½ cup chicken stock

olive oil spray

50 grams feta cheese

TOPPING

1 egg

4 tablespoons double cream

freshly ground nutmeg

50 grams finely grated parmesan cheese

METHOD

Making the eggplant and lamb sauce

1. Slice the eggplant into round, half-centimetre-thick slices. Sprinkle the slices with a little salt, then cover with a tray and set some weight on top. Leave for 20 minutes, then rinse off the salt and pat the slices of eggplant dry.
2. Preheat grill to medium high.
3. Heat the oil in a medium frying pan over medium heat. Sauté the onion for 3–4 minutes, until soft and starting to brown.
4. Add the garlic, chilli flakes, dried oregano, cinnamon and paprika. Cook for about 1 minute.
5. Add the minced lamb and stir over the heat, breaking up the meat, until browned.
6. Stir through the tomato passata and chicken stock. Bring to a boil, then reduce the heat and simmer for 15 minutes, until the mixture is thick. Stir occasionally.
7. Line a baking tray with baking paper. Place the slices of eggplant in single layer and spray with olive oil spray. Grill for 5 minutes, until beginning to brown. Turn the slices and grill for another 5 minutes, or until the eggplant is tender.
8. Preheat the oven to 200 °C.
9. Grease an ovenproof dish of approximately 22 × 20 × 5 centimetres. Line the base with half the eggplant slices, cover with half of the lamb sauce, crumble over the feta cheese, then spoon over the remaining lamb sauce. Finish with the remaining eggplant slices.

Making the topping

1. Lightly beat the egg and cream together and stir in the nutmeg. Pour over the layered eggplant and lamb, then sprinkle with the grated parmesan cheese.
2. Bake for 20 minutes, until golden brown. Allow to rest for 5 minutes before serving.
3. Serve with a bitter leaf salad.

SERVES 2

Alternative ingredients

For a vegetarian alternative, substitute the minced lamb in the recipe with plant-based mince.

EVALUATION

1 Describe the sensory properties – appearance, aroma, flavour and texture – of the moussaka. Consider all elements of the recipe in your answer.
2 Classify the ingredients of the moussaka on a diagram of the Australian Guide to Healthy Eating.
3 Use the data in question 2 to discuss how well the moussaka meets the recommendations of this food selection model.
4 Based on the nutritional rationale of the Australian Dietary Guidelines, justify the importance of including dairy products such as feta and parmesan cheese in the diet.
5 Vegetables such as eggplants are a popular crop in community gardens. Explain how vegetables from community gardens assist in establishing food sovereignty.



Mark Fergus Photography

Chocolate, pear and raisin cake

Chocolate is a favourite ingredient for many of us. The combination of the smooth, silky texture of chocolate, along with the sweetness of the pears and raisins, makes a moist, delicious cake. Select a ripe, but firm Packham pear for this recipe, and chocolate that has a minimum of 50 per cent cocoa butter. Like other cakes, this recipe for chocolate, pear and raisin cake is made with significant amounts of butter and sugar as well as chocolate, which means that it is high in saturated fat and sugar.

½ cup (80 grams) raisins

1 cup boiling water

100 grams dark chocolate (50 per cent cocoa solids)

1 pear

100 grams of butter

½ cup raw caster sugar

2 eggs

⅔ cup (100 grams) self-raising flour, sifted

2 tablespoons milk

METHOD

Preparing the raisins

1. Cut the raisins into halves or thirds using a pair of kitchen scissors.
2. Place them in a small bowl and cover with boiling water. Allow to soak for 5 minutes until soft and plump. Drain well and set aside.

Making the cake

1. Preheat the oven to 180 °C.
2. Line and grease a 20-centimetre ring tin with melted butter and dust with flour.
3. Break the chocolate into pieces and chop finely.
4. Peel and core the pear and cut into 1-centimetre dice.
5. Cream the butter and raw caster sugar until the mixture is light and fluffy.
6. Add eggs one at a time, beating well after each addition.
7. Stir in the sifted self-raising flour and milk, then fold through the chocolate, diced pear and raisins.
8. Spoon the mixture into the prepared ring tin.
9. Bake in the preheated oven for approximately 25–30 minutes or until well risen and firm to the touch.
10. Cool in the tin for 10 minutes. Turn out onto a wire rack and cool to room temperature.
11. Dust with icing sugar to serve.

EVALUATION

1 Describe the sensory properties of the chocolate, pear and raisin cake – appearance, aroma, flavour and texture.
2 Classify the ingredients used in the chocolate, pear and raisin cake on a diagram of the Australian Guide to Healthy Eating.
3 Use the data in question 2 to evaluate the nutritional value of the product according to the guidelines for this food selection model.
4 Explain how a cake such as this could be included as part of a healthy meal for children and families.
5 Discuss why the provenance of the chocolate is an ethical consideration in the production of this ingredient.



Mark Fergus Photography

HOW CONSUMERS' FOOD CHOICES ARE SHAPED BY ETHICS

Sociocultural concerns



Family



Peers



Culture and religious beliefs



Income



Education



Access to health information

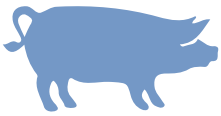
Ethical concerns

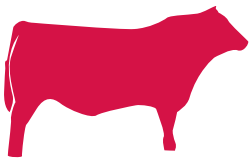
Animal welfare

- Free range egg and poultry, meat and pork production, feedlot cattle production













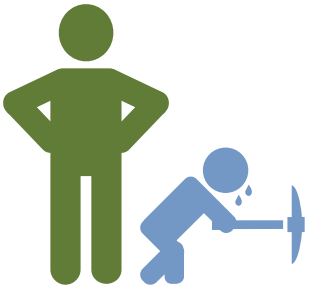


Environmental stewardship

Issues that may impact on the food decisions made by many Australians:

- Palm oil production (impact on habitat of orangutans and Sumatran tigers)
- Reducing meat consumption (impact on animal welfare and sustainable farming practices)





Social justice

Issues that may impact on the food decisions made by many Australians:

- Exploitative labour practices
- Forced labour or child labour
- Poor working conditions, including underpayment of wages

11

FOOD ETHICS

KEY TERMS

cattle feedlot a managed facility for the purpose of producing beef of a consistent quality and quantity

environmental stewardship involves taking responsibility to protect the natural environment through conservation efforts and by implementing sustainable practices in growing and producing the food we consume

ethics a set of principles that are motivated by ideas of right and wrong, or good and bad

free-range poultry birds that are not closely confined and have some access to the outdoors

free-range pork production producing pigs that are born and raised with free access to the outdoors

intensive egg production stocking chickens in much more dense and crowded populations than is the case with other types of animal husbandry

organic food production growing and producing food without the use of synthetic chemicals such as pesticides and artificial fertilisers

sociocultural factors include concern for family traditions, culture, peers, religious beliefs

Resources
Study Design
links
Infographics
Flashcards

Fairtrade

Fairtrade standards include the minimum requirements for the social, economic and environmental wellbeing of local communities. Certified producers must agree to meet these standards and to provide ongoing improvement of conditions for farmers and workers.



Sociocultural and ethical concerns for Australian consumers

Many Australians are becoming more discerning consumers, and are starting to question where and how their food is produced. This move towards food citizenship has encouraged many people to choose the foods they purchase based on their ethical concerns about the way the food is produced, as well as important sociocultural factors.

Sociocultural concerns	Ethical concerns
• Family • Peers • Culture and religious beliefs • Income • Education • Access to health information	• Animal welfare – free-range egg and poultry, meat and pork production, feedlot cattle production • Environmental stewardship – palm oil production, reducing meat consumption • Social justice – FairTrade

FIGURE 11.1 Sociocultural and ethical issues in food choice

Sociocultural factors

Sociocultural factors that may influence people's food choices include concern for family, peers, culture and religious beliefs, income, education and access to health information.

FAMILY

One of the most widely recognised factors that can impact on an individual's food choice is family. The adults in a child's life, such as their parents, grandparents and carers, are the people who make the key decisions about the food they consume. During the early preschool years, family members are key to the development of children's food habits and food preferences, and children are more likely to adopt the same food behaviours as their parents.

The family's cultural background will also influence individual family members' food choices. For example, a family with an African heritage will be more likely to select and serve ingredients and foods that they are familiar with such as sweet potatoes, corn, rice, millet and yams. Similarly, rice, miso, noodles, pickled vegetables and fish are favourite foods among many families of Japanese heritage. Those families from an Indian or Sri Lankan background may prefer ingredients linked to their traditional culture, such as lentils, chickpeas, rice, cardamon, curry leaves, chilli and turmeric. These family foods are likely to remain favourites throughout the child's life, and may influence their future food choices.

PEERS

Like family, peers also play an important role in determining a young person's food choices. When a child starts preschool or primary school they are likely to be influenced by the food preferences of their friends. Sharing snacks and lunch foods with their playmates may mean children are introduced to a new vegetable or fruit, for example, capsicum, celery or kiwi fruit. This may become a new favourite food and influence the child's future food choices.

During adolescence, peers take on an even more influential role in a young person's food choices. While they may normally eat healthy meals at home with their family, their food choices may be very different when they are with their peers. Travelling home from school or getting together with friends at the weekend often involves eating less nutritious foods than those they would normally eat with their family.

As the young person reaches adulthood, peers continue to influence the food they consume. However, their food choices are often more strongly determined by the foods they grew up with.

CULTURE

The traditions, customs, beliefs and values, including religious beliefs, that are passed down through our family are the basis of our culture. Along with the influence of family and peers, cultural factors have a strong influence over the food choices individuals make.

If an individual is brought up in a family that does not eat particular foods for religious or cultural reasons, these factors are likely to influence their food choice throughout their life. For example, individuals who are brought up in a Jewish household may only consume Kosher foods throughout their life. Similarly, a Muslim family may only purchase

beef or lamb that has been slaughtered under halal conditions. Many people who follow Hindu traditions may choose to only follow a vegetarian diet, and to avoid purchasing any food that has caused harm to animals. For other families, food selection may be based on ethical values of health and environmental sustainability. For these people, choosing food that has been grown organically or by local farmers is important.

INCOME

It is well recognised that the sociocultural factor of income has a major influence on an individual's food choices. Individuals who have a secure income are more likely to have access to a broad range of high-quality foods. They are also more able to purchase expensive, premium cuts of meat or fruits and vegetables. However, the choices of individuals who have a limited food budget may be more restricted. For these people, the cost of some fresh fruit and vegetables may be prohibitive. Their food choices may be limited to own-brand products or products from less expensive retail outlets.

EDUCATION

Education provides consumers with the ability to gain knowledge and information, and is key to enabling individuals to make informed food choices. Education programs such as the Eat for Health program provide important information about selecting food wisely. This program incorporates the Australian Dietary Guidelines and the Australian Guide to Healthy Eating. Individuals who have access to this information can use these programs and resources to understand the relationship between food choice and good health, and so are more likely to make healthy food choices. However, individuals who lack information about making healthy food choices may have limited knowledge when selecting and preparing foods for good health.

Other resources, including the LiveLighter campaign, Stephanie Alexander's Kitchen Garden Scheme and school canteen programs, aim to educate children and families about the benefits of healthy eating. This education is often carried through life, and can influence consumers' individual food choices.

ACCESS TO HEALTH INFORMATION

Access to health information is another important sociocultural factor that will influence the food choices individuals make. Many consumers will examine the labelling on food products to determine whether the food will meet their health needs. Some consumers will carefully examine the nutrition label to decide whether the food is low in kilojoules or sodium or high in fibre, for example, before they purchase a product.

Other consumers may find the Health Star Rating on the front of the package helpful. Many breakfast cereals, for example, include a Health Star Rating on the front of the packet that enables consumers to compare the nutrition profile of different products. Some consumers may use the Health Star Rating to select a breakfast cereal that is low in sugar.



Mark Fergus Photography

Many consumers use the Health Star Rating to compare breakfast cereals.

Government and non-government organisations such as Nutrition Australia, Dietitians Association of Australia, National Heart Foundation of Australia, Diabetes Australia, Cancer Council Australia and the Obesity Policy Coalition all provide a range of resources to help consumers select foods to address particular health concerns.

Ethical principles of concern to Australian consumers

By contrast, **ethics** is a term used to describe a set of moral principles that are motivated by ideas of right and wrong, or good and bad. For many people, **environmental stewardship** – that is, taking responsibility to protect the natural environment through conservation efforts and by implementing sustainable practices – is a key ethical principle of concern. Other ethical decisions many people consider before making food purchasing choices are the humane treatment of animals, and social justice issues. Consequently, an increasing number of shoppers are demonstrating their food citizenship by asking where the fruits they are about to purchase were grown, or whether the chicken was produced in a factory farm or in a free-range environment. Other consumers want to ensure that the farmer who produced their food is making a fair wage.

Consumer concern about animal welfare

The way meat is produced is a significant ethical concern for many Australian food consumers. Intensive farming practices in the production of meat, poultry and eggs have become increasingly common over the past century as the population increased and consumers began to demand cheaper food. This demand put pressure on farmers to produce these basic commodities at a cheaper price. This meant that farmers needed to increase the stocking density of their chicken sheds, and to reduce costs by moving to more mechanised production methods. However, in recent years many consumers are questioning these practices and demonstrating their food citizenship by demanding that animals be treated in an ethical and humane way.

PRODUCTION OF CHICKEN MEAT AND EGGS

Chicken meat is popular with most Australians as a quick and easy meal option. In 2021, according to the Australian Bureau of Agricultural and Resource Economics and Sciences, Australians consumed approximately 46.9 kilograms of chicken meat per person annually. This means that most Australians eat chicken as a main meal at least three to four times each week. Currently, approximately 80 per cent of chicken meat sold in Australia is produced using indoor intensive production methods, where birds are floor-reared in large sheds. Of the remaining 20 per cent of the market, most is produced using free-range systems, with some organic chicken meat produced. The production of free-range turkey products is also increasing.

Eggs are a popular food with Australian consumers, and Australian egg farmers produce 16.9 million eggs for the national market every day. Layer hens used for the production of eggs are housed in cages, barns or free-range systems. Layer hens are different to meat chickens in that they have been bred to produce large numbers of eggs, rather than muscle for chicken meat.

According to Australian Eggs, an Australian egg farmers' industry organisation, free-range eggs are now the largest sector of eggs sold in major supermarkets, making up approximately 47 per cent of all eggs sold. Cage eggs make up 40 per cent, while barn-laid eggs account for 10 per cent. Organic and biodynamic eggs make up the remaining 3 per cent of egg sales.

Intensive indoor egg production

Intensive egg production involves stocking chickens in much more dense and crowded populations than is the case with other types of animal husbandry. With intensive indoor egg production, hens are housed in rows of wire cages stacked several tiers high in large sheds. In recent years, many egg producers have upgraded their sheds and have improved the living conditions of the poultry. This has been achieved by installing technology such as automated feeding and watering systems, and conveyer belts to collect and remove the eggs and manure. The temperature in these sheds is kept at 23 °C to maximise the egg production and growth rate of the poultry. However, in intensive indoor systems the hens do not have access to nesting boxes or perches. This means they are unable to forage or dust bathe, and their ability to interact socially with other birds is reduced.



Collaborative Activity



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Cage-egg production

Intensive indoor chicken meat production

When birds are grown for chicken meat, they are not kept in cages but are housed in large, highly mechanised barns. The floor of the barn is covered in 'litter', which is made up of absorbent material such as wood shavings or rice hulls. These barns are highly intensive systems where the amount and type of feed the chickens consume is monitored to ensure the chicken meat is produced in a specific time period and to a standardised quality. Chickens grown for meat production are genetically selected to ensure they grow rapidly and will be of a suitable weight for slaughter within 42 days. This very rapid growth rate and weight gain puts great stress on the birds, and can lead to significant health issues. Birds can suffer from heart failure or malformation and weakness in their legs, causing them to become lame. This deformity in turn may restrict their ability to access water and food. As the birds grow rapidly, conditions in the sheds often become cramped and they may die from heat stress.

Barn-laid eggs

The laying hens that produce barn-laid eggs live their lives entirely inside a barn or shed. They are able to roam and to spread their wings inside the barn, but they do not have access to the outdoors. In barn-laid or cage-free systems, hens are provided with nesting boxes. Egg producers who run higher welfare systems provide hens with perches on which they can roost, and litter they can scratch or dust bathe in, or use for foraging.

Free-range poultry and egg production

In 2018, federal government legislation defining free-range egg production was mandated. According to the legislation, 'Eggs labelled as "free range" are required to have been laid by hens with meaningful and regular access to the outdoors and with an outdoor stocking density of 10 000 hens per hectare or fewer.' Egg producers are required to display the outdoor stocking density of laying hens on their packaging.

One of the key features of **free-range poultry** and egg production is that chickens are not closely confined, and are allowed to range outdoors in large runs during daylight hours. They retreat to the safety of sheds in the late afternoon, where they are protected from predators and the elements overnight.

Some small-scale free-range poultry producers now use mobile sheds so they can move their chickens onto a fresh paddock, maintaining the grass cover and minimising the build-up of bacteria and the likelihood of spreading disease.

The hens also have access to a wide range of grain and green foodstuffs such as corn, wheat, peas and lupin. Any additional food products must not contain antibiotics or synthetic colour additives that might increase the colour of the egg yolk. Instead, some farmers are experimenting with other pasture crops such as purslane in order to naturally increase the omega-3 content of the eggs. Purslane or pigweed is a native of inland Australia, and is naturally high in omega-3.

Stocking densities of poultry production using a free-range system are lower, to ensure the birds are kept in a healthy environment. They have room to flap their wings, socialise with other hens and enjoy dust baths.



Alamy Stock Photo/Farlap

Free-range poultry production



Free Range Egg & Poultry Australia Ltd

The Free Range Egg and Poultry Australia Ltd logo allows consumers to easily identify eggs and poultry that are free-range.

Organic poultry and egg production

Poultry that is classified as organic must comply with stringent certification requirements. **Organic food production** involves growing and producing food without the use of synthetic chemicals such as pesticides and artificial fertilisers. From birth, the chickens must be given feed that is 95 per cent organic, and all birds must be able to range freely and have access to green pasture to forage. The feed must also be free of any antibiotics, vitamins and minerals. As a result, outdoor areas where the hens forage must be free of any chemicals. This means organic egg farmers minimise invasive weeds and pests using natural techniques such as companion planting and rotational grazing systems, instead of chemicals. Stocking levels on farms that are certified for organic poultry production are very low in comparison with conventional systems.

Activity 11.1

Battery hens to be outlawed by 2036 under new national proposal

Read the article that follows, then answer these questions.

1. Evaluate the validity of the news article by assessing the source, purpose, context, presentation of evidence and language used. Alternately use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this news article. See pages 193–94 for additional information on completing a CRAAP test.
2. Outline the main features of the proposed new laws.
3. Explain the differences in opinion about the legislation held by the animal welfare lobby and poultry farmers.
4. Why are some small food manufacturers resistant to using free-range eggs in their products?
5. Outline the reasons that this legislation has taken a significant amount of time to be introduced into parliament.
6. Based on the information in the article, do you support the introduction of the new legislation? Justify your decision.

BATTERY HENS TO BE OUTLAWED BY 2036 UNDER NEW NATIONAL PROPOSAL

Eggs from caged hens would be phased out by 2036 under a major plan to end the practice of keeping poultry in battery cages across the country.

The federal government has been forced to table proposed new standards for poultry welfare in parliament.

The draft standards were written by an independent panel, which has recommended traditional battery cages be phased out between 2032 and 2036.

But the plan has already been criticised by animal welfare groups for being too slow to end the use of cages, while the industry wanted a longer phase-out lasting until 2046.

Internationally, Australia has been an outlier on chicken welfare, with 30 of the 36 nations of the OECD either having phased out battery cages or in the process of getting rid of them.

RSPCA senior policy officer Jed Goodfellow said they'd been outlawed in Europe since 2012, and New Zealand would finish their use next year.

'Australia really is lagging behind at the moment so it is pleasing to see we're seeing some progress finally,' he said.

'It is impossible to meet the welfare needs of hens inside these cage systems.'

The RSPCA would like to see the phase-out of existing cages, which would have been installed in about 2008, happen faster.

'We would like to see the transition timeline shortened considerably. Ten to 15 years is far too long,' Mr Goodfellow said.

'We can produce safe, affordable, nutritious eggs without confining animals to small, barren cages.'

While caged hen eggs have lost popularity on supermarket shelves, their decline from the commercial cooking sector has been slower.

Just over half the eggs sold at the grocery shops are free-range, but the commercial sector uses a higher proportion of eggs from caged hens.

A long list of Australian manufacturers including Arnotts, McDonald's and Messina already use free-range eggs in their products.

But smaller producers such as bakeries and restaurants may have to put up their prices if they are forced to switch to free-range eggs, which are generally more expensive.

While the recommendations are expected to be met with resistance from some farmers, others say they are well overdue.

A Victorian Government review of scientific literature found caged hens had five times more bone fractures than hens in other systems.

Setting the new standards has been a protracted process that began more than four years ago.

It was then that the NSW Government had been asked to lead the process for national reforms via its Department of Primary Industries.

The ABC published documents at the time suggesting the department colluded with the chicken industry to stifle attempts at a phase-out – something the government and industry denied.

New South Wales is the largest producer of caged hen eggs in the country, and about one-third of Australia's chicken farms are in the state.

Following the report, the project was taken out of the NSW Government's hands and handed over to an independent panel.

The federal government's most recent draft attributes the establishment of the national panel to an 'unprecedented number of public submissions made during public consultation' and a decision by all the state agriculture ministers.

The new recommendations do allow for the use of so-called 'furnished cages', which are a larger version of battery cages with things like scratch pads, perches, and nest areas for the hens.

However, industry experts suggest it is unlikely many farmers would spend money replacing battery cages with slightly larger ones and would be more likely to move to barn-laid systems altogether.

Once approved, it will be up to the state agriculture departments to turn the new standards into state-based regulations.

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Ethical and sociocultural purchasing decisions

Free-range and organic poultry products are more expensive to produce than poultry meat and eggs produced using indoor intensive methods. This means that consumers may have to choose between their concern for animal welfare and price. Some people may demonstrate their food citizenship by purchasing ethically produced free-range eggs or poultry despite the higher price. However, while other consumers may still have ethical concerns about the conditions in which eggs and poultry are raised, they may have a limited budget to spend on food, and so the sociocultural concern of income may be the deciding factor in their choice.

Activity 11.2

Consumer views on purchasing free-range eggs

1 Work in small teams to develop a questionnaire about consumers' views on purchasing free-range eggs. Use the following points as the basis of your questionnaire:
   - the frequency of purchasing free-range eggs
   - the reasons for purchasing/not purchasing free-range eggs
   - the consumer's understanding of the free-range production system
   - the consumer's sense of confidence that the eggs they are purchasing have been produced based on what they expect to be free-range conditions.

2 Interview six people from your neighbourhood who are the main purchasers of food for their family.

3 Draw up a table to summarise your findings.

4 Analyse your findings.
   - a How frequently do consumers purchase free-range eggs?
   - b What are the main reasons for consumers to purchase free-range eggs? What are the main barriers to purchasing free-range eggs on a regular basis?
   - c Have the types of eggs consumers purchase changed over the past decade?
   - d How well do consumers understand the systems used in free-range egg production?
   - e Do most consumers feel confident that, when purchasing free-range products, they are getting what they paid for? Why/why not?

5 Write a conclusion about the considerations consumers take into account when purchasing eggs today.

Ethical poultry and egg products

A wide range of ethically produced poultry and egg products are now available to consumers. All food retailers sell a wide range of free-range and organic eggs. Both Coles and Woolworths have demonstrated their concern for animal welfare by only stocking eggs sold under their home-brand label that are produced under cage-free systems.



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A wide range of eggs are available to consumers.

Lilydale Free Range Chicken is one of the most well-recognised brands of free-range poultry produced in Australia. The first Lilydale free-range farm was established in Lilydale in Victoria's Yarra Valley. Lilydale poultry is farmed not only in Victoria, but throughout South Australia and New South Wales. Lilydale produces a wide range of products, including whole chickens, chicken portions, thigh and breast fillets, drumsticks, chicken drumsticks, mini roasts, chicken mince and cuts suitable for stir-fries. The Lilydale company also produces a range of pre-prepared free-range products that are ideal for busy families, including crumbed schnitzels and drumsticks, and chicken fillets flavoured with barbecue or Asian seasonings or indigenous ingredients.

Inglewood Farms is another ethical poultry producer, producing a range of certified organic poultry products for consumers. The company has an extensive range of whole birds and poultry cuts, which are available in many supermarkets and butchers. Inglewood Farms also provide a variety of



Alamy Stock Photo/Alisha Arif

Lilydale free-range chicken drumsticks

value-added products for consumers who are time poor, such as marinated chicken kebabs, crumbed schnitzels and chicken bone broth.

Other poultry, such as free-range turkey, duck and quail, are also available for consumers to purchase.



Ingelwood Organic Poultry Farms

Inglewood organic chicken breast schnitzels

Understanding the Text

1 Explain how Australian consumers can apply their rights as food citizens to demonstrate their ethical concerns.

2 Discuss the meaning of the term 'sociocultural factors'.

3 Describe the role of the family in influencing an individual's food choices.

4 Explain how the sociocultural factors of peers and income can influence food choice.

5 How do education and access to health information impact on an individual's food choice and health and wellbeing?

6 Describe the main concerns many consumers have regarding intensive egg and poultry production systems.

7 Draw up a mind map to demonstrate the key features of free-range poultry production.

8 What is organic poultry production and how does this system differ from a free-range system?

9 Discuss the reasons some consumers will purchase eggs and poultry based on their ethical concerns, while others may not.

10 Draw up a mind map to demonstrate the types of ethically produced poultry and egg products available to consumers.

Answers
Understanding the Text

PRODUCTION OF PORK

Animal behaviour experts agree that pigs are highly social, intelligent animals that live in complex social communities. In some research studies, pigs have even outperformed dogs and chimpanzees! However, conventional methods of pig production do not recognise or acknowledge these behaviours, and do not take the welfare of the animals into consideration. Various organisations, including the RSPCA, have run campaigns through traditional media outlets and social media highlighting the issues of intensive indoor pig farming. These campaigns have been highly successful in raising public awareness, and have had a significant influence on the types of pork products available to Australian consumers. Another concern for many Australian consumers is whether they can be sure that the pork products they purchase were produced from Australian pigs. According to industry experts, 75 per cent of the bacon sold in Australia is made from imported pork product.

There are three main systems used in the farming of pigs for meat production: indoor or conventional farming, animals that are bred outdoors but raised indoors on straw, and free-range. The standards for each type of pork production are defined under the Australian Pork Industry Quality Assurance Program (APIQ), and overseen by Australian Pork Limited (APL).

Conventional indoor pork production

In Australia, 90 per cent of all pig meat is produced using conventional indoor farming methods. These systems present the greatest animal welfare concerns.

In conventional intensive systems, the pigs are raised in indoor sheds that do not allow them to express their natural behaviours, such as wallowing in mud baths, foraging for food or socialising.

The sheds are highly automated and designed to house a large number of animals in close confinement. Typically, these sheds have slatted concrete floors that can be easily cleaned, and the animals are fed via automated feeding and water supply systems. These surroundings are very barren, and lack any stimulation for the animals.

However, of most concern to many consumers is the treatment of the breeding sows. In the past it was common for sows to be kept in small metal pens called 'sow stalls' that were just 2 metres long and 60 centimetres wide. However, these types of pens are slowly being phased out, and currently about 80 per cent of pregnant sows are kept in a 'gestation'



iStock.com/chayakorn lotongkum

An intensive pig farming shed

shed for most of their 16-week pregnancy. These sheds are very crowded and provide the sows with only just enough space to turn around and extend their limbs. Just before the sow is due to give birth, she is moved into a metal-barred 'farrowing crate'. These crates are so narrow that the animals cannot turn around. They do not provide bedding or nesting material, and therefore do not allow the pig to engage in their natural birthing behaviours. The sow is confined to the farrowing crate until the piglets are weaned at about 3–5 weeks of age. The purpose of using farrowing crates, according to members of the pig industry, is to ensure that the mother does not crush the piglets. However, these methods of confining pigs cause the animals to become stressed and can lead to injury and displays of abnormal behaviour.

Soon after the piglets are born, many intensive farming systems routinely cut off their tails to prevent them from being bitten by other piglets. Teeth clipping is also common, so that the piglets can't damage their mother's teats while they are feeding, or injure each other as they jostle for a feeding position. These strategies are designed to prevent injury and infection in the pigs while they are housed in a confined space.



Australian Pork Limited

Pork certified as free-range



iStock.com/Tawintaew

Sows are confined to a farrowing crate before the piglets are born and for 3–5 weeks while the sow is feeding her litter.

Certified free-range pork production

Free-range pork production is used to produce approximately 5 per cent of all pigs raised in Australia. These pigs are born in a free-range environment and raised with free access to the outdoors. They can enjoy fresh air, sunshine and pastures, have access to communal shelters, and dig wallows for mud bathing. One of the key criterion of free-range pig production is that the pigs must be able to forage on pasture crops such as alfalfa, sorghum, peas, lupins and soybeans. When the pregnant sows are ready to give birth, they are moved to 'farrowing' paddocks with specifically designed huts where they can build nests for their young in a calm and spacious environment.

All the pigs must have access to outdoor paddocks for their entire lives. This includes the piglets that have been newly weaned from their mothers at 3–4 weeks of age, the adolescent pigs that have not yet reached the size required before they are sent to market, and the sows. They have the opportunity to seek shelter in the huts in hot or inclement weather, and to move freely around the paddocks to graze and



iStock.com/whitemay

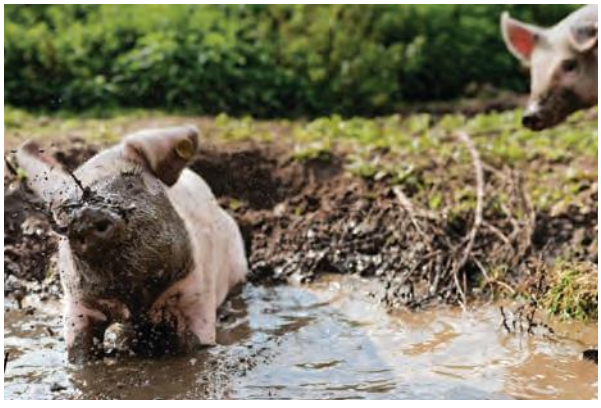
Certified free-range pork comes from pigs that can range freely outdoors.

forage in pasture where they are able to raise happy, healthy pigs in small family groups.

Free-range pork is more expensive for farmers to produce than indoor intensive farming methods. This is because farmers require more land to allow their animals to range freely, meaning farmers have a larger area to manage and oversee the welfare of the animals.

Outdoor bred: raised indoors on straw

Another alternative to purchasing pork produced using intensive farming practices is to purchase pork that is bred outdoors, but raised indoors on straw. Breeding pigs (the parents) live in a free-range environment and are allowed to roam in the paddock; they have open huts for shelter and can enjoy wallowing in mud baths. When the sow is ready to give birth, she is moved to an open straw-based shelter. These shelters protect the animals from predators, but allow them access to the outdoors. The piglets are weaned from their mother at four weeks of age and are then moved to a separate indoor shelter with bedding such as straw or rice hulls, where they are raised before they are sent to market. This production method does not use farrowing stalls, and the pigs are never housed on concrete floors. Their diet is based on natural grains that are free from growth hormones and antibiotics.



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Pigs wallowing in mud

What ethically produced pork products are available to consumers?

A large number of producers now supply free-range pork products. Under their 'Coles finest' label, Coles provides consumers with an extensive range of fresh free-range pork products, including boneless pork leg roasts, pork loin chops, pork belly and pork belly strips, minced pork and free-range pork sausages. This range also includes 'value added' products such as pork loin roast with sage and ginger. Woolworths also offers a variety of free-range products such as pork medallions and minced free-range pork, under its 'Macro' brand.

Activity 11.3

The advantages and challenges of free-range pork or egg production

Worksheet

Prepare a PMI (plus, minus, interesting) chart for free-range pork or egg production.

FREE-RANGE PORK OR EGG PRODUCTION		
Plus	Minus	Interesting

ETHICAL ISSUES IN THE PRODUCTION OF BEEF

Beef continues to be a popular food with many Australians. According to the Meat and Livestock Australia 'State of the Industry Report – 2020', in 2018–19 Australians ate approximately 25 kilograms of beef per person.

Beef produced for the Australian market is based on both pasture-fed and feedlot beef. However, there is concern among some consumers that feedlot systems raise issues of animal welfare.

Feedlot cattle

Meat and Livestock Australia Limited states that a **cattle feedlot** 'is a managed facility where livestock are provided [with] a balanced and nutritious diet for the purpose of producing beef of a consistent quality and quantity'.

Beef cattle spend between 85–90 per cent of their life grazing on pasture. The feedlot is the final stage of production, where beef cattle spend between 50 and 120 days being fattened up for market before they are trucked to the abattoir for slaughter. During their time in the feedlot, the cattle are fed a special diet of grains including barley, wheat and sorghum.

Feedlots are widely used in Australia to overcome challenges in ensuring there is sufficient pasture for animals to graze on, given Australia's dry climate, especially during years of drought. The use of feedlots also enables producers to provide consumers, both in Australia and overseas, with beef that is of a consistently high quality in flavour and texture.



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Feedlot cattle being fed

The ethical issues surrounding feedlot cattle are very complex. Some consumers are concerned about the issue of overcrowding and the lack of shade for animals. There is also debate about the environmental impacts of feedlot cattle production in relation to animal waste management and water, air and noise pollution.

The feedlot industry claims that they have been able to address all of these environmental concerns, for example by composting cattle manure to be used as a soil conditioner and using the run-off from the cattle yards for crop irrigation.

Approximately 80 per cent of beef now sold in major Australian supermarkets comes from feedlot cattle.

Pasture-fed cattle

Rather than using a feedlot system, many cattle producers rely solely on a system of pasture for feeding their cattle. Under the Pasturefed Cattle Assurance System (PCAS), producers must meet a number of strict requirements in the production of their beef.

PCAS producers must ensure that their cattle are fed only on pasture for their entire lives. The cattle can be fed cereal grain crops, but only before the crops come into seed or once they have been harvested. Another important requirement of pasture-fed beef is that the cattle are able to graze in open pasture, and are not confined at any stage for intensive feeding. Farmers using this system must also guarantee that their animals are not treated with growth hormones or antibiotics. One of the most important features of the PCAS is that the cattle can be identified individually, and that they are traceable through all stages of their lifetime, from the time they are weaned until their eventual slaughter.

Cattle Council of Australia Pasturefed Cattle Assurance System

CERTIFIED PASTUREFED

Certified Pasturefed beef



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Pasture-fed cattle

The difference in flavour and texture

The type of diet an animal is fed can affect the flavour and texture of the meat that is produced.



Feedlot cattle

- Cattle fed on a diet of grain put on weight more rapidly.
- Grain-fed meat has a higher marbling content; that is, there is more fat throughout the meat.
- As there is more marbling, the meat is considered to have more flavour.



Pasture-fed cattle

- Pasture-fed cattle are smaller and leaner than feedlot cattle.
- The meat has about 4 per cent less fat than feedlot cattle. The fat lies under the skin, rather than being marbled throughout.
- As there is less fat, the meat may be slightly tougher if overcooked.

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FIGURE 11.2 The difference in flavour and texture of feedlot and pasture-fed beef

Practical Activity 11.4

Taste testing beef steak produced using different production methods

Aim: To compare the physical and sensory properties of grass-fed, grain-fed and organically grown beef.

Method

1. Purchase the same cut and thickness of steaks to ensure consistency in the testing.
2. Bring steaks to room temperature before cooking.
3. Before cooking, assess and record the appearance and weight of the steaks.
4. Pan fry the steaks to medium rare – 65 °C. To ensure consistency in the testing process, use a meat thermometer to ensure all steaks are cooked to exactly the same degree of doneness.
5. Allow to rest for 5 minutes before carving into thin slices to taste.
6. Complete the sensory analysis and record your results in the table

Results

	GRAIN FED BEEF 	GRASS FED BEEF 	ORGANIC BEEF 
Cost per 100 grams			
Appearance before cooking such as marbling of fat, colour of the flesh			
Weight of raw steak			
Appearance after cooking (grain and fat)			
Weight of cooked steak			
Aroma			
Flavour			
Texture			
Preference scale 1: dislike very much 5: neutral 9: like very much			

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Shutterstock.com/Milanchikov Sergey

Analysis

1. Did one steak cook faster than the others? If yes, can you account for why this may have occurred?
2. Discuss how the production method of beef may affect the nutritional composition of the meat.
3. Many consumers are concerned about the ethical issues associated with animal production methods. Based on your understanding of the three different production methods, which do you believe is the most ethical production method? Explain your answer.
4. Identify additional factors, other than production methods, that consumers may take into account when deciding which type of steak to purchase.

Conclusion

Using the information you gathered from the analysis of the sensory properties of the cooked steaks, which steak did you prefer? Justify your answer.

Ethical beef products

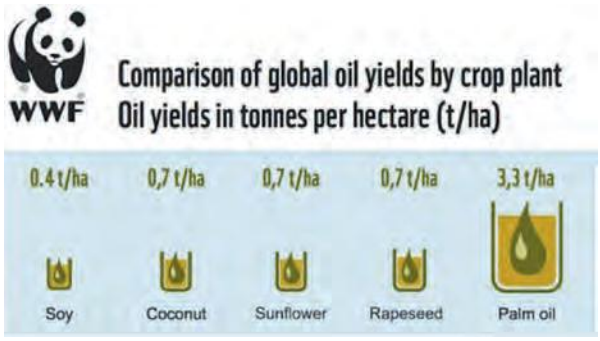
There is a growing trend among consumers to demonstrate their food citizenship by purchasing ethically produced beef products. There is a widely held view that meat that is produced ethically also has a better taste. A wide variety of grass or pasture-fed beef is available through specialty butchers, markets and farmers' markets. Woolworths and Coles supermarkets also stock a range of pasture-fed meat products, including rump, T-bone, porterhouse, scotch fillet and eye fillet. Other beef cuts such as beef schnitzel, lean minced beef, beef roasts, stir-fry cuts, diced cuts for casseroles and beef ribs are also popular with consumers.

Environmental stewardship

Another key ethical principle for many Australian consumers is concern for the environment. Often described as 'environmental stewardship', many people believe that humans have a responsibility to protect the natural environment through conservation efforts and by implementing sustainable practices in growing and producing the food we consume. Two key environmental issues of concern to many consumers are the production and use of palm oil in food products, and the desire to reduce their impact on the environment by adopting a more environmentally friendly or 'low carbon' diet.

PALM OIL PRODUCTION

Palm oil production is an ethical concern to many consumers because of the impact it has on the environment and the habitat of endangered orangutans and Sumatran tigers. The oil palm that produces palm oil is widely grown across the globe, particularly in warm, tropical rainforest climates, including South-East Asia, Latin America and Africa. Today, the countries that produce the greatest amount of palm oil are Indonesia and Malaysia, which together produce more than 80 per cent of the world's palm oil. Palm oil is used by food producers because it gives a far greater yield than other vegetable oils and is cheap to produce. It is also ideal for food production, as it is naturally hydrogenated, unlike other vegetable oils, and is very stable at room temperature.



WWF

Comparison of global oil yields

Products containing palm oil

Palm oil is one of the world's most widely used and consumed vegetable oils. It is used to produce many processed foods, including margarine, instant noodles, sweet biscuits, pizza dough, ice-cream and bread. Palm oil is also a key component of health and beauty products including shampoo, soap and lipstick, as well as household cleaning products. Other uses of palm oil are as a component of animal feed and in the production of biofuels.



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The oil from palm oil fruit is widely used in many manufactured products.

The cost of palm oil plantations to the environment and endangered animals

In order to develop palm oil plantations, developers and rural farmers often bulldoze and burn areas of rainforest. The United Nations Environment Programme (UNEP) has stated that the development of oil palm plantations is the leading cause of rainforest destruction in Malaysia and Indonesia. Many rare and endangered species, including orangutangs, elephants, rhinoceros and tigers, live in these rainforests and use them as corridors to travel through areas in search of food.



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The expansion of palm oil plantations has a negative impact on the viability of orangutan populations.

The clearing of rainforests for palm oil plantations has been devastating for the orangutan population that live in the Malaysian rainforests. Orangutans are tree-dwelling or arboreal apes that play a critical role in the Borneo rainforest ecosystem. It has been estimated that more than 50 per cent of orangutan deaths in Borneo are linked to the destruction of their rainforest habitat through clear felling and forest fires.

Weblink
World Wildlife Fund

The Indonesian island of Sumatra is home to the Sumatran tiger. Like the orangutans, the Sumatran tiger's existence is threatened due to the expansion of palm oil plantations on the island. According to the World Wildlife Fund (WWF), 'Forty-three percent of Tesso Nilo National Park in Sumatra – which was established to provide habitat for the endangered Sumatran Tiger – has now been overrun with illegal palm oil plantings.' By 2011, more than 15 per cent of the Sumatran tiger rainforest habitat was lost as a result of the development of palm oil plantations. Current estimates indicate that fewer than 400 tigers survive in the wild in Sumatra, classifying them as a critically endangered species.



Shutterstock.com/neelsky

Rainforest clearing for palm oil plantations has led to the Sumatran tiger being declared critically endangered.

Sustainably produced palm oil

Palm oil is an invaluable crop for small farm holders in many of the world's poorest countries, helping to keep them out of poverty. It provides the income needed by more than 2 million farmers to provide food, shelter and clothing, and to educate their families.

In 2004, the Roundtable on Sustainable Palm Oil (RSPO) was established to minimise the impact of palm oil on the environment and on endangered species. It includes a range of organisations, including palm oil producers, manufacturers, retailers, banks, investors and non-government organisations such as WWF. The aim of this not-for-profit organisation is to prevent future deforestation by increasing the sustainability and productivity of palm oil plantations, rather than banning the production and use of palm oil. The RSPO is also working alongside local communities to develop strategies that create value from rainforest landscapes and keep them intact, rather than converting them to agriculture.



The Roundtable on Sustainable Palm Oil logo

© Roundtable on Sustainable Palm Oil

In 2004 the RSPO established a range of criteria for member certification. These criteria were strengthened in 2018 to give companies certainty that the palm oil they use is sourced from plantations that do not use strategies such as deforestation, expansion onto peat, forest burning or the exploitation of workers.

Today, approximately 20 per cent of all palm oil produced globally is certified by the RSPO.



FIGURE 11.3 Advanced criteria for RSPO palm oil producers

Products using only sustainably produced palm oil

Many Australian and international food producers and manufacturers of health and beauty products, including Ferrero, Nestlé Australia and Arnott's Australia, are members of the Roundtable on Sustainable Palm Oil and have converted to using only RSPO Certified Sustainable Palm Oil (CSPO) in their products, in an effort to reduce their environmental and social impact.

Ferrero, the producers of the popular hazelnut spread Nutella, is one company that has made a strong commitment to using only sustainable palm oil. In June 2021, Ferrero released their new palm oil charter, which commits the company to using sustainable palm oil that is 100 per cent RSPO sourced and is traceable from the plantation and throughout all stages of production. Ferrero was recognised in the WWF 2020 edition of its 'Palm oil buyers scorecard: Measuring the progress of palm oil buyers' as achieving the highest score of any company worldwide for its efforts to address deforestation and for the transparency of its supply chain. One strategy Ferrero has introduced to achieve this is the use of a satellite monitoring system to identify potential areas of deforestation in the palm plantations operated by its suppliers.



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Ferrero's Nutella hazelnut spread is produced using sustainable palm oil.

Arnott's Australia has stated that the savoury and sweet biscuits the company makes in its Australian factories are only made from palm oil that is certified as sustainable and that is traceable and segregated within the production system. This includes many popular Arnott's products, such as Cruskits, Salada, Shapes, Savoy, Vita-Weat, Tim Tams, Tiny Teddies and Wagon Wheels.

Similarly, Nestlé Australia has committed to using only palm oil that is certified as sustainable in its Australian chocolate manufacturing facilities. The production facilities segregate the palm oil from other oils throughout the entire production and supply chain. Popular Nestlé and Allen's chocolates and sweets, including their chocolate blocks, Kit Kat, Smarties, Aero, Milky Bar and sweets such as Fantales, Freckles and Jaffas are all made using sustainable palm oil.

REDUCING MEAT CONSUMPTION

Many Australians have joined the global movement towards reducing the amount of meat they consume by adopting a plant-based diet for at least some of their weekly meals. For many, this decision is based on both their concern for health and the cost of meat. Other consumers have demonstrated their food citizenship by adopting a diet that is more environmentally sustainable and considers animal welfare. Reducetarianism and flexitarianism are two terms used to describe consumers choosing to reduce their consumption of meat and to increase their consumption of plant-based products. The term 'reducetarianism' refers to people who want to gradually reduce the amount of animal products they consume, rather than follow a completely vegan or vegetarian diet. People who follow a flexitarian diet consume mainly plant-based meals, but do not exclude meat or fish completely, instead including them occasionally.

Data released in 2019 by Roy Morgan, an Australian market research company, indicates that there is an increasing trend for people to follow a plant-based diet. In 2014, the number of Australians following a vegetarian diet was approximately 2.2 million people, or 11.2 per cent of the population, but by 2019 this had increased to almost 2.5 million, or 12.1 per cent.

Factors influencing consumers to follow a plant-based diet

Food citizenship is a key factor driving the trend towards following a plant-based diet, particularly concern for environmental sustainability, including issues such as climate change, greenhouse gas emissions and water pollution. In a 2019 report by the United Nations Food and Agriculture Organization, livestock production was identified as one of the major causes of global warming, land degradation and water pollution. This finding is supported by data released in January 2021 by the Australian Federal Department of Primary Industries and Regional Development, which states that livestock are directly responsible for 70 per cent of all greenhouse gas emissions within the Australian agricultural sector and 11 per cent of the total national greenhouse emissions. They also state that 'this makes Australia's livestock the third largest source of greenhouse gas emissions after the energy and transport sectors'. The pollution of waterways, including the Great Barrier Reef, by runoff from grazing and other agricultural properties is another environmental concern for consumers.

Plant-based products

The move towards consuming a diet that contains less animal protein has been aided by the increasing variety of plant-based options available in the supermarket. Innovation in the food industry has led to the production of a wide range of plant-based food that mimics the flavour, quality and cooking properties of meat and poultry. Food production companies are continuously developing 'new generation' alternatives to popular animal protein products, such as plant-based sausages, mince, schnitzels, plant-based nuggets and meatless lasagne.



Shutterstock.com/Salena Stinchcombe

A new generation of plant-based products are available for consumers who wish to reduce their consumption of animal protein.

Social justice issues

Social justice issues are a key ethical concern for many Australian consumers when making decisions about purchasing food products. Issues such as exploitative labour practices, including forced labour or child labour, or where workers are underpaid or not paid a minimum wage, are social justice issues that may impact on consumers' decisions.

FAIR TRADE

Many people are becoming more aware of social justice issues and demonstrating their food citizenship by increasingly choosing Fairtrade products. Data released by Fairtrade Australia New Zealand indicates that approximately half of all Australians recognise the Fairtrade mark. These shoppers reported that it helps them decide if the product has been responsibly sourced and reflects their personal values. In recent years, individuals have become more forthright in seeking Fairtrade products and demanding that business, including food producers and retailers, take positive action in addressing social justice issues.

The ethics of fair trade is based on the concept of ensuring that farmers and workers, particularly in developing countries, are guaranteed a fair wage for their work. Fairtrade aims to address poverty, to empower food producers in developing countries to improve the quality of their lives and to give them greater control over their future.



Alamy Stock Photo/Archive PL

The Fairtrade mark helps shoppers recognise and purchase ethically sourced products.

A system of labelling products as certified Fairtrade is now in use throughout the world; these products have been produced according to the standards of the Fairtrade Labelling Organisations International (FLO), or Fairtrade International. Fairtrade standards include minimum requirements for the social, economic and environmental wellbeing of local communities. In order to be certified, producers must agree to meet these standards and to provide ongoing improvement of conditions for farmers and workers.

Benefits of Fairtrade

Fairtrade benefits approximately 1.7 million farmers and workers in 72 developing countries throughout the world, particularly communities in Africa, Asia and Latin America. The Fairtrade system benefits small-scale farmers and workers by:

- enabling farmers to receive a fair price for their harvest
- ensuring a fair wage and therefore economic independence for workers
- prohibiting modern slavery through forced labour and child labour
- improving the workers' standard of living
- encouraging sustainability of the local environment through organic food production methods
- enabling farmers access to low- or no-interest loans
- providing access to education and better healthcare.

Fairtrade cocoa and chocolate

The establishment and certification of Fairtrade cocoa and chocolate is an example of ethical food production. In the past, world cocoa prices have fluctuated widely. In many cases, the cost of producing the cocoa was greater than the price farmers were paid for their crop. Plummeting cocoa crop prices left many farmers in developing countries facing severe poverty. In an attempt to reduce their labour costs, many farmers were forced to take their children out of school to work on their farms. Reports from the International Labour Organization claim that in some cases children as young as six, many of whom are sold as child labour, are forced to work picking cocoa beans for 80–100 hours a week. They are often subjected to beatings and suffer malnutrition, as well as undertaking back-breaking and dangerous work. The long hours spent working on the cocoa bean plantations mean most children do not have the opportunity to attend school and gain an education, leaving them with no way out of the cycle of poverty.

In 2012, international snack food company Mondelēz International established its global cocoa sustainability program, Cocoa Life. Many chocolate brands produced by Mondelēz International, including Green & Black's 'Smooth Chocolate' range, Toblerone, and Cadbury's Dairy Milk chocolate are made from cocoa that is ethically produced through Cocoa Life. This chocolate is sourced from the cocoa farmers in Ghana, Côte d'Ivoire, Indonesia, India, the Dominican Republic and Brazil.

Fairtrade products

People who have an ethical concern about how farmers in developing countries are treated can purchase an increasing range of products that carry the Fairtrade mark, including bananas, coffee, sugar, cocoa, chocolate, fresh fruit, tea, quinoa, rice, dried fruit, honey and nuts.



Shutterstock.com/Cheryl Ann Studio

Green & Black's Fairtrade Maya Gold chocolate

Understanding the Text

11 Write a short paragraph to explain the key ethical issues in the production of pork products.

12 Make a list of the key features of conventional indoor pig production.

13 Explain how free-range pork production differs from outdoor bred, raised indoors on straw production systems.

14 Draw up a diagram to demonstrate the types of ethically produced pork products available to consumers.

15 What is a 'feedlot' and why is it used in the production of beef cattle? Outline the ethical issues involved in the use of cattle feedlots.

16 Explain the method of producing pasture-fed cattle and state why this is considered a more ethical method of meat production.

17 Prepare a PMI chart (plus, minus interesting) on the use of palm oil in food products.

PMI CHART – THE USE OF PALM OIL IN FOOD PRODUCTS		
Plus	Minus	Interesting

18 Write a paragraph to explain the ethical reasons some Australians are adopting a plant-based diet. Explain how this improves global food security.

19 Draw up a mind map highlighting the benefits of the Fairtrade movement to farmers in developing countries.

20 Write a brief paragraph describing how the establishment and certification of Fairtrade cocoa and chocolate is an example of ethical food production.

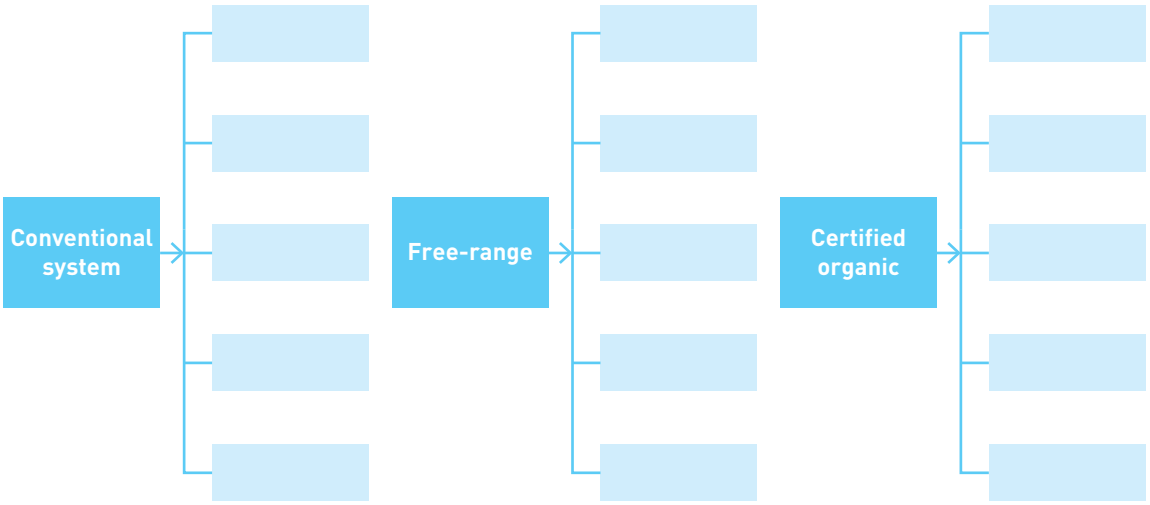
Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

Applying knowledge

Comparing poultry production systems: Draw up a comparison diagram like the one below to compare the features of each type of poultry and egg production system.



Analysing information

Prepare a SWOT analysis for Fairtrade chocolate.

Strengths	Weaknesses
Opportunities	**Threats**

Evaluating concepts

1 Write a paragraph to evaluate the positive features of free-range production of pigs compared with conventional or intensive farming.

2 Justify why the consumption of sustainably produced beef should be encouraged.

EXAMINATION-STYLE QUESTIONS

Answers
Examination-style questions

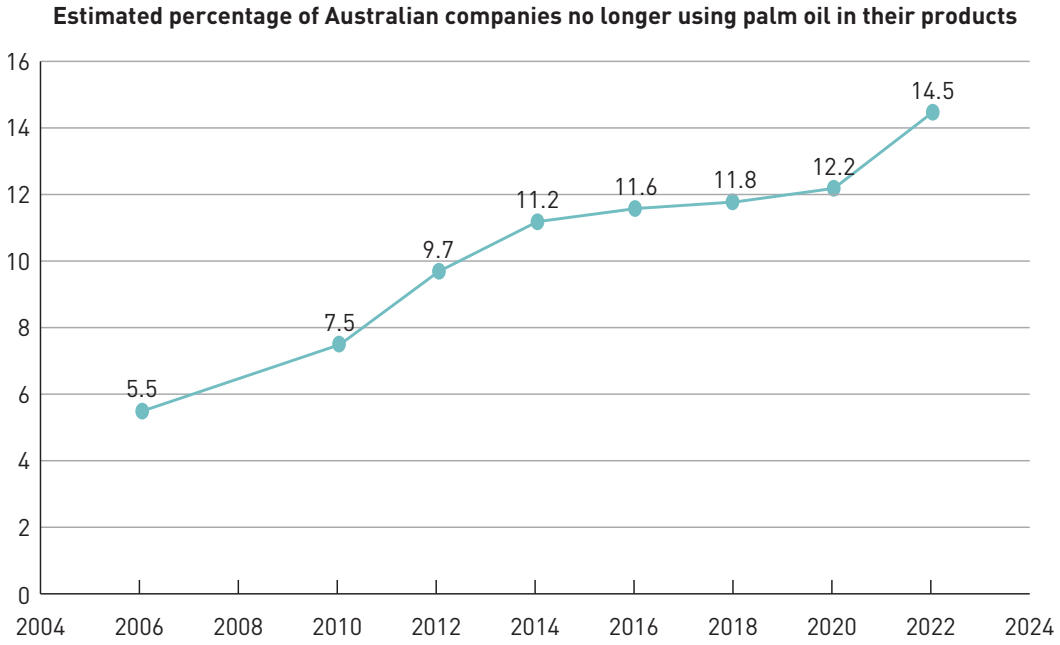
Resources
Preparing for exams support

Question 1 (4 marks)

Australian consumers have differing points of view regarding the decision to purchase meat produced using conventional systems or free-range systems.

Explain the diverse points of view that lead some consumers to purchase meat produced using conventional systems while others select free-range products.

Question 2 (9 marks)



The graph above is an estimation of the percentage of Australian companies that are no longer using palm oil in their products.

Using the data in the graph above, discuss:

- the trend in the reduction in the number of Australian companies using palm oil in their products
- the environmental and ethical reasons many companies have moved away from using palm oil in their food production
- the role of the Roundtable on Sustainable Palm Oil (RSPO) in minimising the impact of palm oil on the environment and on endangered species
- the strategies used by some companies to ensure their use of palm oil is sustainable.

Question 3 (4 marks)

Explain the diverse points of view in the debate about following a plant-based diet.

Japanese-style curry

Japanese curries are full flavoured but not too spicy. The dark chocolate in this curry adds a richness to the curry sauce, and the apple gives a touch of sweetness. The carrots in this recipe provide an excellent source of vitamin A, while the potatoes provide both vitamin C and carbohydrate. Like potatoes, apples provide a good source of vitamin C. All the vegetables add fibre to the diet, and the meat provides an excellent source of protein. Try to purchase an ethically sourced chocolate for this curry.

CURRY BASE

40 grams butter

20 grams dark chocolate, chopped

3 teaspoons garam masala

2 teaspoons hot curry powder

1 teaspoon salt flakes

1 teaspoon brown sugar

3 tablespoons plain flour

CURRY SAUCE

1 tablespoon olive oil

½ onion, chopped

1 garlic clove, finely diced

1½ carrots, cut into 2-centimetre chunks

½ daikon or 2 potatoes, cut into 2-centimetre cubes

300 grams scotch fillet steak, cut into 4-centimetre cubes

3 centimetres fresh ginger, finely sliced

500 millilitres chicken stock

1 Granny Smith apple, peeled and grated

1 tablespoon mirin

2 spring onions, sliced on an angle as garnish

steamed rice to serve

METHOD

Making the curry base

1 Place the butter and chocolate in a small saucepan over low heat until it has just melted.
2 Add the garam masala, curry powder, salt, sugar and flour and cook for 2–3 minutes, stirring constantly until a thick brown paste is formed. Remove from the heat and cool.

Making the curry sauce

1 In a medium saucepan, heat the oil over moderate heat. Add the onion, garlic and carrots, and sauté for 2–3 minutes, until the onion softens.
2 Add the diced daikon or potatoes and cook for 3 minutes.
3 Add the diced beef and ginger slices, season with salt and pepper, and cook for 5 minutes.
4 Add the curry base and stir through to ensure the meat is coated.
5 Add the stock, grated apple and mirin, then bring to a simmer. Cover and simmer gently for 30 minutes, stirring occasionally.
6 Serve with rice (page 232) and garnish with sliced spring onion.

SERVES 2

EVALUATION

1 Describe the sensory properties of the Japanese-style curry – appearance, aroma, flavour and texture.
2 Classify the ingredients for the Japanese-style curry and rice onto a diagram of the Australian Guide to Healthy Eating.
3 Use the data from question 2 to suggest other vegetable dishes that would complement the Japanese-style curry and rice and ensure the meal meets the recommendations of Dietary Guideline 2.
4 Explain why consumers would decide to use Fairtrade chocolate instead of a regular type of chocolate.
5 Outline the facts a consumer needs to compare when deciding whether to use feedlot or pasture-fed beef for the curry.



Mark Fergus Photography

Spinach, bacon and red capsicum roulade

A roulade is a soufflé-type mixture that originated in France and comes from the word 'rouler', meaning 'roll'. There are many recipes for both savoury and sweet roulades. The soufflé base of the roulade is baked until it is firm but still moist, and then rolled and spread with the filling. This recipe for spinach roulade includes capsicum, bacon, spring onion and cream cheese in the filling, however a wide range of other savoury fillings could be used to make a delicious lunch or light dinner.

½ red capsicum
olive oil spray
250 grams frozen spinach, defrosted
60 grams butter
60 grams (⅓ cup) plain flour
1 cup milk
4 eggs, separated
salt and pepper
2 rashers bacon, finely diced
3 spring onions, finely diced
250 grams cream cheese

METHOD

1. Preheat the oven to 180 °C.
2. Line a small baking tray with baking paper. Place the capsicum on the lined baking tray and spray with olive oil spray.
3. Bake in the preheated oven for approximately 25 minutes, or until the skin is blistered. Remove from the oven and allow to cool. Peel and cut into small dice, then set aside.
4. Spray a 33 × 24 centimetre Swiss roll tin with olive oil spray and line with baking paper.
5. Place the defrosted spinach into a sieve and press firmly with a wooden spoon to remove all of the liquid.
6. Melt the butter in medium saucepan over a moderate heat.
7. Add the plain flour and stir well with a wooden spoon for 1 minute.
8. Add the milk gradually, stirring constantly until smooth. Stir over a moderate heat until the mixture boils and thickens.
9. Quickly stir in the spinach and egg yolks. Transfer the mixture to a large bowl.
10. Beat the egg whites until soft peaks form. Gently fold ¼ of the egg whites into the spinach mixture to loosen the mixture. Fold in the remainder of the egg white ⅓ at a time, being careful not to overmix.
11. Pour the mixture into the prepared Swiss roll tin and smooth the top.
12. Place the mixture in the preheated oven for 12–15 minutes, until puffed and golden brown and beginning to shrink slightly from the sides of the tin. Cover a cooling rack with a clean tea towel and set aside until the roulade is cooked.
13. Meanwhile, to prepare the filling, sauté the diced bacon in a small frying pan over a moderate heat until lightly browned. Add the diced spring onion and cook for a further 2 minutes. Remove from the heat. Add the diced red capsicum.
14. Beat the cream cheese in a medium bowl until smooth. Add the cooked bacon, spring onion and red capsicum and stir to combine.
15. Remove the cooked roulade from the oven and turn upside down onto the tea towel-lined cooling rack. Remove the baking paper.
16. Spread the cream cheese, bacon, spring onion and red capsicum mixture evenly over the warm roulade, leaving a 1-centimetre border along one long side.
17. Roll the roulade along the long side towards the border, using the tea towel as a guide. The seam side should be underneath. Allow to rest for 5 minutes before serving.
18. Place the roulade seam-side down on a serving platter and serve warm.

SERVES 3

EVALUATION

1 Describe the sensory properties – appearance, aroma, flavour and texture – of the spinach, bacon and red capsicum roulade.
2 Using the nutritional rationale of the Australian Dietary Guidelines, explain why bacon should be eaten only sometimes, and in small amounts.
3 Classify the ingredients of the spinach, bacon and red capsicum roulade onto a diagram of the Australian Guide to Healthy Eating and explain how well it meets the guidelines of this food selection model.
4 Outline why consumers might select free range eggs to make the roulade, instead of barn-laid eggs.
5 Create three questions that consumers could ask about the production of the bacon used in the filling of the roulade that demonstrate their food citizenship.



Mark Fergus Photography

Wholemeal chocolate biscuits

Wholemeal flour and quick-cook oats increase the dietary fibre content of these crunchy biscuits compared to regular biscuits. The dark chocolate is lower in sugar than milk chocolate. The oats included in the biscuits are high in dietary fibre.

125 grams quick-cook oats

125 grams wholemeal self-raising flour

125 grams brown sugar

pinch of salt

125 grams butter, roughly chopped

1 tablespoon golden syrup

¼ teaspoon bicarbonate of soda

2 teaspoons boiling water

100 grams dark chocolate (60 per cent cocoa solids)

METHOD

1. Preheat oven to 180 °C. Line two baking trays with baking paper.
2. In a food processor, pulse the quick oats for five pulses, then transfer to a large bowl.
3. Add in flour, brown sugar and salt, and stir to combine.
4. Dissolve the bicarbonate of soda in the boiling water and set aside.
5. In a small saucepan, add the chopped butter and golden syrup. Cook over low heat, until the butter is melted. Remove from heat, then stir in the dissolved bicarbonate of soda.
6. Pour the butter mixture into the dry ingredients and stir until combined. Using your hand, bring the mixture together in the bowl – it will be a little crumbly. Divide the mixture in half.
7. Between 2 sheets of baking paper, roll out half the mixture to 4 millimetres thick.
8. Use a scone cutter to cut out 6-centimetre diameter circles. Slide a metal spatula under each circle and transfer it to the lined baking tray.
9. Re-roll the scraps and the other half of the mixture and cut out the remainder of the biscuits.
10. Bake for approximately 12 minutes, or until the biscuits are golden. Cool on the baking tray for 5 minutes, because the biscuits will be soft.
11. Use a metal spatula to transfer the biscuits to a cooling rack.
12. Break the chocolate into pieces and melt over a double boiler. Do not stir the chocolate as it melts – this can cause crystals to form and the mixture to seize. Remove from heat and cool.
13. Use a metal spatula to spread the chocolate thinly over the top of each biscuit. Alternatively, the chocolate could be piped on in a pattern.
14. Place the biscuits chocolate side up to set.

MAKES APPROXIMATELY 16 BISCUITS

EVALUATION

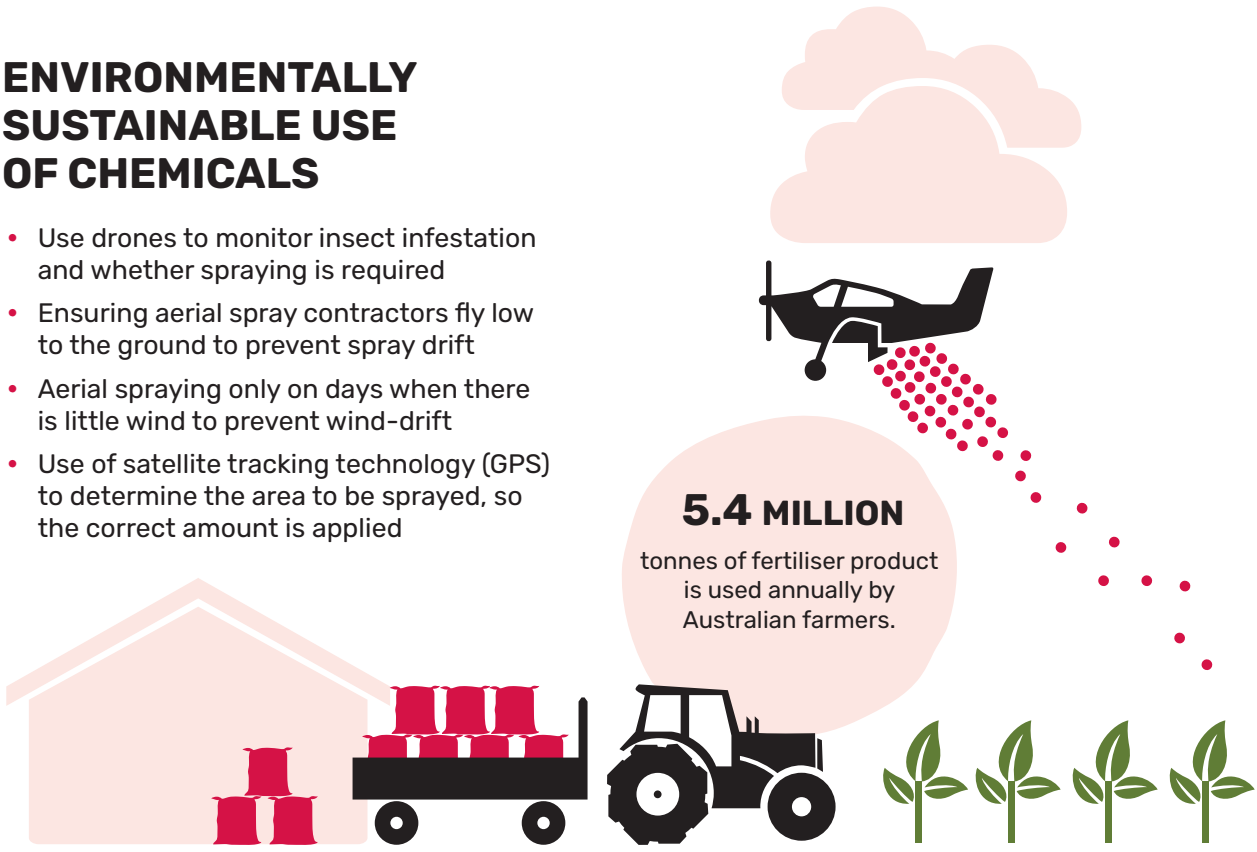
1 Describe the sensory properties – appearance, aroma, flavour and texture –of the wholemeal chocolate biscuits.
2 Outline the health benefits of using wholemeal flour and oats in a biscuit recipe.
3 Discuss why portion size is an important consideration when making food items that are considered discretionary foods according to the Australian Guide to Healthy Eating.
4 Why would Fairtrade chocolate be a more ethical choice of ingredient compared to a regular chocolate? Explain why consumers might not purchase Fairtrade chocolate.
5 Palm oil is an ingredient that can be used in the production of chocolate. Explain how the Roundtable on Sustainable Palm Oil (RSPO) helps minimise the impact of the production of palm oil on the environment and on endangered species.



Mark Fergus Photography

ENVIRONMENTALLY SUSTAINABLE USE OF CHEMICALS

- Use drones to monitor insect infestation and whether spraying is required
- Ensuring aerial spray contractors fly low to the ground to prevent spray drift
- Aerial spraying only on days when there is little wind to prevent wind-drift
- Use of satellite tracking technology (GPS) to determine the area to be sprayed, so the correct amount is applied

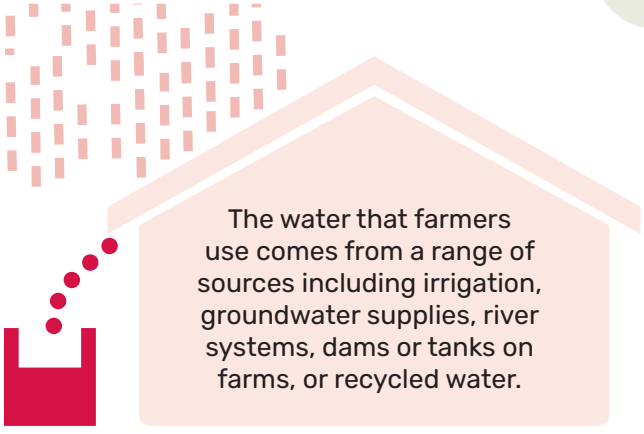


5.4 MILLION

tonnes of fertiliser product is used annually by Australian farmers.

ENVIRONMENTALLY SUSTAINABLE USE OF WATER

- Use computer controlled drip -irrigation systems
- Enclose open-channel irrigation systems
- Capture and reuse irrigation water in channels and dams
- Install soil moisture sensors



The water that farmers use comes from a range of sources including irrigation, groundwater supplies, river systems, dams or tanks on farms, or recycled water.

CATTLE AND ENVIRONMENTAL SUSTAINABILITY

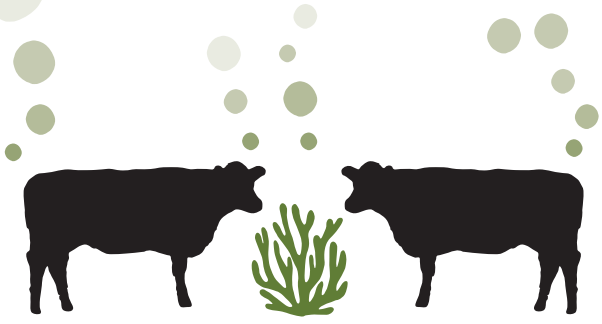
On average, a cow emits between

70–120 KILOGRAMS

of methane annually

Feeding cows seaweed could cut their methane emissions by

82%



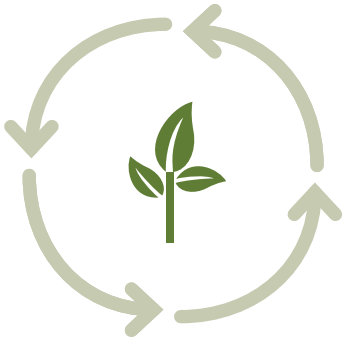
12

SUSTAINABLE PRIMARY FOOD PRODUCTION



SUSTAINABLE FARMING PRACTICES

- Minimum tillage farming
- Pasture cropping
- Crop rotation
- Organic farming



KEY TERMS

aquaculture the farming of captive-bred fish stock

bycatch the incidental capture of non-targeted fish species and other marine life

conservation farming a term used to describe farming practices that conserve the soil and the capacity of the soil to retain water, thereby improving the conditions for plant growth

fertilisers widely used in agriculture to improve crop yields

groundwater surface water that has migrated from the surface through the ground and is stored in porous soils and rocks

herbicides chemicals used to kill weeds that compete for nutrients in the soil needed by food crops such as wheat, oats, rice and barley

irrigation salinity occurs if groundwater reaches the surface and salt emerges through the topsoil

minimum tillage farming includes farming practices such as direct-drill and no-till farming that minimise damage to the soil structure and improve the conditions for plant growth

organic farming farming practices that produce crops and animals without the use of artificial chemicals, instead using natural systems

pesticides chemicals that are sprayed on specific crops to control a particular pest, such as grasshoppers, so that they do not destroy the crop

soil acidification occurs when plants take up nutrients and release acidic waste from their roots

sustainability in agriculture refers to farming practices that help maintain the land to ensure it is available for future generations

sustainable seafood species that are caught or farmed in a way that ensures the long-term health and stability of that species, as well as the greater marine ecosystem



Resources
Study Design
links
Infographics
Flashcards

Sustainable farming practices

Collaborative Activity

One of the most critical issues facing Australia, like all other countries in the world, is the need to ensure the sustainability of our food production systems. This involves using farming practices that sustain the land so that it will remain productive and available for future generations. There is a strong link between our food production systems, climate change and the environment.

Today, agricultural production is as much a science as it is a business. Agricultural scientists, or agronomists, work hand-in-hand with farmers to ensure that all aspects of their agricultural production systems are considered in a holistic way. Agronomists assist farmers to develop a profile of their soil, and to understand the types of fertilisers that will be most beneficial to improving their crop or pasture production. Agronomists also provide farmers with advice on the best methods to control weeds, pests and crop disease, while also considering how to conserve and protect the sustainability of the environment.

Given the risks posed by climate change to Australian agriculture, agricultural scientists, along with the agricultural community, are developing strategies to ensure that our primary food production systems are sustainable. **Conservation farming** uses a range of strategies to conserve the soil and the capacity of the soil to retain water, thereby improving conditions for plant growth and ensuring environmental sustainability. Today, farmers try to avoid over-irrigating their crops by monitoring soil moisture levels to determine the amount of moisture needed, or they use drip irrigation where appropriate. Ensuring good crop selection is also important. For example, farmers might try to use deep-rooted plants to maximise the amount of water extracted, therefore minimising salinity in the soil. Minimum tillage farming, pasture cropping, crop rotation and organic farming are all examples of sustainable or conservation agricultural practices.

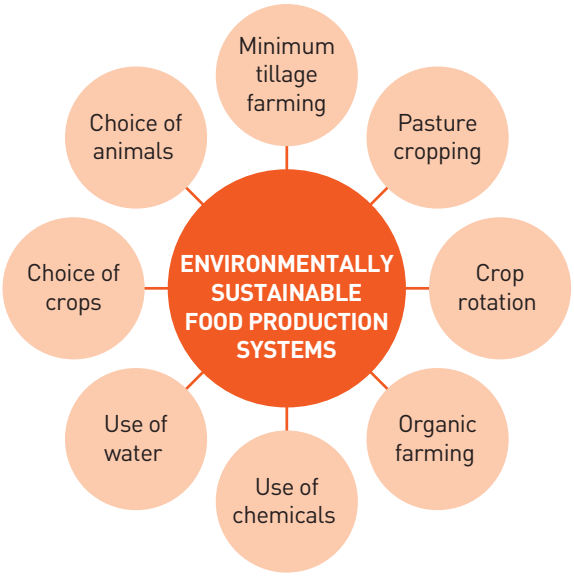


FIGURE 12.1 Issues in sustainable primary food production

MINIMUM TILLAGE FARMING

Minimum tillage farming is a term used to describe broadacre farming practices that minimise damage to the soil structure and the capacity of the soil to retain water, thereby improving the conditions for plant growth. It includes practices such as direct-drilling and no-till farming.

Minimum tillage farming involves leaving the stubble from the previous year's crop to help retain moisture in the soil. This enriches and stabilises the soil, and minimises soil erosion. The new crop is planted by direct drilling in between the rows of the previous crop without tilling the soil. Retaining crop stubble helps to mulch the soil, enabling it to retain more moisture. The crop residue stays on the land and eventually decomposes, and nutrients are returned to the soil, enriching it and improving its carbon profile. This keeps the soil friable (loose), uncompacted and moist.



Retaining stubble in minimum tillage farming

Alamy Stock Photo/Bill Barksdale/AgStock/Design Pics Inc

Retaining the stubble also prevents exposure to wind and rain and helps prevent soil erosion. Farmers who use strategies such as minimum tillage to improve soil health may also measure the pH of the soil because a high acidity level can be detrimental to plant growth.

Minimum tillage farming and environmental sustainability

Minimum tillage farming provides significant advantages for environmental sustainability, in terms of both soil health and crop yields. Up to four years of stubble can remain in the soil, which means the nutrients contained in the stubble are returned to the soil as it breaks down, building the soil structure and improving its health. The stubble also acts as a mulch, ensuring that moisture is retained, especially in dry years, and prevents moisture run-off from the property. The roots of the stubble also hold the soil in place and prevent wind erosion.

Combined with direct-drilling or precision seeding and the use of GPS technology, specially designed machinery deposits fewer seeds during planting, which allows larger, healthier plants to grow. This ensures improved yields, particularly in canola crops in drier years. Farm machinery such as harvesters also use designated traffic lanes or tramlines so that there is minimal compaction of the soil. Minimal tillage farmers often rotate crops including wheat, canola, fava beans and lentils. However, herbicides and pesticides are still used when necessary.



Alamy Stock Photo/Grant Heilman Photography

Sowing seed by direct drilling

PASTURE CROPPING

Pasture cropping, or regenerative agriculture, is a low-impact, environmentally sustainable food production system that combines grazing and cropping into one system. It involves sowing an annual cereal crop into an existing perennial pasture using direct drilling. Perennial pastures are 'cover crops' that regenerate from year to year and are suitable for animals to graze on. Some perennial crops are dormant in winter, meaning a cereal crop can be sown into it without killing the pasture.

Growing a cereal crop is combined with allowing cattle to graze at relatively high stocking levels, but only for a short duration. Cattle graze in one paddock for about 4–6 days before they are moved on to another paddock. The stock is rotated through a large number of paddocks so the pasture has up to three months to recover, and to prevent erosion by cattle movement, before the cattle come back to re-graze.

Pasture cropping and environmental sustainability

Farmers who follow a pasture cropping system find that once the system is well established, the natural grasslands recover and the diversity and density of perennial grasses is improved. In addition, the ground is well covered throughout the year, rather than lying fallow, as occurs with traditional cropping systems. This increases the nutrients and the levels of carbon present in the soil. As the health of the soil improves, so too does the soil's ability to hold and retain water. Another advantage of pasture cropping is that the use of fertilisers is reduced significantly, due to the increased soil fertility. Farmers have also been able to reduce the amount of herbicides they use, particularly where sheep graze on the pasture. As sheep are much



Colin Seis

Pasture cropping allows cereal crops such as oats to be directly planted into dormant perennial crops.

smaller and lighter animals than cattle, they can graze on the pasture until the new cereal crop is grown, as they don't compact the soil to the same degree as cattle. This means there are fewer weeds, and therefore a reduced need for herbicide control.

CROP ROTATION

Australia's main cereal crops, including wheat, barley and sorghum, all require a large amount of nitrogen to grow. This can lead to depletion of the nitrogen stores in the soil. A system designed to overcome this problem is crop rotation, which involves planting a series of different crops in a specific order in the same field. The crops generally include lentils or pulses such as faba beans or chickpeas to fix the nitrogen in the soil, ensuring it is available to assist the growth of cereal crops such as wheat. To be most effective, a successful crop rotation system should use some crops that are deep rooted and others that are shallow rooted. In addition, farmers need to consider rotating crops that will allow nutrients such as nitrogen to accumulate in the soil as well as those that will deplete nitrogen. It is also important for farmers to consider the types of pests and diseases that will be attracted to specific crops, to ensure that no one pest or disease is allowed to thrive.

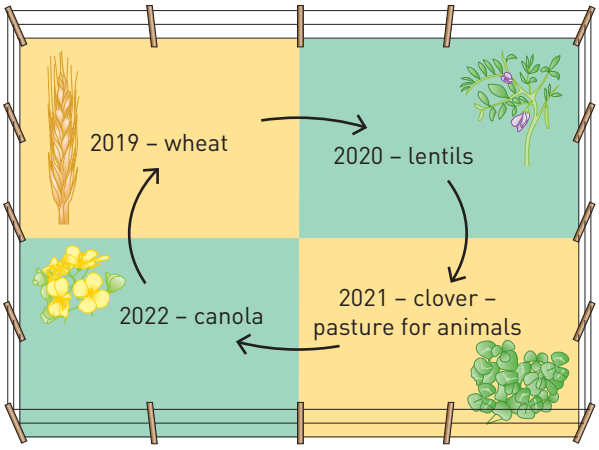


FIGURE 12.2 Crop rotation improves nitrogen levels in the soil.

Crop rotation and environmental sustainability

In addition to building up the nutrient levels in the soil, crop rotation is also environmentally sustainable because it reduces weed and pest problems and minimises the need for artificial chemicals. Crop yields, particularly for cereal crops, are improved, as the soil contains higher levels of nitrogen than occurs if cereals are grown in a mono-culture system. Another environmental advantage of crop rotation is that carbon emissions are reduced. This is because the farmer does not need to transport and use nitrogenous fertilisers, because the pulses and legumes used in a crop rotation system mean the nitrogen is fixed in the soil.

Crop rotation has also been shown to improve biodiversity, with increased numbers of insects and soil microorganisms present. This means farmers experience fewer problems with insect or fungal infestation of their crops, as they are controlled by natural predators.

ORGANIC FOOD PRODUCTION SYSTEMS

Australians have become big consumers of organic produce in recent years, choosing to purchase products that have been produced sustainably using organic systems. Today, Australia has the largest area of land used for organic food production in the world. The latest data from the Australian Organic Market Report states that the organic industry in Australia is now worth more than $2 billion.

Organic farming is an environmentally sustainable food production system because it does not use artificial chemicals, instead using natural systems. These natural systems can include the use of organic fertilisers, composting, crop rotation and biological pest control. These natural systems minimise any environmental damage and help to ensure the future productivity of the land.

Organic food production is a 'whole system' of growing and handling food. This means that organically produced foods:

- are produced, processed, packaged and transported without the use of herbicides, pesticides, fungicides or synthetically produced fertilisers or other products
- are produced using methods such as natural fertilisers
- are not treated with preservatives, hormones, other synthetic chemicals or irradiation
- cannot use genetically modified organisms in any stage of their production.

Certified organic

'Certified organic' means that a product has been produced in accordance with a specific organic standard, as established by the Australian Federal Department of Agriculture, Fisheries and Forestry and accredited through a certification body. Organic certification ensures that a product is able to be traced through the food production system from paddock to

plate, including not only the producer, but the retailer, wholesaler or exporter of the product. This system of traceability is designed to protect consumers and producers of organic food products from false claims or misleading labelling.

Annual inspections ensure audit trails of the food. To receive certification, the farmer has to demonstrate the strategies they use for soil and fertility management, crop rotations, weed control, pest and disease management, windbreaks and buffer zones, biodiversity, animal health and water management.

It takes three years to change over from regular farming practices to certified organic production. The food produced during this changeover period is labelled 'certified in conversion' after the first year of certification is completed, so that consumers know it is not completely organic, and the price reflects this status.



Australian Organic Limited

This label is displayed on products that are certified organic.

Organic food production and environmental sustainability

Environmentally sustainable farming practices are the cornerstone of an organic food production system.

- Crop rotation enables farmers to improve soil fertility while reducing the impact of pests and weeds.
- Artificial pesticides and herbicides are prohibited; the use of organic and sustainable methods of pest and disease control ensures that plant health is maintained.
- Sustainable farming practices can prevent salination and soil erosion and improve the ability of the soil to take up and retain water.
- Organic fertilisers and natural methods to reduce insect infestation and control weeds are used, leading to healthier waterways, as chemical run-off into streams does not occur.
- Many organic farmers use traditional seed varieties that help preserve the diversity of crops for future generations.
- The use of non-renewable resources is minimised; for example, organic fertilisers can be produced from organic waste from the farm.
- Biodiversity is maintained – organic farms are required to retain a minimum of 5 per cent of native vegetation, or to plant windbreaks to provide homes for wildlife and protection for livestock. Naturally occurring wetlands such as dams, creeks, swamps and riverbanks may be incorporated into farm design as a way of maintaining biodiversity.



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Certified organic products



Shutterstock.com/Sodel Vladyslav

Organically produced free-range pigs

Activity 12.1

Preparing a summary frame of a sustainable food production system

Select one method used in a sustainable food production system and prepare a summary frame under the following headings:

- What are the characteristics of the selected sustainable food production system?
- What plants and/or animals are produced using this sustainable system?
- Why is this method of food production considered to be environmentally sustainable?

Practical Activity 12.2

Taste testing a warm noodle salad

Work with a partner to complete the following taste test of warm chicken and noodle salad.

1. One person should make the salad using organic somen noodles such as Hakubaku somen noodles, and one person should make the salad using regular somen noodles.
2. Each student should prepare the recipe according to the instructions that follow. Remember to set aside a few of each type of noodle after they have been boiled and before they have been mixed with the salad ingredients and dressing.
3. Complete the following sensory analysis table:
   - Taste the plain noodles and describe their appearance, aroma, flavour and texture.
   - Taste test both of the salads and describe their appearance, aroma, flavour and texture.
4. When you tasted the plain noodles, was there a noticeable difference between the sensory properties of the organic and regular noodles? Explain your answer.
5. Which salad did you prefer? Why?
6. Write a brief description of the warm chicken and noodle salad made with organic noodles to post on a food blog.

	APPEARANCE	AROMA	FLAVOUR	TEXTURE
Plain organic noodles				
Plain regular noodles				
Warm chicken and noodle salad made with organic noodles				
Warm chicken and noodle salad made with regular noodles				

CHICKEN SALAD

1 tablespoon oil

½ chicken breast, thinly sliced

90 grams or 1 individually wrapped serve of organic or regular somen noodles

½ Lebanese cucumber

1 spring onion, sliced

¼ red capsicum, finely sliced

2 tablespoons canned corn kernels

½ small carrot, peeled and cut into julienne strips

¼ cup coriander leaves to garnish

DRESSING

1 teaspoon ginger, finely grated

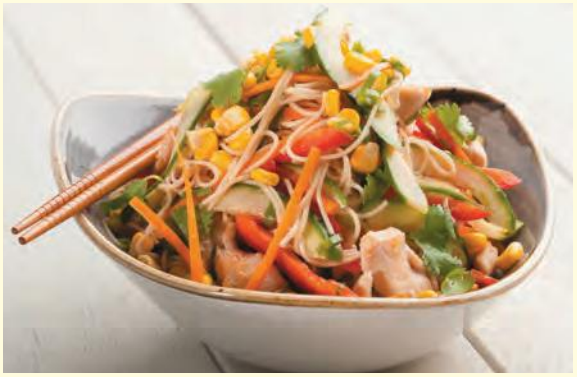
1 teaspoon sesame oil

½ lemon, juiced

1 tablespoon soy sauce

½ tablespoon rice vinegar

½ teaspoon sugar



Worksheet

Mark Fergus Photography

METHOD

1 Heat the oil in a small frypan over a moderate heat. Pan-fry the sliced chicken breast until just cooked. Remove from the pan, cover with foil and set aside.

2 Bring a saucepan of water to boil. Cook the noodles according to the manufacturer's instructions. Drain the noodles and set aside.

3 Slice the Lebanese cucumber in half lengthwise. Remove the seeds from the cucumber using a teaspoon, then slice the cucumber into thin slices.

4 Put all salad ingredients in a large bowl and combine.

5 Mix the dressing ingredients together, then stir the dressing through the noodles.

6 Add the dressed noodles to the salad and toss well.

7 Top with the pan-fried chicken and garnish with the coriander.

SERVES 1

Activity 12.3

SWOT analysis of an organic food production system

Worksheet

Prepare a SWOT analysis (strengths, weaknesses, opportunities and threats) of an organic food production system. Consider all aspects of organic production, including the impact on organic food producers, consumers, retailers and the environment.

Strengths	Weaknesses
Opportunities	**Threats**

Understanding the Text

1 Explain how agronomists can assist Australian farmers to develop sustainable farming practices.

2 Draw up a mind map to highlight some of the environmentally sustainable farming strategies being used by Australian conservation farmers.

3 Explain what is meant by 'conservation farming'. Identify three examples of this type of agriculture.

4 What is minimum tillage farming? Draw a mind map showing the characteristics of minimum tillage farming.

5 Explain why minimum tillage farming is considered to be environmentally sustainable.

6 Describe the features of a crop rotation system.

7 List four reasons crop rotation is considered to be environmentally sustainable.

8 Explain what is meant by the term 'organic farming' and how a primary producer can achieve the label 'certified organic'.

9 Draw a knowledge map to demonstrate the environmental benefits of organic farming methods.

10 Prepare a table like the one below to summarise the key information on pasture cropping.

Characteristics	Advantages to the environment

Answers
Understanding the Text

The environmentally sustainable use of chemicals in primary food production

Australia is one of the oldest continents and, as a result, has some of the oldest soils on the planet. These soils are nutrient poor and extremely shallow. Unlike soils in other parts of the world, Australian soils replenish themselves very slowly, and in many areas are considered non-renewable. Australian farmers rely on a range of fertilisers to replenish the nutrients lost from the soil.



Collaborative Activity

However, soil fertility is not the only problem that Australian farmers face. When crops or orchard fruits are growing, farmers need to keep the environment free from weeds, pests and diseases that may spoil the crop and/or reduce their yield. Sometimes, strategies such as crop rotation, cultivation, using clean seed and healthy plants are not enough to produce high-quality food crops, and so farmers use chemicals to improve their yield. These chemicals fall into three groups: fertilisers, herbicides and pesticides.

Fertilisers, especially those that are nitrogen-based, are widely used in agriculture to improve crop yields. Most food crops are grown on a large-scale, intensive farming system where new crops are planted in the same paddock each season. This practice does not allow the soil to replenish the nutrients it loses as the crop or pasture grows. To maintain the fertility of farming soils, farmers use artificial fertilisers. Most inorganic fertilisers contain a range of chemicals such as nitrogen to promote leaf growth, phosphorous to help the roots, flowers and seeds of plants develop, and potassium to promote the strong growth of stems and to help water move throughout the developing plant.

Herbicides are chemicals sprayed onto paddocks to kill weeds that compete for nutrients in the soil. In Australia, glyphosate is the herbicide most widely used to kill broad leaf weeds and grasses that compete with food crops. Another herbicide that is widely used in Australia is 2,4-D, which is used to control broad-leaf weeds in cereal crops, potato crops and orchards.

Herbicides are biodegradable, which means they begin to break down soon after spraying. All legal herbicides go through a rigorous testing program to ensure no harmful residues remain when food is harvested. However, there is a concern that some commonly used herbicides may contain dioxin, a chemical that is highly toxic to humans.

Pesticides are chemicals that are sprayed on specific crops to control a particular pest, such as grasshoppers. Pesticides help to produce food products that have fewer blemishes and are therefore more appealing to consumers. They have varying toxicity levels, and must be used responsibly. In the Australian vegetable industry there is a national registration system, listing pesticides that are effective, made and labelled correctly, and are safe for humans, animals and the environment when used as directed. These pesticides do not leave unacceptable pesticide residue in the vegetables or the soil.

AGRICULTURAL CHEMICALS AND ENVIRONMENTAL SUSTAINABILITY

The agricultural sector is a vital component of the Australian economy, and therefore it is essential that all farming and grazing practices are environmentally sustainable.

Given that Australian soils are low in natural fertility, the use of fertilisers is important to improve the nutrient profile of farming lands. It is estimated that Australian farmers use almost 5.4 million tonnes of fertiliser annually.

Fertilisers are used to fortify the soil with some of the essential nutrients in which it may be deficient. This allows farmers to produce high-yielding crops, especially grain foods and pasture crops. Crops have also been shown to grow faster when soils have been fortified with fertilisers. As the crops grow at a faster rate, they also cover the soil more quickly, protecting it from direct exposure to rain and wind and the loss of topsoil. The loss of topsoil can lead to soil erosion and make the land unproductive. Faster-growing crops also shade out weeds more effectively, and can minimise the amount of herbicides needed in agricultural production.

However, there are some significant disadvantages in using artificial fertilisers, herbicides and pesticides in agricultural production. Some of the key concerns are:

- Unless they are applied appropriately, they can lead to **soil acidification**.
- The use of artificial chemicals in agricultural production can contaminate waterways and groundwater supplies through nitrate run-off.
- They can have a detrimental impact on biodiversity.

Impact of chemical crop spraying on environmental sustainability

Herbicides and pesticides are sprayed onto crops and plants as they grow, and this is of particular importance to environmental sustainability. The chemicals are often sprayed using large mobile equipment pulled by tractors, or from specially equipped four-wheel motorbikes. However, aerial spraying using light aircraft or drones is the most cost-effective way of covering many broadacre crops, such as wheat.



Alamy Stock Photo/Bruce Miller

Spraying a vegetable crop

A major concern about spraying crops with artificial fertilisers, herbicides and pesticides is that the agricultural chemicals can drift onto non-targeted crops or land. This spray drift can affect the health of nearby crops, animals and the natural biodiversity of the area. Research has shown that agricultural spay vapour can drift off-target by up to 10 kilometres, depending on the prevailing winds. There is also evidence that nitrogen is released into the atmosphere and is a major air pollutant, as well as contributing to acid rain.

Whether the agricultural chemicals are applied using aerial spraying or through land-based machinery, the chemicals can contaminate our water systems. Approximately half of the nitrate in these products is dissolved by rain. The dissolved nitrate runs off the paddocks and can contaminate rivers and groundwater, polluting freshwater systems that provide water for farm animals, and adjacent waterways that may have sensitive ecosystems. The nitrate run-off can also contribute to the development of blue-green algae in rivers, streams and dams.



Shutterstock.com/Cheng Wei

Nitrate run-off from chemical spraying can contribute to the development of blue-green algae in rivers and streams

Strategies to ensure environmental sustainability of chemical use

Sustainability in agriculture describes farming practices that are used to maintain the land to ensure it is available for future generations. An increasing number of farmers now use a range of strategies to minimise the environmental impact of their use of agricultural chemicals; for example:

- monitoring crops on a weekly basis, either through visual inspection or the use of drones to assess the insects present on the crops, to determine whether spraying is required and, if so, which chemicals to use, making sure the use of chemicals is effective and necessary
- the introduction of precision technology such as the use of drones that can fly low to the ground and can apply agricultural chemicals in a more targeted and environmentally sustainable manner
- the use of satellite tracking technology (GPS) by aerial spray contractors to determine their flight path and application area, so the correct amount of chemicals is applied
- ensuring drones or aerial spray contractors fly low to the ground, to ensure crops are sprayed accurately and to prevent spray drifting onto other paddocks
- only allowing aerial spraying to be done on days when there is little wind, to prevent wind-drift.



iStock.com/JohnCarnemolla

Aerial spraying

Soil acidification

Soil acidification happens naturally as the soil is weathered over millions of years. Soil acidification occurs when plants take up nutrients and release acidic waste from their roots. Approximately 50 per cent of Australian agricultural land is considered to be acidic; that is, to have a pH of less than 5.5. However, the increased use of nitrogenous fertilisers over many years has increased the rate at which soil acidification occurs.

One of the main ways soil acidification occurs is when plants take up the nutrients in agricultural chemicals and release acid waste from their roots.

Nitrogen is necessary for nutrient balance in the soil, and is needed to produce protein in cereal crops such as wheat. However, an excess of nitrogen can cause soil acidification. Many cereal farmers in particular have practised monoculture – the planting of the same crop – over many decades. This leaves the soil depleted of the nutrients that are essential for the crop to grow, and so the farmers have had to add artificial fertilisers to the soil in order to grow productive crops. The problem, however, is that the main fertilisers used are high in nitrogen, which can leach nitrate into the soil, increasing the acidity level. Superphosphate, a fertiliser widely used in Australia, is not linked to soil acidification, unlike other inorganic fertilisers.

The removal of the remainder of the harvested crop, such as the stalks and leaf matter, can also contribute to soil acidification. Cereal crops are naturally alkaline, and their removal leaves the soil slightly more acidic.

Soil acidification can also be increased in areas of high rainfall or where irrigation is used, as this increases the level of nitrate leaching, and therefore soil acidification. Soil acidification can also damage the water-holding capacity of soil, and can be associated with increasing soil erosion.

Once soil becomes acidic, the fertility of the land decreases and plants cannot thrive, because their root growth is stunted. This reduces the productivity of the land and limits the type of crops that can be grown.

Contamination of groundwater supplies

Groundwater is rainwater that has seeped from the surface into the ground and become stored in porous soils and rocks. Groundwater is a valuable resource in our food system as it is the main source of water for many farmers and pastoralists, particularly in many remote regions in Australia. Farmers and pastoralists access the groundwater by using water bores that bring the water to the surface. Therefore, the contamination of groundwater supplies by chemical fertilisers and pesticides is a major issue for environmental sustainability.

When nitrogen-based fertilisers are used on crops and pastures, they break down into water-soluble nitrates. Because they are water soluble, these nitrates are easily absorbed into the soil, where they can accumulate before being leached into groundwater aquifers.

The contamination of groundwater supplies can impact on the quality of drinking water for people living in country regions. Farmers or pastoralists also use groundwater to supply water for their crops or stock. If the groundwater stocks are contaminated, the health of their crops and stock can be put at risk.

In addition, many ecosystems are completely dependent on groundwater supplies, including wetlands, coastal mangroves, and animals and birds that rely on fresh drinking water for their survival.



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A water bore being used to bring groundwater to the surface

Herbicide resistance

Over the past 20 years, some weeds have developed a resistance to the herbicides used to control them. If a weed becomes resistant to one herbicide, it can go on to develop a resistance to other herbicides that are designed to work in a similar way. If weeds develop a 'multi-herbicide resistance' – that is, they become resistant to more than one group of herbicides – this becomes a major problem for farmers.

Case study

The impact of fertiliser run-off on the Great Barrier Reef

The wet tropical coast of northern Queensland is home to most of Australia's sugar and banana industry. Approximately 90 per cent of all bananas, and 95 per cent of all sugar cane produced in Australia is grown in northern Queensland. Banana and sugar plantations use large amounts of irrigated water, and therefore many of these plantations are located along the northern Queensland river systems. These rivers run into the coastline adjacent to the Great Barrier Reef. As well as having access to a good water supply, growing healthy bananas and sugar cane also requires the heavy application of fertilisers including nitrogen, phosphorus and potassium.

However, recent evidence clearly demonstrates that fertiliser from these plantations is running into the river systems in northern Queensland and polluting the waters of the Coral Sea that surround the Great Barrier Reef. This pollution of the ocean waters by chemical fertilisers provides a perfect breeding ground for the Crown of Thorn starfish that are destroying the Great Barrier Reef.

These threats to the Great Barrier Reef have been recognised by the Queensland Government who, along with sugar cane growers and banana farmers, is developing strategies to reduce agricultural run-off in an effort to improve the health of the reef.



A plume of coastal sediment carrying chemical fertiliser out to sea near the Great Barrier Reef

Age Fotostock/Spacephotos/JMH-Galaxy Contact

Use of water in primary food production systems

Australia is the driest inhabited continent in the world – two-thirds of the continent is classified as either arid or semi-arid, with an annual rainfall of less than 500 millimetres.

Fresh water is vital for agriculture. Farmers use water in their orchards, vineyards, vegetable market gardens, in the production of rice, to produce pasture for dairy cows and sheep, and for drinking water for their animals. Climate change is having a dramatic impact on the national rainfall totals, and the Australian Bureau of Statistics reports that 'despite rainfall returning to some parts of eastern Australia in early 2020, national rainfall was below average with 2019–20 the sixth driest year on record'.

In Australia, approximately 75 per cent of all water supplies are used in agriculture. The water that farmers use comes from a range of sources, including irrigation, groundwater supplies, river systems, dams, or tanks on their farm, or by using recycled water.

IRRIGATION IN AUSTRALIAN PRIMARY FOOD PRODUCTION SYSTEMS

Australia has the highest per capita water storage system in the world. The system was built following World War II in an attempt to ensure a reliable water supply for domestic consumption, and also for irrigation. To support the irrigation systems, dams and channels are built and paddocks are levelled to move water from natural waterways to agricultural production areas.

In the past, some irrigation systems were not adequately maintained, and a large percentage of the water harvested for irrigation was lost through seepage and evaporation. As a result, pollution and salinity problems threaten hundreds of millions of dollars in agricultural production.

The production of rice and cotton crops requires high levels of irrigation. This has led to rising water tables, salinity, the washing of herbicides and pesticides into the water courses downstream, and the potential for nitrates to leach into groundwater and cause contamination.



FIGURE 12.3 Irrigation areas of the Murray–Darling Basin

Wimmera Mallee Pipeline – an environmentally sustainable irrigation system

The Wimmera Mallee region of Western Victoria is recognised as one of the driest areas in the state. Natural rainfall is insufficient to provide adequate water for the farming properties in the region. Prior to building the Wimmera Mallee Pipeline, farming communities in the region relied on 17 500 kilometres of earthen open channel to deliver their water. However, more than 85 per cent of all available water was lost through seepage from the channels, and through evaporation. The aim of the Wimmera Mallee Pipeline was to bring water to farming properties in the western region of Victoria, providing them with a secure, high-quality water supply. The project, funded by the Australian and Victorian Governments, replaced the open channel system with approximately 9000 kilometres of pressurised pipeline. It is estimated that the pipeline saves approximately 103 billion litres of water a year, much of which has been used to support environmental projects such as the development of wetland areas and to relieve stressed rivers in the region.



Alamy Stock Photo/redbrickstock.com

Spray irrigation of crops can lead to increased soil salinity if not carefully managed.



Newspix/Greg Scullin/News Ltd

Building the Wimmera Mallee Pipeline

SALINITY

Salinity in Australia has recently been described as a national crisis. Drinking water and farm productivity are threatened by salinity, as is the future existence of the Snowy, Murray and Darling rivers. Salinity means there is too much salt in the soil. Most plants associated with food production will not grow in salty soil.

Irrigation salinity occurs if groundwater rises, which generally occurs when excess water is added to groundwater supplies, such as through irrigation. As the water table reaches the surface, waterlogging becomes apparent, and water and salt emerge through the topsoil, forming salt crusts and killing vegetation and crops. This leads to further soil erosion and increased salinity in rivers and streams.

Collaborative Activity

In areas where irrigation salinity occurs, saline groundwater is forced into local waterways, causing extensive damage to the environments and ecosystems along the river system.

Strategies to ensure environmentally sustainable water use

Farming that uses irrigated water can lead to salinity, reducing the productivity of the land and causing a decline in crop yields. Preventing the creation of saline land is essential to ensure the long-term sustainability of Australia's primary food production system.

Farmers work with government authorities and local communities to develop plans for managing the water they use efficiently, as well as to minimise the impact of farming on the natural environment. Some of the strategies used to ensure effective water use are:

- monitoring water quality regularly to test for salinity
- using new technologies, such as GPS for laser levelling, to flood paddocks quickly
- using only just enough water for maximum growth and good health of the crop or pasture; for example, using drip-irrigation systems controlled and monitored by sophisticated computer systems to deliver only the water needed for optimal growth of the plants
- maintaining and repairing breaks in channels and banks to avoid water loss
- enclosing open-channel irrigation systems or using pipelines to prevent evaporation
- using irrigation layout or design that reduces water use on a farm by only watering necessary areas
- capturing irrigation water in channels and dams and reusing it
- improving efficiency of water use by analysing soil moisture. To achieve this, farmers are installing moisture sensors and connecting them through the Internet of Things to determine the amount of water needed for specific crops.

Improvements in sustainable water management

Improvements in the sustainable management of water have been demonstrated by developments in the rice and dairy industries. In Australia, rice can only be approved as a crop on heavy clay soils, because the clay minimises seepage of irrigation water into the water table. Containing the water on top of the clay layer stops the water table from rising and reduces the threat of salinity. Having a clear understanding of the soil profile means the farmer minimises the use of water to grow rice; Australian grown rice uses 50 per cent less water than the global average. Using the appropriate soil for growing rice will also lower the cost of water and make more water available for other environmental uses. During drought years, the irrigated water allocation to rice farmers is also reduced.



Alamy Stock Photo/Excitations

The impact of salinity on agricultural land



Alamy Stock Photo/Tony Hertz

Using GPS for precision farming – laser levelling



Science Photo Library/Mitch Kezar/AgStockUSA

Using sensors to analyse the water requirements of the crop



Newspix/Sam Mooy

Irrigating a rice crop in Griffith, NSW

Agricultural departments throughout Australia have been working with dairy farmers to develop systems that reuse effluent and drainage water from dairy sheds. Effluent from dairy sheds, including urine and faeces, can wash into local rivers and creeks after rainfall, causing significant pollution of the waterways. Results indicate that a well-managed reuse system can achieve significant water and nutrient savings on dairy farms. The nutrients can be added to the irrigated water and used as fertiliser on the pasture, instead of being washed away into natural water systems, and the water can be reused to grow pasture, rather than being lost in drainage.

Understanding the Text

Answers
Understanding the Text

11 Explain why the use of fertilisers is important in primary production of food. What is the difference between herbicides and pesticides?

12 Prepare a PMI chart (plus, minus, interesting) on the role of agricultural chemicals on environmental sustainability.

PMI CHART – THE ROLE OF AGRICULTURAL CHEMICALS IN ENVIRONMENTAL SUSTAINABILITY		
Plus	Minus	Interesting

13 Describe three ways in which sprays used in food production can be applied so they have a minimal impact on the environment.

14 Outline two key ways in which soil acidification can occur.

15 Explain how the use of chemicals in agriculture can contaminate groundwater supplies. Why is the contamination of groundwater supplies an important issue for Australian farmers?

16 Explain why the development of the Wimmera Mallee Pipeline has been such an important project for farmers in this region.

17 What is salinity, and why is it a problem for primary producers?

18 Describe four strategies that farmers who rely on irrigation could use to ensure a sustainable water supply.

19 Outline the strategies Australian rice farmers have developed to ensure their use of water is environmentally sustainable.

20 Describe a strategy dairy farmers have developed to sustainably manage the use of water on their properties.

Choice of crops and animals for farming

Australia produces some of the world's best wheat, beef and sheep. Our milk is also sought after in many Asian countries, where it is seen as being of high quality and produced using world's best practice. However, it is evident that our climate is changing, leading to increased land temperatures and a more variable rainfall in many of our traditional farming areas. As a consequence, primary food producers are being forced to reconsider the types of crops and animals they use, in order to ensure the sustainability of these important primary food products.

SUSTAINABLE CROP PRODUCTION

While a wide variety of cereal crops are grown in Australia, the country is especially well known for producing high-quality wheat. Wheat is Australia's largest grain crop, though a wide range of other crops are also grown, including barley, sorghum, oats, rice and pulses such as lentils, lupins, fava beans and chickpeas. The grains grown in Australia are for both domestic and export markets, where they are used in the food processing industry to produce products for consumers and for livestock feed.

Deciding which types of crops to plant is very complex, and farmers must consider a number of competing factors. Climate change modelling shows that Australia can expect to see an increase in temperatures and carbon dioxide (CO_2) concentrations, and reduced rainfall, all of which will impact on soil health and grain growth. In addition, farmers will face a risk from pests and diseases. These are all critical environmental factors in the farmer's decision-making when determining the sustainability of future crops.

Wheat

A key problem facing wheat farmers is that wheat is a winter crop, and grows best when the air temperature does not exceed 23 °C. However, recent years have seen higher temperatures during the growing season, which decreases the period the grain flowers, and consequently reduces crop yield. In addition, wheat is grown as a dry-land broad-acre crop that is reliant on natural rainfall rather than irrigation. Early rain is needed in autumn to sow the crop, and follow-up rain during spring is also necessary for the grain to develop and form the head containing the wheat grains. However, as land temperatures rise and the frequency of drought increases, many of the traditional wheat varieties are becoming less viable.



iStock.com/Orientaly

Harvesting wheat

Developments in wheat production

Today wheat farmers rely on the advice of agronomists and agricultural scientists when determining the most suitable varieties of wheat to grow on their farm. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) has undertaken research to examine a range of data, including weather conditions, soil types and the geography of the land, to determine the most suitable varieties of wheat to grow in Australia's changing climate. Plant breeding and research into genetically modified organisms has enabled scientists to develop wheat breeds that are more drought, frost or salt tolerant. Some of the most interesting developments in wheat research are into varieties that are more water efficient, and use less water as they grow. This reduces the amount of foliage the plants produce and enables the soil to retain more water, which can then be used by the plants as the wheat ears or grain begins to develop. The CSIRO is also undertaking research into developing wheat varieties that can grow in an atmosphere that contains higher levels of carbon dioxide and/or at increased temperatures.

Activity 12.4

Choosing crops for sustainability

Prepare a PMI (plus, minus interesting) chart on the use of wheat as a sustainable food crop

PMI CHART – WHEAT AS A SUSTAINABLE FOOD SUPPLY CROP		
Plus	Minus	Interesting

Rice

Rice growing in Australia is very water dependent, and rice growers rely on flood irrigation to supply the water necessary to grow their crop. Rice, which can only be grown in certain soil profiles, is grown in the summer months in Australia, and rice growers use a system of crop rotation to plant wheat or pasture crops for animals at other times of the year. These crops utilise the water that is retained in the soil after the rice crop has been harvested.

While Australian rice growers use 50 per cent less water than the global average, the availability of water for irrigation is dependent on the health of our river systems and the amount of water they hold. During periods of drought, less water is available for irrigation, and so less rice can be grown. Severe drought across much of Australia in recent years has meant that many rice farmers received only a fraction of the water they would normally have been allocated for irrigation. As a result, many farmers in the Riverina were forced to cut their planting by between 30 and 50 per cent. The drought conditions have also forced many farmers to rely on using groundwater supplies, and after years of drought these precious supplies have been severely diminished. Despite the progress many rice farmers have made in reducing their water use, the changing climate and unpredictable rainfall pose a significant threat to the sustainability of rice production in Australia.

Future crops

As drought and increasing land temperatures affect the viability of many crops, agricultural scientists are looking to identify crops that will be successful in a hotter and drier Australia.

Saltbush, a shrub native to Australia, is becoming more widely used as a feed crop, particularly for sheep in parts of the country affected by a rising water table and salinity. Saltbush is environmentally sustainable in these areas, as it has been shown to lower the water table and to improve soil health by reducing soil salinity. This enables farmers to grow understory plants that help improve the biodiversity and sustainability of the ecosystem. Farmers who graze sheep on saltbush use it alongside other pasture crops to ensure the sheep have a balanced diet.



Hayley Norman, CSIRO

Sheep grazing on saltbush

Research has also shown that other perennial legume pastures such as tedera are likely to be useful pasture crops in the future. Tedera is native to Canary Island, where it grows in the hot, desert-like climate. Current research shows that tedera is very drought tolerant, and can reduce the need for supplementary feeding of sheep during the summer and autumn, when temperatures are higher and rainfall often lower. As such, it is likely to be a useful animal fodder crop, and will increase farm productivity as the climate becomes hotter and drier.

Messina is another pasture legume that is tolerant to both saline soils and to those that are waterlogged, and may therefore provide a more sustainable crop



Dr Daniel Real, Department of Agriculture and Food Western Australia

Sheep grazing on tedera

in the future. Another advantage of messina is that, as it is a legume crop, it will be useful in improving nitrogen levels in these types of degraded soils.

Other enterprising farmers are exploring the way some of Australia's indigenous plants such as samphire, karkalla, sea parsley and warrigal greens can be developed as sustainable food crops. Many of these plants are salt tolerant, and trial crops are being developed to explore their use in some of the country's salt-degraded agricultural land. They are also proving to be useful as a feedstock for cattle, adding to their value as a sustainable food crop.



Alamy Stock Photo/flowerphotos

Samphire – a salt-tolerant indigenous food crop

SUSTAINABLE ANIMAL PRODUCTION

Australia produces a wide range of animals that are used as meat for human consumption, and for the production of milk and milk products such as cheese, butter and yoghurt. Cattle, sheep, pigs, goats and poultry are the animals most widely farmed to meet the food needs of Australian consumers. Other native fauna, such as kangaroo, crocodile and emu, are also finding their way into our food markets and supermarkets, and onto our dinner plates.

Australian livestock producers and their industry bodies are eager to ensure the environmental sustainability of the industry. A significant amount of research has been undertaken into reducing methane emissions, particularly in cattle, developing strategies to improve water use and to maintain the health of soils. Livestock producers also monitor the density and frequency of grazing livestock on their property; that is, how many cattle or sheep they can run in a particular paddock and how long they leave the paddock free of grazing animals so that the pasture can regenerate. By using strategies such as these, livestock producers are endeavouring to manage the environment in a more sustainable manner.

Cattle and environmental sustainability

Evidence from the United Nations Food and Agriculture Organization shows that there is a clear link between the production of meat and milk for human consumption and the amount of methane in the atmosphere. Australia is a major producer of beef and dairy products for the domestic and international market. Approximately 12 million head of beef cattle are raised in Australia annually, and our dairy herd is made up of more than 1.5 million dairy cows. Research has shown that, on average, a cow emits between 70–120 kilograms of methane annually, contributing approximately 70 per cent of all methane produced by the Australian agricultural sector. Methane, a greenhouse gas, is considered to be a greater problem than carbon dioxide (CO_2), as its negative impact on global warming is 25 times greater than that of carbon dioxide.

Beef and dairy cattle produce large amounts of methane from enteric fermentation, the chemical process that occurs in the stomach of animals that graze on plants. As they feed, cows expel most of this methane by burping, and pass the remainder as flatulence.

Strategies to minimise methane production in cattle

One of the key aims of Meat and Livestock Australia is to ensure the industry is environmentally sustainable and is carbon neutral by 2030. This means that there will be no net release of greenhouse gases into the atmosphere by Australian beef, sheep and goat producers and processers by that date.

Scientists across the globe are exploring the development of feeds that help minimise the amount of methane cattle emit. Research by scientists in Australia, Canada and the United States has identified a red-coloured seaweed, asparagopsis, that may dramatically reduce the methane produced by cattle and other ruminant animals. In Australia, the CSIRO has founded a company called FutureFeed to manage the commercial use of asparagopsis as a feed supplement.

When small amounts of asparagopsis are added to cattle feed – less than 0.5 per cent of the cattle's diet – it can reduce the amount of methane they produce by approximately 80 per cent. The seaweed, a native to Australian coastal waters, contains an organic compound called bromoform that prevents carbon and hydrogen atoms from forming methane in the cow's stomach.



iStock.com/Damocean

The seaweed asparagopsis can help reduce the methane emitted by cattle.

To convert it to a form that can be added to animal feed, asparagopsis is freeze-dried and then flaked or crushed into a powder.

While trials in the use of asparagopsis in cattle have been very positive, there are still a number of problems to overcome. Adding the asparagopsis into the feed mix of dairy or feedlot cattle can be easily controlled and managed. However, researchers are still investigating the best way to add it into the diets of grass-fed beef that graze in paddocks. In addition, scientists are trying to determine how to scale up seaweed production to provide sufficient quantities for commercial use.

Activity 12.5

Feeding cows seaweed could cut their methane emissions by 82 %, scientists say

Read the article that follows, then answer these questions:

1. Evaluate the validity of the news article by assessing the source, purpose, context, presentation of evidence and language used. Alternatively use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this news article. See pages 193–94 for additional information on completing a CRAAP test.
2. Explain how adding asparagopsis to the diet of cattle can benefit the environment.
3. Clarify why methane is considered to be so damaging to the environment.
4. Assess whether adding asparagopsis to the feed of beef and dairy cattle will have an impact on the flavour of milk and meat.
5. Discuss one of the remaining challenges to including asparagopsis in the diet of cattle.

FEEDING COWS SEAWEED COULD CUT THEIR METHANE EMISSIONS BY 82%, SCIENTISTS SAY

Feeding seaweed to cows is a viable long-term method to reduce the emission of planet-heating gases from their burps and flatulence, scientists have found.

Researchers who put a small amount of seaweed into the feed of cattle over the course of five months found that the new diet caused the bovines to belch out 82% less methane, a potent greenhouse gas, into the atmosphere.

The finding builds on previous research that showed that seaweed could reduce cows' methane output over a shorter time span. 'We now have sound evidence that seaweed in cattle diet is effective at reducing greenhouse gases and that the efficacy does not diminish over time,' said Ermias Kebreab, director of the World Food Center and an agricultural scientist at University of California, Davis.

Kebreab conducted the research, published in PLOS One with Breanna Roque, a PhD graduate student.

Cows produce methane via microbes in their stomachs as they digest their fibrous food, in a process a little like fermentation. Methane is shorter-lived in the atmosphere than carbon dioxide but is more than 30 times as effective in trapping heat, making it a major greenhouse gas. A type of seaweed called *Asparagopsis taxiformis* can partially counteract these emissions from cows.

Agriculture makes up about 10 per cent of emissions in the US, much of it from cows that belch, and to a lesser extent, fart out methane. This has led some climate campaigners to urge people to eat less meat but the UC Davis researchers said that existing meat production could be made better for the climate by putting seaweed on the menu for cattle.

Two years ago, separate research by Kebreab and Roque found that the seaweed supplements reduced methane in dairy cows, with a blind taste test of milk finding that it didn't affect the milk output of the ruminants. The latest research, this time on beef cattle, similarly found no difference in the taste of the meat from seaweed-consuming animals.

The next challenge, according to the researchers, will be finding ranchers enough supply of *Asparagopsis taxiformis*, a crimson marine grass that drifts on waves and tides, given there isn't a bountiful supply of it available to farms.

'There is more work to be done, but we are very encouraged by these results,' Roque said. 'We now have a clear answer to the question of whether seaweed supplements can sustainably reduce livestock methane emissions and its long-term effectiveness.'

Extract from 'Feeding cows seaweed could cut their methane emissions by 82%, scientists say', Oliver Milman, *The Guardian*, 18 March 2021. https://www.theguardian.com/environment/2021/mar/18/cows-seaweed-methane-emissions-scientists. Copyright Guardian News & Media Ltd 2022

Dorper sheep and environmental sustainability

Just as Australia is recognised for producing high-quality wheat, we have a strong reputation for being one of the world's leading producers of high-quality fine wool. Merino sheep have been the backbone of the Australian wool industry, while 'fat lambs' for the lamb meat market have traditionally been produced from British sheep breeds such as Border Leicester sheep. However, high labour costs, a fluctuating market and a changing climate have seen a decline in the Australian sheep flock.

In 1996, the first Dorper sheep were imported into Australia from South Africa, where they had been bred for their lamb meat. The Dorper sheep is a white sheep with a black head, while the White Dorper is an all-white breed. They are a low-maintenance breed of sheep, as they shed their fleece, so do not require shearing or crutching (the removal of wool around the tail area of the sheep to prevent fly strike).

Dorper sheep are recognised as being a very hardy breed of sheep that can adapt to a range of climates. They thrive in the harsh terrain found in some of the arid and semi-arid regions of Australia, where there is very low rainfall. The breed is also adaptable, and can be successfully raised in semi-tropical regions. They are now one of the fastest growing sheep breeds in Australia, and are rapidly spreading across the country as part of both conventional and organic farming systems.

Dorpers are considered to be a very sustainable breed of sheep, as they graze on a wide variety of pasture, including saltbush, which is commonly found in many arid areas. Most arid land is not suitable for conventional crop farming, so grazing sheep on the saltbush in what is considered to be 'marginal' land provides farmers with a valuable source of income.

The Mallee has a very low rainfall and is often subjected to drought. Dorper sheep have enabled Mallee farmers to develop a sustainable business by providing diversification, especially in drought years. Dorper sheep grazing on saltbush are now a common sight in the Mallee.

One of the key benefits of Dorper sheep is that they gain weight rapidly and can be produced for both the conventional and organic market. The meat that is produced from lambs that graze on saltbush is very tender, lean meat, and is considered to be very flavoursome. Dorper saltbush lamb is now highly prized by consumers, and is more readily available at farmers' markets across the country.



Alamy Stock Photo/Agencja Fotograficzna Caro

Dorper sheep

Aquaculture and environmental sustainability

Seafood is an important source of protein, and more than 20 per cent of the world's population rely on seafood as their main source of this key nutrient. However, research by the United Nations Food and Agriculture Organization has shown that approximately 70 per cent of the world's fish stock are in crisis, and in danger of being overfished.

Depletion of world fish stocks

Much of the damage to world fish stocks has occurred as a result of overfishing by large-scale commercial fishers. Most of these ships, often described as 'factory' ships, catch vast quantities of fish each time they set out from port. These ships use a technique called 'bottom trawling'; the ship drags a large, heavy weighted net across the seafloor, and trawls up and down the coast, 'clear felling' the ocean floor. This type of fishing is not considered environmentally sustainable. All the marine habitat and sea-life that lives on the floor of the ocean is caught up in the nets, including ancient sea corals and endangered fish species. Less than 30 per cent of the fish caught in these nets is suitable to be sold for food; the remainder is described as bycatch, or 'trash fish'.

Bycatch or trash fish

An inevitable side effect of all large industrial fishing systems is the incidental capture of non-target species, called **bycatch**. Dolphins, marine turtles, seabirds, sharks and juvenile fish are all caught up in the bottom trawling nets. As they have little commercial value, the bycatch is discarded overboard, dead or dying, back into the ocean. To gain a commercial benefit from what would otherwise be a waste product, factory ships grind the bycatch into fish meal that is then sold and used as feed for farmed fish. The unintended capture of such vast quantities of marine life has led to a dramatic decline in populations of many marine species.



Alamy Stock Photo/Jeff Rotman

Sea turtles and other unwanted species caught as bycatch

Sustainable seafood

The global conservation organisation Ocean Wise defines **sustainable seafood** as 'species that are caught or farmed in a way that ensures the long-term health and stability of that species, as well as the greater marine ecosystem'.

The **aquaculture** industry has developed across the globe in an effort to address the concerns of overfishing and the depletion of world fish stocks. The United Nations Food and Agriculture Organization predicts that by 2030, farmed seafood will make up more than 50 per cent of the fish produced and consumed globally.

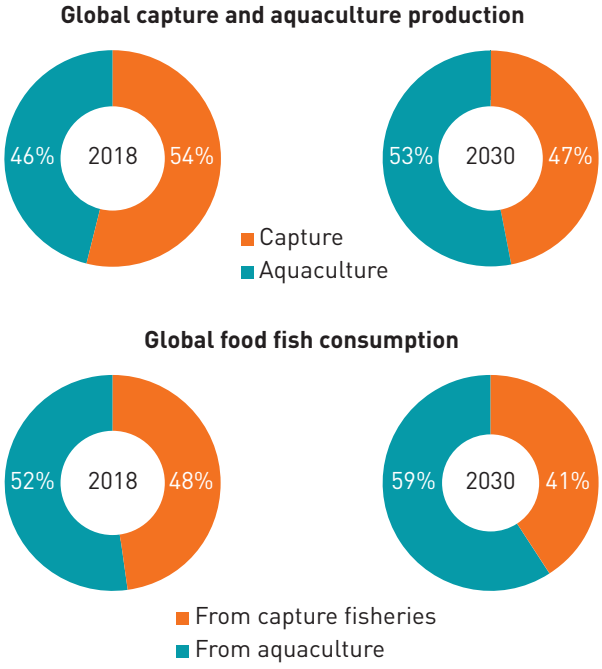


FIGURE 12.4 Aquaculture will supply most of the world fish supply by 2030.

Source: Food and Agriculture Organization of the United Nations

Aquaculture in Australia

Aquaculture, the farming of captive-bred fish stock, has grown considerably over the past decade, and is now the country's fastest growing primary food production system. In Australia, specific species of fish or shellfish are grown in enclosed offshore floating cages or pontoons, or in ponds, tanks or pens. This is an artificial environment, as the fish cannot swim in open waters as they do in the wild. This method of producing seafood is used to grow many marine species, including Australian southern bluefin tuna, Atlantic salmon, Pacific oysters, prawns, kingfish, mulloway, barramundi and abalone. The sea cage or sea pontoon can be located up to 25 kilometres out to sea, where the fish stock is fed, monitored and harvested. The growing cycle for farmed fish takes approximately 6–7 months, however, Atlantic salmon may take up to two years to be ready for harvest.

Salmon farming in the waters off Tasmania involves a series of stages that are carefully monitored. During autumn, the salmon eggs or ova are collected and incubated in on-shore hatcheries. When the juveniles mature, they are moved to tanks until they large enough to be transferred to sea cages to grow and reach their adult size.

While aquaculture has been seen as a solution to overfishing of some endangered species, there is considerable debate, both in Australia and worldwide, about its environmental sustainability.



Fiona Ewing, Tassal Group

Aquaculture sea cages used for farming Tasmanian Atlantic salmon

Features of atlantic salmon farming

- Fish welfare and feeding behaviour is monitored in real-time using the latest technology.
- Fish-feeding barges are moored near the sea cages; underwater cameras and feed detectors are controlled remotely.
- Food pellets are distributed across the pens using air or water propulsion.
- Remotely operated aquatic robots clean the cage nets to prevent the build-up of algae, which hinders water flow and reduces oxygen levels.
- Pens are enclosed with heavy netting to prevent seals and birds from entering the sea cages.
- Salmon are harvested at night when they are resting, so that they are less stressed.
- Fish waste and excess food pellets can pollute the waterways.

FIGURE 12.5 Atlantic salmon farming

Arguments in support of aquaculture

The aquaculture industry can provide many advantages for the environment and consumers.

- It provides a much-needed protein source for the world's population.
- Aquaculture reduces pressure on wild fish stocks, and it helps to prevent overfishing and consequently protects critically endangered species.
- The protein produced from fish has a lower carbon footprint than protein produced from beef.
- Fish is able to be sold at a reasonable and affordable price.
- The industry is able to regulate the supply to meet an increased demand for seafood.
- Fresh water trout, Murray cod, silver perch, jade perch and eels are reared in enclosed inland freshwater fish farms, causing little environmental damage.
- Shellfish such as oysters, mussels and scallops obtain their food directly from the plankton in the ocean currents, and do not need supplementary feeding.
- Crayfish and yabbies are farmed in enclosed inland ponds and do not pollute rivers and oceans.
- Several aquaculture companies have been approved in Australia by the RSPCA, having met their stringent animal welfare standards. These standards include ensuring that fish are able to swim in oxygen-rich water, have sufficient space to swim, can school with other salmon as they would naturally, and be monitored regularly to ensure they are in good health.

Arguments against aquaculture

- Significant pollution of the sea habitat surrounding aquaculture sea farms is caused by fish faecal matter and waste feed being released into the sea. This can harm wild fish populations. In some cases, the high nutrient load has led to an increase in algae growth choking waterways.

- Noise and light pollution from farms are a problem for local communities. These farms operate 24 hours a day, and generate considerable noise and light pollution from essential machinery such as generators, feed barges, net-washing machines and service boats.
- Farmed fish have escaped from the sea pens into the surrounding waterways, where they can have a negative impact on the genetic make-up of native fish. Escaped fish may spread disease among other fish species or prey on other native species.
- Feedstock used to feed and grow farmed fish species, including Atlantic salmon farmed in the waters off Tasmania, is produced from fish such as anchovies, sardines and mackerel, sourced from wild fisheries throughout the world. Atlantic salmon are voracious feeders, and they consume more food per kilogram from wild fish than they produce as fish protein for consumers. Harvesting native fish stock to use as a feed source for carnivorous finfish such as Atlantic salmon impacts on biodiversity, meaning that some native species may not survive for future generations.
- The Australian Marine Conservation Society lists the southern bluefin tuna as a critically endangered species. Ninety-five per cent of the southern blue fin tuna used as stock for aquaculture are caught as juvenile fish in the Great Australian Bight. The juvenile fish are then sent to fish farms in South Australia, where they are fattened up for the domestic or international market. Capturing such a large proportion of juvenile fish does not allow them to mature sufficiently to spawn and produce offspring to rebuild the species.
- Environmental monitoring of the waterways housing the sea cages has shown that high stocking has led to a dramatic deterioration in the water oxygen levels. Neither farmed salmon nor native fish species can survive in these conditions. A report from Tasmania's Environment Protection Authority (EPA) showed that in 2018, approximately 1.35 million salmon farmed in sea cages in Tasmania's Macquarie Harbour had died.
- Environmental studies have identified significant damage to the sea floor below some aquaculture farms. Evidence has shown that pollution from fish faeces and fish feed can create 'bacterial mats', leading to large dead zones, devoid of any aquatic plant or animal life if not well monitored.

Practical Activity 12.6

Sustainably sourced tuna

Aim To investigate the influence of the sustainability of tinned tuna on purchasing decisions.

Method

1. Select three brands of single-serve tinned tuna.
2. Using the details on each label and by accessing the website of each brand, record your research about the sustainability of each product.

Results

	PRODUCT A	PRODUCT B	PRODUCT C
List the information on the label that suggests the product is sustainably sourced			
Using the website for each brand, summarise the key information on how the tuna is sourced: • Where is the fish grown? • How is the fish caught? • Benefits of this method of catching fish • Problems with this method of catching fish			
Outline the environmental impact of the packaging used for the product.			

Analysis

1. Based on your results, identify and explain which product you consider to be more sustainable.
2. As a consumer, was the information on the labels helpful in making an informed decision about which product to choose? Explain your answer.
3. Does the environmental impact of the materials used to package the tuna influence your purchasing decision? Why or why not?

Conclusion

Identify which product you would purchase. Consider the sustainability of tinned tuna when justifying your decision.

Goat production and environmental sustainability

Goats are often considered to be a feral pest in outback Australia, where over 2 million range throughout central and northern Australia. However, livestock producers are now considering goats as an environmentally sustainable source of meat and milk. Rangeland goats are becoming an animal of choice for livestock producers in Central Australia, where they have replaced sheep in many areas. Goats are able to tolerate very hot, dry conditions, and adapt well to drought conditions that are too harsh for sheep. They are scavengers that graze on a wide range of plants, including pests or noxious weeds.

Goat-proof fences are an essential feature to ensure the animals do not escape and degrade the surrounding natural environment. Goat meat also has the potential to be a valuable export commodity, with markets opening up in China and India, as well as in North America.

Dairy goats

The Australian dairy goat sector is a small but emerging industry. Initially, goat's milk was sold as fresh milk or cheese, but new products made from goat's milk, such as yoghurt, ice-cream and butter, are now entering the marketplace. Goat's milk is becoming increasingly popular with Australian consumers, particularly among people who are unable to digest the protein in cow's milk. The fat globules in goat's milk are also smaller and more easily digested than the fat in cow's milk.

Goats are considered an environmentally sustainable dairy herd, as different breeds are suited to different climates and can adapt to a variety of conditions. Varieties that were initially bred in Europe are better suited to the cooler climates, while those from Middle Eastern countries are able to tolerate far hotter and more extreme climates. As a consequence, they are more able to adapt to climate change than other ruminant animals such as cows and sheep. Another environmental advantage of goats is that they require far less land than cows to graze, and can browse on a wide range of vegetation, including the foliage from trees and shrubs, as well as weeds. Goats also emit less methane than cows or sheep, so they have less impact on greenhouse gas emissions.



iStock.com/chrissmith731

Goats are an environmentally sustainable dairy herd.

Understanding the Text

21 List four key problems facing wheat farmers in Australia today.

22 Describe two developments in wheat breeding that will assist wheat farmers in the future.

23 Explain why many Australian rice farmers use a form of crop rotation on their property.

24 Outline some of the environmental sustainability issues facing Australian rice farmers.

25 Describe the advantages that the introduction of future crops such as saltbush, tedera and messina will have for the sustainability of Australia's food supply.

26 Draw up a mind map to demonstrate the sustainability issues being addressed by Australian livestock producers.

27 Explain why the production of dairy and beef cattle is seen to have a major impact on environmental sustainability. Describe a key strategy being developed by agricultural scientists to address this environmental sustainability issue.

28 List the key advantages of using Dorper sheep for the production of sheep meat in Australia.

Answers
Understanding the Text

Chapter Test
Chapter review

29 Explain the meaning of the term 'factory ship' and outline the implications they have for the sustainability of fish stocks.

30 Prepare a PMI (plus, minus, interesting) chart on the environmental sustainability of aquaculture as a method of providing seafood for consumers.

THE ENVIRONMENTAL SUSTAINABILITY OF AQUACULTURE		
Plus	Minus	Interesting

THINKING SKILLS

Applying knowledge

Identify three facts relating to each of the following aspects of organic food production:

- the characteristics of organic farming
- the advantages of organic farming to producers and the environment.

Analysing information

Prepare a PMI (plus, minus and interesting) chart of minimal tillage farming as an environmentally sustainable method of farming. Use examples to support your answer.

MINIMUM TILLAGE FARMING AS AN ENVIRONMENTALLY SUSTAINABLE METHOD OF FARMING		
Plus	Minus	Interesting

Evaluating concepts

Worksheet

Prepare a SWOT analysis on the use of chemicals in primary food production

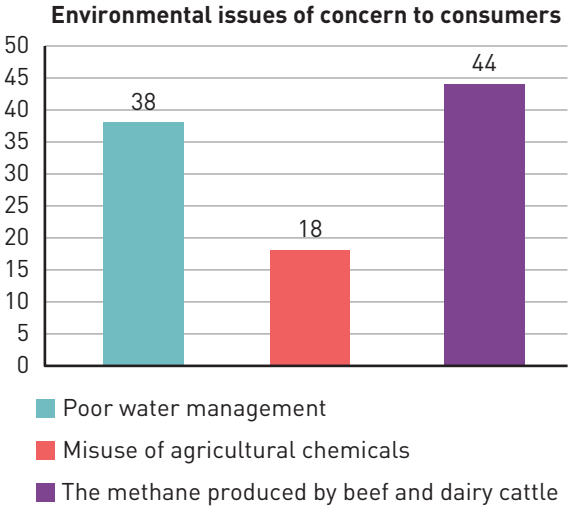
STRENGTHS	WEAKNESSES
OPPORTUNITIES	**THREATS**

EXAMINATION-STYLE QUESTIONS

Answers
Examination-style questions

Resources
Preparing for exams support

Question 1 (8 marks)



Select one of the environmental issues identified in the graph on the previous page.

a Explain how the production of food can contribute to the environmental issue you have selected. [5 marks]

b Describe the way in which Australian scientists and farmers are developing strategies to address the environmental issue you have selected. [3 marks]

Question 2 (6 marks)

'Minimum tillage farming is considered to be the most environmentally sustainable primary food production system.'

Evaluate this statement in relation to primary food production in Australia.

Question 3 (7 marks)

Supporters of organic food production believe that it is the most environmentally sustainable food production system.

a Describe the characteristics of an organic food production system. [3 marks]

b Discuss the advantages to environmental sustainability of organic food production. [4 marks]

Question 4 (6 marks)

Discuss diverse points of view in the debate over the environmental sustainability of aquaculture as a method of supplying Atlantic salmon for the Australian market.

Question 5 (11 marks)

Environmental sustainability in primary food production is a key issue for all Australian farmers.

a Discuss whether rice is an environmentally sustainable crop for Australian primary producers. [6 marks]

b Describe practices farmers can implement to ensure the environmental sustainability of Australian water supplies. [5 marks]

Pasta and cannellini bean soup

Pasta and cannellini beans are ingredients synonymous with Italian cuisine. Cannellini beans are a large white bean popular in central and southern Italy. The variety of vegetables used in this soup, and the addition of cannellini beans, provides a wide range of nutrients including vitamins, minerals and dietary fibre, as well as having the added advantage of being low in kilojoules. The combination of pasta, cannellini beans and pumpkin in this recipe makes a delicious, thick, nutritious soup.

1 tablespoon olive oil

½ onion, finely diced

½ stalk celery, finely diced

1 garlic clove, crushed

pinch dried chilli flakes

salt

sprig fresh rosemary, finely chopped

200 grams canned chopped tomatoes

3 cups vegetable stock

200 grams butternut pumpkin, peeled and cut into 2-centimetre dice

50 grams risoni pasta

200 grams canned cannellini beans, drained and rinsed

1 tablespoon sour cream or Greek yoghurt

1 tablespoon grated parmesan cheese

1 teaspoon olive oil

METHOD

1 Heat 1 tablespoon of olive oil in a medium saucepan over moderate heat. Add the onion and celery and sauté until soft but not brown. Add the garlic, chilli flakes, salt and rosemary and sauté for a further minute.
2 Add the canned tomatoes, stock and diced pumpkin and bring to the boil over a moderately high heat. Reduce the heat and simmer for 20 minutes, until the pumpkin is tender.
3 Add the risoni pasta and cook for a further 10 minutes.
4 Using a potato masher, crush some of the pumpkin lightly to thicken the soup.
5 Add the cannellini beans and heat through gently. If the soup is too thick, adjust the consistency by adding a little more vegetable stock or water. Check the seasoning and add a little more salt or pepper if desired.
6 Serve the soup topped with a dollop of sour cream or yoghurt, a sprinkle of parmesan cheese and a drizzle of olive oil.

SERVES 2-3

EVALUATION

1 Describe the sensory properties – appearance, aroma, flavour and texture – of the pasta and cannellini bean soup.
2 Classify the ingredients used in the pasta and cannellini bean soup on a diagram of the Australian Guide to Healthy Eating.
3 After classifying the ingredients, discuss how well the soup meets the recommendations of this food selection model.
4 Suggest additional foods that could be served with the pasta and cannellini bean soup to ensure the meal meets the recommendations of the Australian Guide to Healthy Eating.
5 The cannellini beans are an example of pulses that can be grown as part of a crop rotation system. Explain how crop rotation improves the environmental sustainability of land used for farming.



Mark Fergus Photography

Grain and lentil salad with salmon and fennel

This salad is very colourful and has a great crunchy texture. Freekeh is young, green wheat that is toasted to develop a nutty flavour. Both freekeh and Puy lentils are high in dietary fibre, a good source of protein and have a low GI. Serving the salad with salmon adds protein and omega-3 to the meal. The salmon is quickly pan-fried to ensure it is moist and tender.

GRAIN AND LENTIL SALAD

½ cup cracked freekeh, or cracked wheat or quinoa
¼ cup Puy lentils
1 tablespoon salted capers
1 tablespoon pumpkin seeds
1 tablespoon slivered almonds
¼ cup currants
½ pomegranate, de-seeded
¼ red onion, finely diced
¼ bunch flat-leaf parsley, chopped
¼ bunch coriander, chopped
½ lemon, juiced
2 tablespoons extra virgin olive oil
1 tablespoon pomegranate molasses

TOPPING

3 tablespoons Greek yoghurt
1 teaspoon honey

SALMON AND FENNEL

2 × 150-gram portions of salmon with skin on
1 teaspoon fennel seeds
8 black peppercorns
¼ teaspoon ground coriander
¼ teaspoon salt flakes
2 tablespoons olive oil
½ lemon, juiced

METHOD

Making the grain and lentil salad

1 To cook the cracked freekeh, fill a medium saucepan with water and bring to the boil. Add the cracked freekeh and simmer, covered, for 20–25 minutes, or until the grains are tender. Drain and cool. (Note: cracked wheat and quinoa only take approximately 12 minutes to cook.)
2 Put the lentils in a small saucepan, cover with cold water and bring to the boil, then strain immediately. Cover the lentils with cold water again, bring back to a simmer and cook for 12–15 minutes, or until the lentils are just tender. Drain and cool.
3 Soak the salted capers for 20 minutes. Change the water several times, then drain and chop roughly.
4 Preheat oven to 180 °C and toast the pumpkin seeds and slivered almonds on a tray for about 3 minutes, until they are pale gold in colour.
5 Finely dice the red onion and chop the parsley and coriander.
6 In a large bowl, combine the freekeh, lentils, chopped capers, toasted pumpkin seeds and almonds, currants, pomegranate seeds, diced onion, parsley, coriander, lemon juice, olive oil and pomegranate molasses.
7 In a separate bowl, combine the yoghurt and honey.
8 Serve the salad with a spoonful of the honey yoghurt.

SERVES 2

Making the salmon and fennel

1 Remove the salmon from the refrigerator 30 minutes before cooking. This allows the portions to cook evenly and prevents them from drying out.
2 Rinse the salmon portions and pat dry with paper towel.
3 Use a mortar and pestle to coarsely crush the fennel seeds and peppercorns.
4 Combine the ground fennel seeds, peppercorns, coriander and salt on a plate.
5 Press the salmon flesh-side down into the ground spices.
6 Heat the oil in a frying pan over medium heat. Add the salmon skin-side down and cook for about 5 minutes, until golden brown. Turn and cook for 3–5 minutes. Place the salmon on a serving plate and drizzle over the lemon juice and pan juices.
7 Serve with the grain and lentil salad and yoghurt topping.

SERVES 2

EVALUATION

1 Describe the sensory properties – appearance, aroma, flavour and texture – of the grain and lentil salad and the salmon with fennel.
2 Discuss why including foods such as salmon, which are a good source of omega-3, is important in the Australian diet.
3 Explain why, according to the Australian Dietary Guidelines, it is important to include grains such as freekeh in the diet.
4 Plot the ingredients used in the salad and salmon recipes on a diagram of the Australian Guide to Healthy Eating. After classifying the ingredients, comment on how well the meal meets the recommendations of this model.
5 Most of the fresh salmon available in supermarkets and markets is produced by aquaculture. Discuss why this method of production is beneficial for consumers, but may be of concern for the sustainability of the environment.



Mark Fergus Photography

Soba noodles with Asian dressing and spicy Shaanxi-style stir-fried lamb and celery

The concept of the 'shared table' is popular in many cultures around the world. A variety of complementary dishes are served at the same time, and are shared by all the diners at the table. Shaoxing wine, a key ingredient in the spicy Shaanxi-style stir-fried lamb and celery, is a traditional Chinese wine that originated in the Zhejiang province of eastern China. It is widely used as a cooking wine in Chinese cuisine. The flavour of this dish is enhanced with Chinkiang vinegar that has a delicious salty flavour and a sweetness similar to balsamic vinegar. The flavours of the soba noodles with Asian dressing and spicy Shaanxi-style stir-fried lamb and celery are very complementary, and perfect for preparing as part of a shared table.

DRESSING

2 teaspoons fresh ginger, finely grated
2 garlic cloves, crushed
¼ teaspoon chilli powder
2 tablespoons tamari
1 tablespoon rice wine vinegar
2 teaspoons mirin
½ teaspoon caster sugar
1 tablespoon sunflower oil

SOBA NOODLES

1 medium carrot
3 spring onions
1 bundle soba noodles (70 grams)
1 tablespoon sunflower oil
¼ cup coriander leaves, picked and rinsed

METHOD

Making the dressing

1 Combine the ginger, garlic and chilli powder in a small bowl.
2 Add the tamari, rice wine vinegar, mirin and caster sugar. Gradually add the oil and stir well. Set aside.

Preparing the noodles

1 Peel the carrot, then slice into very fine julienne sticks.
2 Cut the spring onions into 12-centimetre lengths and slice into very fine julienne sticks. Keep them separate from the carrot.
3 Bring a medium-sized saucepan of water to a boil and add the soba noodles. Cook for 4 minutes, then drain well and rinse under running water. Drain again. Place the soba noodles in a serving bowl.
4 Heat the oil in a wide frying pan or wok. Add the carrot and stir-fry over a moderate to high heat for 2 minutes, until just cooked, but still crunchy.
5 Add the spring onion. Stir through the stir-fried carrot and immediately remove the pan from the heat.
6 Place the stir-fried carrot and spring onion in the serving bowl with the cooked soba noodles. Add the dressing and toss lightly until just combined.
7 Garnish with coriander leaves. Set the salad aside while you prepare the spicy Shaanxi-style stir-fried lamb and celery.

SERVES 2

RECIPE

SPICY SHAANXI-STYLE STIR-FRIED LAMB AND CELERY

1 teaspoon sesame seeds
2 spring onions
2 tablespoons vegetable oil
250 grams minced lamb
½ teaspoon ground cinnamon
½ teaspoon ground star anise
15 grams ginger, grated
2 garlic cloves, finely chopped
¼ teaspoon dried chilli flakes
½ teaspoon ground cumin
3 small celery stalks, sliced thinly on the diagonal
3 tablespoons Shaoxing wine
3 tablespoons soy sauce
2 teaspoons Chinkiang vinegar
1 teaspoon honey

METHOD

1 Toast the sesame seeds in a small saucepan over a medium heat for approximately 5 minutes, or until lightly toasted. Remove from the saucepan and set aside to cool.
2 Slice the white part of the spring onions finely and set aside. Finely slice the green tops of the spring onions on the diagonal and set aside to use as a garnish.
3 Heat 1 tablespoon of the vegetable oil in a wok over medium–high heat. Add the minced lamb, cinnamon and star anise and stir constantly with a wooden spoon until the lamb is well browned and crumbly in texture; approximately 5 minutes. Remove the lamb from the wok and set aside.
4 Heat the remaining 1 tablespoon of vegetable oil in the wok over medium–high heat. Add the ginger, garlic, white part of the spring onion, chilli flakes and cumin and stir-fry for 1–2 minutes, until aromatic.
5 Add the finely sliced celery and stir-fry for 2 minutes. Return the lamb to the pan with the Shaoxing wine, soy sauce, Chinkiang vinegar and honey and stir until well combined.

To serve

1 Place in a serving bowl and garnish with toasted sesame seeds and sliced green spring onion tops.
2 Serve the spicy Shaanxi-style stir-fried lamb and celery with the soba noodles with Asian dressing as part of a shared table.

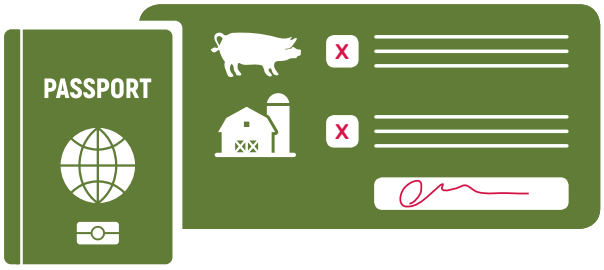
EVALUATION

1 Describe the sensory properties – appearance, aroma, flavour and texture – of the Shaanxi-style stir-fried lamb and celery with the soba noodles with Asian dressing.
2 Classify the ingredients used in the Shaanxi-style stir-fried lamb and celery with the soba noodles with Asian dressing recipes on a diagram of the Australian Guide to Healthy Eating.
3 Use the data from question 2 to discuss how well the meal meets the recommendations of this food selection model.
4 Discuss why, in Australia, Dorper sheep are becoming increasingly popular to produce meat such as the minced lamb used in this recipe.
5 Soba noodles are often made of organic wheat. Explain why an organic food production system is considered to be environmentally sustainable.



Mark Fergus Photography

MANAGING BIOSECURITY IN AUSTRALIA



Travellers entering Australia from overseas must declare if they have had contact with farms or farm animals in the previous 30 days.

Screening imported goods and the baggage of international arrivals at ports and airports using:



Biosecurity dogs



X-ray machines

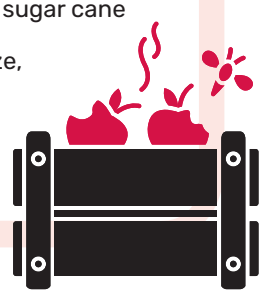


Surveillance

BREACHES OF BIOSECURITY CAN THREATEN AUSTRALIAN AGRICULTURE AND LIVESTOCK

Threats to crops:

- X Panama disease to bananas
- X Fire blight to apples and pears
- X Red fire ants to crops, pastures and fruit trees
- X Coconut rhinoceros beetle to coconut oil palms and sugar cane
- X Fall armyworm to maize, rice and sugar cane



Threats to animals:

- X Foot and mouth disease in cattle, pigs, goats and sheep
- X Asian honeybees to native Australian honeybees
- X African swine fever to domestic and feral pigs
- X Bluetongue virus to sheep



13

RISKS TO ENVIRONMENTAL SUSTAINABILITY

KEY TERMS

biodiversity the vast array of living organisms that inhabit the planet, and the interactions between them

biosecurity the protection of people, animals and the environment from infectious disease, pests and other biological threats

climate change a change in the pattern of weather, and related changes in oceans, land surfaces and ice sheets, occurring over timescales of decades or longer

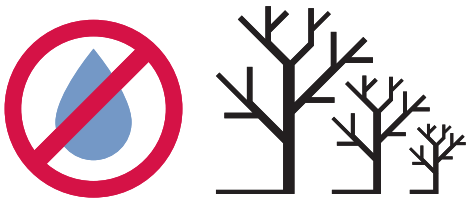
sustainability in agriculture, describes farming practices that are used to sustain the land so it is available for future generations and to ensure the sustainability of our future food supply

Resources
Study Design
links
Infographics
Flashcards

IMPACT OF CLIMATE CHANGE ON AGRICULTURE AND FOOD SUPPLY

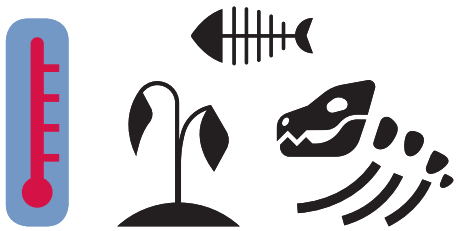
Less rain

Longer and more severe droughts, less water for irrigation, increase in salinity of groundwater affecting the health of crops and animals, increased rate of soil degradation and erosion



Increased temperatures

Reduced crop yields, reduced viability of some fruit and vegetable crops to grow in some regions (such as stone fruits and berries in cool climates), heat stress on livestock affecting their rate of growth and productivity, greater threat from pests, rising sea temperatures affect fish stocks



More intense & frequent natural disasters

Bushfires, cyclones and floods – destroying crops and pastures and killing livestock



Risks to environmental sustainability in Australia

Australia's reputation for producing food that is safe and clean is well-recognised across the globe. However, a range of factors affect the **sustainability** of Australia's agricultural sector, particularly the farming practices implemented. Sustainable farming practices must be used in order to ensure the land will be available for future generations and to ensure the sustainability of our future food supply. Breaches of biosecurity regulations can damage the crops and animals we produce for food. In addition, climate change and the loss of biodiversity pose many risks to our future food production.

What is biosecurity?

Biosecurity is the protection of people, animals and the environment from infectious disease, pests and other biological threats. Rabbits, now recognised as one of Australia's most invasive pests, arrived with the First Fleet and were originally intended as a source of food for the new colonists. However, their release into the Australian countryside saw their population explode, as they had no local natural predators. Similarly, the introduction of the cane toad to control cane beetles in Queensland in 1935 has led to widespread destruction of much of Australia's small indigenous animal species. Having learnt from these lessons of the past, Australia now has a much more rigorous approach to biosecurity.

MANAGING BIOSECURITY IN AUSTRALIA

The primary responsibility for managing Australia's biosecurity system lies with the Federal Department of Agriculture, Fisheries and Forestry. As an island nation, Australia is one of the few countries in the world to remain free of some of the most severe pests and diseases. To prevent diseases that may be endemic in overseas countries being introduced into Australia, travellers entering Australia from overseas are required to state whether they have been in contact with farms or farm animals in the previous 30 days. However, with the increased ease of travel and international trade, our ability to remain free from these risks becomes more challenging.

One of the key responsibilities of the Department of Agriculture, Fisheries and Forestry is to ensure any risks to Australia's biosecurity are minimised before goods arrive in the country, and to inspect goods as they arrive at our airports, seaports or through our mail centres. Staff use trained detector dogs, X-ray machines and surveillance to detect and prevent any exotic pests, weeds and disease from entering the country.

Biosecurity on Australian farms

BIOSECURITY AND IMPORTED PESTS AND DISEASES

Australia is relatively free of a range of pests and diseases that threaten the sustainability of primary food production in many other countries. One of the greatest concerns for the Federal Department of Agriculture, Fisheries and Forestry is the potential for biosecurity breaches due to the movement of people and trade across the globe. Biosecurity pests can enter Australia in many ways. They can hitchhike on the hull of ships, stow away in the bilge water of container ships, attach themselves to the shoes or clothing of overseas travellers, or secrete themselves in food products or food packaging intended as gifts for family and friends.

Weblink
Biosecurity in Australia

Panama disease in bananas

In 1997 the biosecurity of the Australian banana industry was breached when Panama disease was detected in Cavendish banana plantations in the Northern

Threats to Australia's crops	Threats to Australia's livestock
• Fall armyworm – maize, rice, sugar cane	• White spot disease – prawns
• Coconut rhinoceros beetle – coconut oil palms, sugar cane	• Foot-and-mouth disease – cattle, pigs, goats, sheep
• Fire blight – apples, pears	• Asian honey bees – Australian honey bees
• Panama disease – bananas	• African swine fever – domestic and feral pigs
• Russian wheat aphids – wheat, barley	• Bluetongue virus – sheep
• Red fire ants – crops, pastures, fruit trees	

FIGURE 13.1 Infectious diseases, pests and biological threats to Australian agriculture and livestock



Australian Department of Agriculture, Water and the Environment 2022

Biosecurity detector dog

Territory. Panama disease is a very destructive disease. It is spread through soil and water and can survive for up to 40 years in fungal spores in the soil. Another outbreak of Panama disease was detected in 2015 in a banana plantation in Tully, in northern Queensland. A further outbreak was identified in 2021, and is of great concern for biosecurity specialists endeavouring to minimise the impact of this disease on the banana industry and on the sustainability of banana production in the future.

Asian honey bees

European honey bee populations are essential to the pollination of Australian crops and fruit and nut trees, particularly canola and lucerne crops and avocado, almond and cherry trees. However, European honey bee colonies are at risk from both bushfires and Asian honey bees, which poses a threat to the sustainability of Australia's food production system.

Asian honey bees act as a host for varroa mites, which have devastated honey bee colonies in many countries across the globe. Until recently, Australia was considered to be the last area in the world to be free from varroa mites. However, Asian honey bees were identified in Australia in 2008, having arrived in Cairns, in Northern Queensland, via boat from either Papua New Guinea or the Indonesian province of Papua. Asian honey bees are a major biosecurity threat to Australian bee populations, as they can spread the varroa mites, disrupting the ability of European and native bees to pollinate important food crops. The varroa mites feed and reproduce in the infant bees, causing malformations in their legs and wings and eventually decimating the colonies.

African swine fever

African swine fever is a highly contagious, viral disease that affects both domestic and wild pig populations. Pigs that contract African swine fever suffer from fever, skin blotching, diarrhoea, vomiting and pneumonia, often resulting in death. The disease is endemic in sub-Saharan Africa, but outbreaks have also occurred across eastern Europe. By 2019 it had also been detected throughout South-East Asia, including Papua New Guinea and Timor-Leste.

African swine fever is spread through contact with infected animals or contaminated farm vehicles and infrastructure. The virus can survive for extended periods, even in cured and frozen pork products such as ham, bacon and sausages. At present there is no treatment.

Australia is currently free from African swine fever. However, it is a constant threat and could have devastating consequences for pig populations and pig producers if it became established here. To minimise the likelihood of African swine fever entering Australia, a number of biosecurity protocols have been established:

- Australia prohibits the importation of fresh pork products and has strict requirements for the importation of pork products from countries where African swine fever is prevalent.
- Swill feeding – that is, feeding food scraps to pigs – is banned in Australia. Pigs cannot be fed any food that has been in contact with meat or dairy products.
- All products containing meat must be declared on arrival at Australian seaports or airports.

Foot-and-mouth disease

Foot-and-mouth disease (FMD) is one of the greatest threats to the Australian livestock industry. At present, Australia is free of this highly contagious disease, which has been found in many countries, especially in Asia, the Middle East, South America and Africa. Foot-and-mouth disease is a viral infection that affects animals with cloven hoofs, including cattle, sheep, pigs, goats, deer, buffalo and camels. The disease spreads rapidly, especially when animals are housed closely together or when they are moved between properties or countries. Affected animals develop huge blisters in-between their toes and on their heels, which can grow into painful ulcers, leaving them unable to walk to find water or food. Blisters on their lips and in their mouths also mean they are unable to eat or drink, and as a result, young animals can die. The effect of the disease on farms can be devastating. An outbreak of

foot-and-mouth disease in the United Kingdom in 2001 was eventually contained after approximately 10 million pigs, sheep and cattle were destroyed.

Any outbreak of foot-and-mouth disease could have a dramatic impact on the sustainability of Australia's livestock industry, and therefore on our primary food production. There would be significant costs involved in destroying infected animals and associated with the resulting loss of production. The Department of Agriculture, Fisheries and Forestry reports that 'a small foot-and-mouth disease outbreak, controlled in 3 months, could cost around $AUD 7.1 billion, while a large 12-month outbreak would cost $AUD 16 billion'.

Fire blight in the apple and pear industry

The Australian apple and pear industry also faces a biosecurity risk to its future sustainability. Our access to locally grown fruit could be at risk if fire blight breaches our biosecurity system. Fire blight originated in the United States of America and has been detected in New Zealand, the United Kingdom, Europe and the Middle East. Fire blight is not present in Australia, but the challenge for biosecurity authorities is to ensure that it does not find its way into the country.

Fire blight is a bacterial disease that can destroy apple and pear orchards within one growing season. The disease gets its name from the effect it has on the blossom, shoots, fruit, branches and limbs of the affected fruit trees, which can appear blackened as though they have been scorched by fire. Fire blight eventually kills the fruit trees, and therefore has a devastating effect on apple and pear production, threatening the livelihood of fruit growers and cutting off consumers' access to locally grown fruit.

The apple and pear industry is worth approximately $580 million to the Australian economy. Victoria produces approximately 46 per cent of Australia's apples and 88 per cent of our pears. An infestation of fire blight could devastate the industry, as infected fruit orchards would need to be destroyed. It has been estimated that approximately 80 per cent of the Victorian pear growing region alone could be decimated by the introduction of fire blight. As the domestic market consumes almost 95 per cent of all apples and pears produced in Australia, any infection by fire blight could severely affect the sustainability of the industry.



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Fire blight in an apple tree

Threats to Australia's cereal production

Cereal farmers also face many risks to the sustainability of some of our most widely grown crops, including wheat, barley and soy beans. It is estimated that approximately 80 per cent of Australia's barley varieties would be at risk if barley became infected with a disease known as barley stripe rust. Similarly, Australian wheat varieties are at risk of severe damage from a variety of wheat rust prevalent in Uganda, and from Russian wheat aphid. Soy beans, a crop widely grown in Australia, could be severely affected by soybean cyst nematode, a pest that affects the roots and stunts the growth of soybean plants.

PATHWAYS TO ENSURING BIOSECURITY ON AUSTRALIAN FARMS

Biosecurity is a major concern for the Australian agricultural and pastoral industries. Pests and diseases can be spread unintentionally between farms through contaminated soil or plant material. Friends, family, neighbours or other farm workers or contractors can carry traces of contaminated soil or plant seeds on their boots and clothing. Contaminated organic material can also be carried on vehicles or farm equipment when people move between farms or between farming regions.

Therefore, preventing the entry and spread of pests and diseases through on-farm biosecurity is the best and safest approach.

Farmers are encouraged to develop biosecurity protocols to minimise the opportunity for pests and disease to enter their property. For example:

- Place signs at the entrance to the property to raise visitors' awareness of on-farm biosecurity.
- Request that visitors to the farm contact the owner or farm manager before entering the property.
- Use vehicles that are solely dedicated for use on the property; for example, quad bikes that are only used on the farm and not taken off the property.
- Develop strategies such as providing a dedicated area for vehicles and farm machinery to be washed before starting work on the property.

The development of biosecurity protocols is essential in order to minimise the possibility of exotic pests or diseases being introduced to farms and jeopardising the sustainability of their primary food production.

Biosecurity on an organic poultry farm

Avian influenza, or 'bird flu', is a highly contagious viral infection that can affect poultry flocks including chickens, ducks and turkeys. It is a very severe disease, and can lead to entire flocks dying or being destroyed. An outbreak of avian influenza was detected in Victoria in 2020 and early 2021; however, the industry sector and Agriculture Victoria worked together to eradicate those outbreaks. Poultry farmers are constantly on the alert, and have an array of biosecurity strategies in place to prevent the introduction and spread of this disease.



Alamy Stock Photo/Suzanne Long

Biosecurity on farms is crucial to prevent the spread of invasive pests.



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Biosecurity protocols are essential to prevent ducks and other poultry from contracting avian influenza.

Vehicles and equipment

- Must be thoroughly clean and well maintained to prevent disease spread from contaminated poultry, plants, soil or manure

Staff and visitors

- Thoroughly checked and quarantine declaration completed to prevent biosecurity risks such as pests and disease they may carry from entering the property

Production practices

- Good staff farm hygiene to reduce the risk of spreading pests and diseases

Farm inputs

- Water, feed and bedding for the poultry is monitored carefully to ensure it is not a source of pests and disease

Water and feed troughs

- Kept clean of uneaten feed to prevent contaminated water spreading disease; water sanitation records maintained

Poultry manure and waste material

- Carefully disposed of to prevent contamination of water storages and pasture

Staff training and detailed record keeping

- Allows biosecurity issues to be accurately traced and action taken

FIGURE 13.2 Biosecurity protocols on an organic poultry farm

Activity 13.1

Scott Morrison announces $370m in biosecurity funding at Beef Australia 2021 as Federal Budget looms

Read the article that follows, then answer these questions:

1. Evaluate the validity of the news article by assessing the source, purpose, context, presentation of evidence and language used. Alternatively use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this news article. See pages 193–94 for additional information on completing a CRAAP test.
2. Outline the main areas that will receive funding under a new national biosecurity surveillance system.
3. Write a short paragraph explaining why the investment in a new biosecurity surveillance system is important to Australia's future.
4. Outline four biosecurity threats that have recently entered Australia.
5. Explain why the new funding for biosecurity measures will be popular with farmers.

SCOTT MORRISON ANNOUNCES $370M IN BIOSECURITY FUNDING AT BEEF AUSTRALIA 2021 AS FEDERAL BUDGET LOOMS

Keeping Australia safe from devastating pests and disease will be the focus of a $370 million federal government splurge announced by Prime Minister Scott Morrison today.

The funding, to be allocated in next week's Budget, includes $67.4m for a 'national surveillance information system' for Australia's animal sector.

There's almost $100m for an offshore assurance program to identify freight containers for intervention, $35m for research about how pests can enter Australia and $20m for a pre-border passenger screening trial.

There's also $30m to improve biosecurity management of international mail and a $3.9m community and business awareness campaign.

'Protecting our borders is as much about protecting our livestock, crops and environment from diseases that have the potential to devastate them and the livelihoods they support,' Mr Morrison said.

Mr Morrison, who is at Beef Australia 2021 in Rockhampton, said Australia's biosecurity system safeguarded the $42-billion inbound tourism industry and $53b in agricultural exports.

'This investment is about putting a protective ring around Australia to safeguard industry as well as the rural and regional communities that depend on it,' he said.

'There will never be zero risk, but we are committed to reducing the risk where possible.'

Despite COVID-19 restrictions closing Australian borders last year, primary producers have faced an onslaught of pest incursions, including the fall armyworm and white spot disease in prawns.

Even with the introduction of tough biosecurity laws in 2019, meat carrying African swine fever fragments has been detected in alarming quantities at Australian mail centres and airports, while last year khapra beetle was found in white goods imported by a major retailer.

Agriculture groups have been calling for increased biosecurity funding and today's announcement is likely to prove popular with farmers who were disappointed by the government's decision to axe plans for a biosecurity levy that would have taxed importers.

GrainGrowers CEO Dave McKeon said the organisation welcomed the government's investment 'toward modernising Australia's biosecurity system'.

'These investments are going to help give our biosecurity system the capability it needs to ensure that we can keep farming Australia's grains sustainably and profitably,' he said.

Mr McKeon said impacts on the Australian grains industry from the khapra beetle alone could rise up to $15.5 billion over 20 years, according to government reports.

According to the government, a recent study by the University of Melbourne suggested the value of the biosecurity system was $314b over 50 years.

More than 2.5m containers and 60m mail items arrived in Australia last year.

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The fall armyworm has attacked crops throughout Australia including maize, rice and sugar cane.

Climate change

The Australian Academy of Science defines **climate change** as being 'a change in the pattern of weather, and related changes in oceans, land surfaces and ice sheets, occurring over time scales of decades or longer'.

It is widely recognised that Australia and Australian farmers in particular are very vulnerable to the changes in climate that will occur over the next century. We live on a continent that has a very variable climate, and are often exposed to extreme weather events such as cyclones, floods, droughts and bushfires.

Across the globe, both land and sea temperatures have risen significantly over the past century. Data from the Australian Bureau of Meteorology shows that the temperature of Australia's land mass and surrounding oceans has increased by more than 1 °C since 1960. They also state that 'Australia's warmest year on record was 2019, and the seven years from 2013 to 2019 all rank in the nine warmest years.'

Climate scientists predict that climate change will have a significant impact on the Australian continent. They forecast that temperatures across the continent will increase, and that the southern states in particular will become far hotter. There is also evidence to suggest that we will experience altered rainfall patterns, with the north of Australia becoming wetter while the southern states become drier. The levels of carbon dioxide in the atmosphere will increase, and this too will have an effect on our primary food production systems.

A report by the Climate Council titled 'Feeding a Hungry Nation: Climate change, Food and Farming in Australia' listed a number of key findings, including that:

- Climate change is making weather patterns more extreme and unpredictable, with serious consequences for Australia's agricultural production.
- More frequent and intense heatwaves and extreme weather events are already affecting food prices in Australia.
- Climate change is affecting the quality and seasonal availability of many foods in Australia.
- Australia is extremely vulnerable to disruptions in food supply through extreme weather events.

THE RISKS OF CLIMATE CHANGE FOR PRIMARY FOOD PRODUCTION

As Australia's climate continues to change and the continent becomes hotter and drier, the agricultural sector in Australia will be at risk. This will impact on the sustainability of our agriculture, livestock and dairy industries.

Climate change and natural resources

One of the most significant impacts of climate change in Australia is that rainfall will diminish in many of our most important food-producing regions, such as the Murray-Darling Basin, and there will be less water available for irrigation. Irrigated beef, sheep and grain producers will be among the most affected and many, by necessity, will become more dependent on groundwater supplies.

In 2020, the Australian Bureau of Meteorology reported that 'the ongoing drought in the Murray-Darling Basin during the latter half of 2019 resulted in widespread decline in groundwater levels.' A major concern for the agricultural sector is that, as more water is extracted from these supplies, increased salinity of groundwater supplies is likely to occur, which will reduce the quality of the water and ultimately the health of crops and animals.

Another consequence of a lack of water is the risk of increased acidification of the soil. Major droughts that hit Australia between 2007 and 2010, and again between 2013 and 2019, led to significantly reduced water levels in the Murray-Darling Basin and resulted in increased levels of soil acidity in the region.

The rate of land degradation and soil erosion is also likely to increase as the soil becomes drier and can hold less carbon. As the soil degrades, plant coverage is reduced, exposing the soil to wind and water erosion.



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The impact of drought on farming land

Understanding the Text

1 Explain the meaning of the term 'biosecurity'.

2 What department is responsible for Australia's biosecurity, and how does that department reduce the risk of any breach to our biosecurity protocols?

3 Describe the threat that Asian honey bees pose to Australian agriculture and our food security.

4 Explain why African swine fever is a threat to Australia's pig population. List two biosecurity protocols that have been established to prevent African swine fever from entering Australia.

5 Briefly outline the impact that foot-and-mouth disease can have on affected animals. Explain why it is important to ensure this disease does not enter Australia.

6 Explain how an infestation of fire blight could impact on the sustainability of the Australian apple and pear industry.

7 Identify two risks that a breach of biosecurity poses to Australian cereal farmers.

8 Draw up a flowchart like the one below to demonstrate some of the strategies farmers could use to ensure they maintain biosecurity on their property.

Answers Understanding the Text



9 What is climate change? List three effects of climate change that are predicted to impact on the Australian continent in the future.

10 Briefly explain how a reduced water supply as a consequence of climate change will impact on farmers in the Murray-Darling Basin.

The impact of climate change on agriculture

As the temperature across the continent increases and rainfall decreases, the moisture in the soil will decline, making it difficult for crops to grow. Wheat is one of the most important cereal commodities produced in Australia. However, as soil and air temperatures increase and rainfall decreases, research has shown that the impact of heat stress and drought will reduce crop yields. In 2015, Victorian wheat farmers faced a year of low rainfall, which caused their crops to fail. Unseasonably high temperatures in October of over 35 degrees Celsius, combined with a lack of rain scorched the crops, wiping out the harvest. In order to recoup some costs, wheat farmers stripped the fields early, making hay out of the failed crop. However, the financial impact was enormous, and the farmers were expected to lose grain worth millions of dollars.

Along with decreased yields, cereal producers will have to contend with new pests and diseases that could attack their crops. This may lead to an increased use of pesticides, which could have a detrimental impact on the environment.

A changing climate also means that some crops may no longer be viable, or suited to the areas in which they have traditionally been grown. Berry crops that require cool climates may be pushed further south, to Victoria or Tasmania. Similarly, stone fruits such as peaches that need a cold winter to grow successfully might only be viable in Tasmania. Vegetable crops are also likely to suffer from sunburn or pests such as powdery mildew as a result of extreme heat, forcing producers to move to areas where the climate is cooler. In Victoria, cropping has moved further south, into areas that were once the domain of sheep and cattle graziers.

The impact of climate change on livestock and fisheries production

As discussed previously, lower rainfall and an increase in soil and air temperatures will lead to increased erosion and land degradation. This will have a significant impact on pasture growth, reducing the quality and amount of pasture available for grazing cattle and sheep. In addition, prolonged higher temperatures increase heat stress on livestock, causing them to consume less food, slowing their rate of growth and impacting on their fertility and general health. Dairy cattle are at even greater risk than beef cattle. They have been shown to produce up to 25 per cent less milk during hot weather, and up to 40 per cent less milk during a heatwave. This will have a flow-on effect for milk producers, and may lead to reduced availability of milk supplies for consumers.

As climate change brings much hotter and drier weather, many pastoralists are looking to breeds such as Brahman cattle and Dorper sheep, which are far more heat tolerant. However, while these animals are more likely to survive in harsh conditions, they produce a lower quality of meat, which may therefore be less appealing to consumers. Some of these animals also have lower fertility rates than many breeds traditionally used. As fewer calves or lambs are produced, farm productivity could be further reduced.



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Brahman cattle can survive in harsh, dry conditions.

Another risk factor is that pests such as cattle ticks will become more endemic as temperatures rise. This will have a greater impact on animal health, forcing farmers to resort to an increased use of pesticides to protect their animals from disease.

Intensive farming practices used to raise animals such as pigs and poultry are similarly at risk from increased temperatures and water scarcity. Poultry and pigs produced using intensive farming systems are more likely to suffer from heat stress. Pigs do not have sweat glands, and so are at particular risk of heat stress, which will affect the quality of their meat. Similarly, the quality of eggs and poultry meat will be reduced if hens are heat stressed. The quality and availability of animal food that is produced off-farm, and therefore needs to be purchased by farmers, will also be in danger if adverse weather conditions limit the amount of feed stock such as grain that is able to be produced.

Aquaculture too is at risk from climate change. According to the CSIRO, 'The ocean surface around Australia has warmed over recent decades at a similar rate to the air temperature. Sea surface temperature in the Australian region has warmed by around 1 °C since 1910, with eight of the ten warmest years on record occurring since 2010.' As sea temperatures rise, many fish species have been observed moving further south, to cooler waters. In addition, the increasing acidification of our oceans, rising sea levels, increasing storm surges and run-off from agricultural land into oceans are all having a detrimental impact on the sustainability of fish populations.

The effect of climate change on Australian food supplies

In recent years, climate change has brought with it an increase in the frequency and ferocity of many natural disasters, including bushfires, cyclones and floods.

The bushfires that raged throughout Victoria and New South Wales in 2019 had a devastating impact on the biodiversity of these regions, killing millions of insects, birds and other small animals vital to healthy ecosystems and our food production. According to the Federal Department of Agriculture, Fisheries

and Forestry, more than 100 000 head of livestock were killed in the fires, affecting both meat and milk supplies. Grazing pasture was also destroyed, reducing the amount of pasture available for surviving stock and impacting on future production.

Bee populations were also decimated in the 2019–2020 bushfires; it is estimated that in New South Wales alone, more than 9000 hives were destroyed. The pollination of important food crops such as canola and many fruit trees are at risk as a result of this reduction of bee numbers.



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Bees are essential to pollinate almond trees.

In 2017, Cyclone Debbie hit Northern Queensland, destroying many of the winter fruit and vegetables grown in the region. More than 20 per cent of tomato, capsicum, melon, bean, eggplant, pumpkin and zucchini seedlings were destroyed, along with farm machinery and infrastructure. The stock loss alone amounted to approximately $100 million, and also limited the stock available to Australian consumers and on the international market. Cyclone Debbie also severely affected sugar cane producers in Northern Queensland, wiping out more than $150 million worth of sugar cane crops.

Cyclone Yasi, which hit north-eastern Queensland in 2011, had a devastating effect on both the banana and sugar cane industries. Approximately 75 per cent of the banana crop was lost, and the price of bananas skyrocketed from $2 to $12 per kilogram, putting them beyond the budget of many Australian families. More than 20 per cent of the sugar crop was also lost, costing the industry more than $500 million in infrastructure and crop losses. Following Cyclone Yasi, world sugar prices hit record levels.

The availability, quality and price of fresh food following a devastating cyclone or flood is of major concern. Most households shop for fresh fruit, vegetables, meat and milk on a regular basis, and only keep enough of these items for about three to five days. Fresh food markets and supermarkets also keep limited supplies of fresh food, operating on a 'just in time' basis. When a flood or cyclone hits one of Australia's main fresh food–producing areas, such as our fruit or vegetable growing regions, these foods may be unavailable for several months, or even years. Consumers are then reliant on fresh produce being imported from overseas, bringing concerns about biosecurity as well as concerns over the quality, health and safety of these imported food products.



Getty Images/AFP PHOTO/PETER PARKS

In 2017, Cyclone Debbie caused significant damage to sugar cane crops.

Scientists predict that climate change will mean there is more carbon dioxide in the atmosphere. Increased carbon dioxide has been shown to reduce the protein content of many plants. This will have a significant impact, not only on the nutrient content of many of our cereal crops, but on their functional properties in food production. For example, reduced levels of protein in wheat mean that less gluten will be developed in making bread doughs, meaning that loaves will not have the same capacity to rise.



Simone Dalton

The impact of climate change on bread – increased levels of carbon dioxide will prevent gluten development and inhibit bread from rising.

Activity 13.2

Bee deaths from fires, drought and slow habitat recovery to hit ag productivity

Read the article that follows then answer these questions:

1. Evaluate the validity of the news article by assessing the source, purpose, context, presentation of evidence and language used. Alternatively use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this news article. See pages 193–94 for additional information on completing a CRAAP test.
2. Outline the importance of pollinators to the Australia's agricultural sector.
3. Draw up a mind map to highlight the impact of the 2020 bushfires on bee colonies across New South Wales.
4. Outline the impact that healthy bee populations have on Australian canola crops.
5. How has the loss of bee colonies affected Australian almond growers?
6. Write a short paragraph to summarise how extreme weather events brought about by climate change are impacting on Australia's agricultural sector.

BEE DEATHS FROM FIRES, DROUGHT AND SLOW HABITAT RECOVERY TO HIT AG PRODUCTIVITY

While cropping season prospects have dramatically revived in many regions after recent rain, the impact of savage bushfires and drought may continue undermining yield prospects for years because so many of nature's pollinators have vanished.

Commercial honey bees, feral bees, native bees and other nectar-loving insects contribute about $14 billion to Australia's farm economy simply by pollinating broadacre and horticultural crops, and pastures.

Healthy bee numbers are vital in ensuring yields are maximised, particularly in the canola and almond sectors.

They also contribute to the profitability of another 29 crops from lucerne to carrots, cherries and cotton.

And they produce 30,000 tonnes of honey, plus beeswax, worth about $90 million in an average year.

The devastating impact of fires, extreme summer heat and several years of drought on bee numbers and native flora reserves could see Australia's weakened bee populations take three to 20 years to rebuild, say apiarists.



Getty Images/Lisa Maree Williams

Beehives and pollinator habitat destroyed by bushfires

In NSW alone commercial beekeepers lost about 9000 hives to fire this summer, and a further 80,000 hives are estimated to be reduced to just a third of their usual bee numbers.

NSW Apiarists Association president, Stephen Targett, said not only were commercial industry bee numbers down at least 10 per cent, some of the state's best nectar producing forests, which sustain hives and breed healthy bees, were lost to fierce south and north coast fires and would take a decade or more to recover.

'Forests which underpinned about 60pc of the NSW honey industry's income in the past three years, and provided some of our best nectar, are now blackened,' he said.

'Honey production will probably be 30 per cent to 50 per cent below average for a decade.'

Soaring summer temperatures and the big dry also killed untold numbers of feral honey bee hives and native pollinators already weakened by a lack of water and poor flowering activity.

Mr Targett, based at Narrandera, said fewer natural pollinators and weak commercial hive numbers would be an issue for this year's canola crop.

Even after recent rain events nectar production from native trees and shrubs during autumn and winter would be patchy and insufficient to revive hives and other insect numbers before spring.

In paddocks where commercial and natural bee numbers were strong canola grain and oil yields could be almost a third higher than crops without good pollinator activity.

Cotton crops were known to yield about 15pc higher in areas close to healthy bee habitats, such as river gum stands.

Ben McKee, the chief operating officer with Australia's biggest honey processing business Health and Wellness, which owns the Capilano brand, agreed there would be insufficient food for bees or healthy beehive numbers in some areas for 'several years', despite recent good rain.

He cited a potential flow on impact to numerous crops including almonds, avocados and blueberries as they struggled to attract enough pollination activity.

Mr McKee and the Honey Bee Industry Council have confirmed higher honey prices were almost certain as drought-reduced supplies continued shrinking after the fires.

Rural Bank's James Robinson said while NSW – Australia's biggest honey producing state – suffered the most bee losses over summer, the bank estimated well over 10,000 hives were lost on the Australian mainland.

About 800 hives and 115 nucleus hives of the Ligurian honey bee subspecies were burnt on South Australia's Kangaroo Island alone.

Bees are crucial to yields from the almond industry's 15 million trees in northern Victoria's Sunraysia, the SA Riverland and the NSW Riverina.

About 200,000 hives are trucked into orchards to maximise the crop's yield potential during its August–September flowering.

Only 60 per cent of Australia's commercial bee hives were normally involved in almond pollination.

'Almond growers have been in continuing discussions on availability and prices with beekeepers for the past year because of the drought pressure on hives,' he said.

'Obviously if more hives have to travel from further away, it's important that apiarists can cover all their costs.'

Australian Almonds was also strongly supporting beekeepers pleas to be allowed access to the perimeter of more national parkland, because the nut industry recognised 'in the long term bees do better on natural flora'.

Mr Targett was pleased to note some almond growers and other irrigators also saw advantages in planting a mix of early flowering pastures or refuge crops in strategic zones designed to attract bees and supplement their healthy pollen diet.

'Bee deaths from fires, drought and slow habitat recovery to hit ag productivity', Andrew Marshall, *Stock Journal*, 2 March 2020. The use of this work has been licensed by Copyright Agency except as permitted by the Copyright Act, you must not re-use this work without the permission of the copyright owner or Copyright Agency

Activity 13.3

Farmers are taking climate action into their own hands

Read the article that follows, then answer these questions:

1. Evaluate the validity of the news article by assessing the source, purpose, context, presentation of evidence and language used. Alternately use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this news article. See pages 193–94 for additional information on completing a CRAAP test.
2. Outline the main reasons that Australian farmers decided to start the *Telling Our Story* campaign.
3. Explain why farmer Tess Butlers feels that farmers have a responsibility to address climate change.
4. Draw a mind map showing the strategies Ms Butler is using on her dairy farm to address sustainability.
5. Outline the strategies the Australian agricultural organisations are developing to meet international carbon emission reduction standards.

FARMERS ARE TAKING CLIMATE ACTION INTO THEIR OWN HANDS

Family farmers are banding together to showcase the climate action they are investing in, speaking directly to the community's growing concerns about global warming and environmental sustainability.

The *Telling Our Story* campaign from the National Farmers Federation will involve farmers making and sharing videos on social media and follows the 'code red' warning from the United Nations climate report last week and comes amid a confusing public policy debate within the federal government.

The Prime Minister wants to reach net zero emissions 'as soon as possible' but is yet to sign off on a deadline. Some rural representatives such as Agriculture Minister David Littleproud and Nationals leader Barnaby Joyce want to wait until they reach an agreement on a comprehensive emissions reduction plan, and others like Senator Matt Canavan oppose emissions reduction targets.

Aiming to cut through the politics, farmers are telling their stories to highlight to consumers the investments they are making to reduce agricultural emissions and boost environmental sustainability.

Farmer Tess Butler, who runs 900 jersey cows with her partner Ben and three-year-old son Will at their West Gippsland dairy, is telling her story as part of the campaign.

'We need to let our consumers know we are meeting their expectations, and we need to be held accountable as well,' Ms Butler said.

'We all have a responsibility to address climate change. The farming industry generates a substantial amount of greenhouse emissions and we have a social responsibility to decrease those.'

The Butlers have made significant investments in their dairy to boost natural habitat and reduce emissions, including an effluent management system to irrigate their paddocks and recycling nutrients. Ms Butler is also investigating bacteria treatments that could help trap carbon in the treatment process.

They have established a grazing system to promote strong grass growth so cows have consistent access to nutritious feed, which promotes more efficient milk production to reduce emissions, as well as improving the genetics of their herd with selective breeding to produce more productive cows.

'We are also using unproductive parts of our farm to bring back native vegetation and fencing off areas for planting,' Ms Butler said.

Australia exports 70 per cent of its agricultural produce, which means most farmers' produce could be subjected to environmental standards imposed by multinational companies, or tariffs set by wealthy nations to ensure a level playing field for their farmers who must comply with binding emissions reduction targets.

The National Farmers' Federation has set a target for net zero emissions by 2050. Industry peak lobby group GrainGrowers has endorsed the NFF's plans and committed to develop a grain-specific target for 2030 within the next 18 months. The red meat sector set a goal in 2017 to reach net zero by 2030.

'Farmers are taking climate action into their own hands', Mike Foley, *The Age*, 18 August 2021. The use of this work has been licensed by Copyright Agency except as permitted by the Copyright Act, you must not re-use this work without the permission of the copyright owner or Copyright Agency

Loss of biodiversity

Biodiversity – or biological diversity – is a term used to describe the vast array of living organisms that inhabit the planet and the interactions between them. Biodiversity includes not only all the different species of animals, plants, bacteria, viruses, fungi and other microbial organisms that live on the earth, but also their genetic make-up and entire ecosystems. It is estimated that more than 10 million species populate the planet.

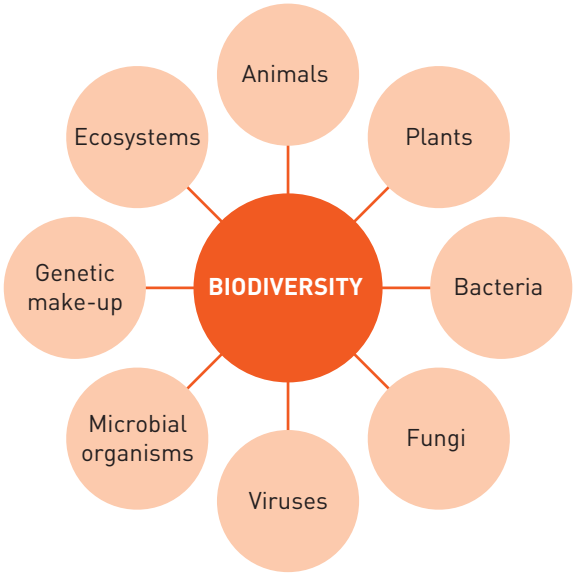


FIGURE 13.3 Components of biodiversity

THE IMPORTANCE OF BIODIVERSITY TO PRIMARY FOOD PRODUCTION

Biodiversity is essential to sustain agricultural food production. The production of healthy crops and pastures relies on billions of microbes in the soil that help cycle nutrients and break down organic matter, ensuring the soil is fertile and crops can grow. Bees and birds are essential in pollinating many crops. More than 60 per cent of Australia's food crops, especially fruit trees including apple and avocado trees, and seed crops such as wheat and canola, rely on the wild bee population to fertilise the plants. Many bird species also play a critical role in our agricultural production, acting as pollinators and helping to minimise the destructive impact some insect pests can have on food crops. Other animals, such as native frogs and bats, live on insects and also help reduce crop pests.

Biodiversity is also important in ensuring the health of the water in all river systems, lakes, dams and groundwater that is used in the production of our food supply. Microbes such as algae, fungi, bacteria and plankton, as well as the plants, fish, water birds and frogs that live in and near waterways, maintain the health of the water systems used in agricultural production by controlling the nutrients in the water and filtering out pollutants.

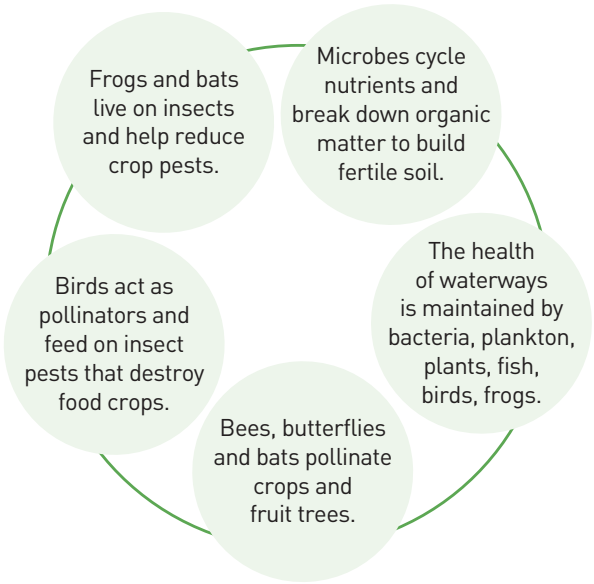


FIGURE 13.4 Biodiversity is essential to sustain primary food production.

THREATS TO BIODIVERSITY

One of the greatest threats to biodiversity is climate change. Drought and major bushfires have intensified in recent years as a consequence of climate change. In 2019–20, more than 2.5 billion honeybees died in Victoria and New South Wales as a result of drought and bushfires. The danger of biodiversity loss was also clearly evident when severe drought hit Australia in 2014, reducing the wild bee population by approximately 30 per cent. A reduction in bee populations has a major impact on agricultural production, particularly on canola crops and avocado and almond trees, which rely on bees for their pollination. As well as being an important oil seed crop, canola is widely used by farmers as part of their crop rotation system. Any reduction in canola crops could lead to a reduction in the variety of the nutritious foods available to all Australians.

Another major threat to biodiversity has been human population growth. The increasing population and a growing demand for food has led to the development of more intensive food production systems. This move to large-scale production has resulted in increased land clearing of forests, wetlands

Climate change	Habitat loss and degradation	Invasive species	Increasing population
Increasing air, land and sea temperatures can impact on growing conditions for plants and animals used for food.	Deforestation and climate change can lead to a significant loss of habitat necessary for ecosystems to survive.	Species that are 'exotic' can become invasive and impact on biodiversity – rabbits, cane toads, weeds.	Demand for food has led to land clearing of forests, wetlands and marginal land to make way for farming.

FIGURE 13.5 Threats to biodiversity

and marginal land to make way for farming, causing a significant loss of biodiversity. As habitats are lost or degraded, native fauna and flora cannot survive, and this can result in the complete loss or extinction of some species.

Biodiversity has also been lost through the excessive use of herbicides and pesticides, which have polluted waterways and caused a loss of bacteria, plankton, plants, fish, birds and frogs that make up the ecosystems found in the river and lake systems.

The introduction of species that are not native to the region can also have a devastating impact on biodiversity. Introduced species such as rabbits, foxes, cane toads and the prickly pear have become invasive and crowded out or replaced native Australian species, changing entire habitats and destroying native ecosystems. For example, the cane toad was introduced into Queensland in 1935 to help control the cane beetle, which was affecting the Queensland sugar industry. However, the cane toad has no natural predators in Australia, and their population has now exploded to more than 200 million. The cane toad has populated large areas of Queensland and the Northern Territory and is now moving into New South Wales. In doing so, it has wiped out many native species, including the northern quoll, many native frog populations, goannas and snakes.



Shutterstock.com/John Carnemolla

The northern quoll

RISKS ASSOCIATED WITH A LOSS OF BIODIVERSITY

A loss of genetic diversity is one of the key risks to the environmental sustainability of primary food production in Australia. Genetic biodiversity refers to the diversity within species; for example, different types of bees available to pollinate crops; the different types of poultry that can be grown as meat or to supply eggs; or the wide variety of wheat or rice species that can be grown as a major food source.

A loss of genetic biodiversity, or 'genetic erosion', has occurred because farmers have limited the variety of crops and animals they use in primary food production. Large-scale food production relies on growing plants or animals that produce the greatest yield and will therefore provide the most grain, milk or meat. A Food and Agriculture Organization report on the state of the world's plant resources estimates that '75 per cent of crop diversity was lost between 1900 and 2000. A recent study predicts that as much as 22 per cent of the wild relatives of important food crops of peanut, potato and beans will disappear by 2055 because of a changing climate'. This report also states that '90 per cent of our energy and protein comes from only 15 plant and 8 animal species'.

This loss of biodiversity in our food supply has serious implications for our future food security. A lack of crop biodiversity and reliance on only a few species of crops may prove disastrous in future years should some of these crops fail because of drought, severe flood, cyclonic conditions or disease.

Food production can also be impacted by a loss of the organisms necessary to break down organic matter and cycle nutrients in the soil. A loss of biodiversity can also impact on the health of animals and plants, leading to increased disease in animals and infestation of crop pests. It can also lead to a loss of habitat, such as through deforestation or erosion, threatening the survival of some species and impacting on primary food production.

STRATEGIES TO PRESERVE BIODIVERSITY

Many countries, including Australia, are now establishing gene banks as a way of preserving the genetic diversity of their crops and some of the wild plants that are closely linked to food crops. The genetic material found in animal sperm and eggs is also stored, as insurance for future generations.

Horsham in Victoria is the location of the Australian Grains Genebank, which houses the seeds from hundreds of wild indigenous crops that are the ancestors of many of today's most commonly grown cereal crops. These indigenous seeds were collected from the Kimberley, Arnhem Land and Cape York to act as insurance, or a safety net for the future. In 2014, 943 of these wild seeds were sent to the Svalbard Global Seed Vault in Norway to add to the global bank of genetic material.

Heritage animals are an important source of genetic diversity, which is essential to ensure the sustainability of breeding stock. For example, as the climate becomes hotter, some of these heritage animals will be able to provide the genetic material for breeding animals suited to an altered climate, or those that are more tolerant to certain conditions. Characteristics such as resistance to disease, or high milk production might also become valuable to ensure sustainability and food security in the future. Many small-scale farmers, especially those using organic and free-range systems, are choosing to use rare and heritage breeds, especially of pigs, sheep and poultry. Some of the heritage poultry breeds have also been shown to be more heat tolerant and to have a stronger body structure, as well as being disease resistant.



iStock.com/ClarkandCompany

Australian heritage poultry

Understanding the Text

Answers
Understanding the Text

Chapter Test
Chapter review

11 Draw up a mind map to clarify how climate change will affect the production of livestock and aquaculture in Australia.

12 Identify one strategy some pastoralists are considering to adjust to the changing weather conditions brought about by climate change. What implications will this strategy have on the quality of meat available to consumers?

13 Explain how natural disasters such as bushfires and cyclones impact on biodiversity and food availability in Australia.

14 Describe how the availability and price of food will be affected by climate change.

15 Explain the meaning of the term 'biodiversity'.

16 Describe three ways in which biodiversity helps to sustain agricultural food production.

17 How will the loss of habitat and invasive species threaten biodiversity?

18 Explain the meaning of the term 'genetic erosion' and state why this is a risk to environmental sustainability and Australia's food security.

19 Describe one key strategy being used to preserve the biodiversity of Australian crops and wild plants.

20 Explain why it is important to maintain the genetic diversity of rare and heritage breeds of animals.



Shutterstock.com/Erika J Mitchell

Tamworth Berkshire pigs are a rare heritage breed.

THINKING SKILLS

Applying knowledge

Develop a graphic organiser that demonstrates the effects of climate change on primary food production.

Analysing information

Prepare a SWOT analysis of the role of Australia's biosecurity system in ensuring the sustainability of primary food production in Australia.

THE ROLE OF AUSTRALIA'S BIOSECURITY SYSTEM IN ENSURING THE SUSTAINABILITY OF PRIMARY FOOD PRODUCTION IN AUSTRALIA	
Strengths	Weaknesses
Opportunities	Threats

Evaluating concepts

Predict the effect on the sustainability of the production of fresh food in Australia if there is a loss of biodiversity.

EXAMINATION-STYLE QUESTIONS

Answers Examination-style questions

Resources Preparing for exams support

Question 1 (11 marks)

Biosecurity has played a critical role in ensuring Australia remains free of some of the world's most invasive pests and diseases.

a Explain the meaning of the term 'biosecurity'. [2 marks]

b Outline three strategies used by Australian authorities to prevent breaches of biosecurity. [3 marks]

c Complete the table below by identifying one biosecurity threat to Australia's agriculture and one biosecurity threat to Australia's livestock and describing the impact each has on the health of the species. [6 marks]

	BIOSECURITY THREAT (1 + 1 mark)	DESCRIPTION OF IMPACT ON SPECIES (2 + 2 mark)
AGRICULTURE		
LIVESTOCK		

Question 2 (4 marks)

'Climate change poses challenges for all sectors of the Australian economy but particularly for those sectors dependent on natural resources, like agriculture … and fisheries.'

Source: Australian Government Department of Agriculture, Water and the Environment, September 2021

Explain how climate change will impact on either Australia's agricultural or fisheries sector.

Sector:

Explanation:

Question 3 (6 marks)

'Climate change is a threat to the environmental sustainability of Australia's primary food production.' Discuss this statement.

Question 4 (8 marks)

a 'The loss of biodiversity is a threat to the sustainability of Australia's primary food production. Discuss this statement. [4 marks]

b Explain why each of the following factors are a threat to biodiversity: [4 marks]

- Australia's increasing population
- introduced species.

Question 5 (4 marks)

Explain why a loss of genetic diversity is one of the greatest risks to the environmental sustainability of Australia's primary food production.

Peperonata

Peperonata is a traditional Italian method of preparing capsicums or sweet peppers. The peppers are simmered slowly with cherry tomatoes and other ingredients to develop the flavour and tenderise the vegetables. This delicious vegetable dish is perfect to serve as part of a shared summer table and goes well with meat, fish and chicken. Alternatively, it can be served cold as part of an antipasto platter.

---

1 teaspoon salted baby capers

½ onion

1 clove garlic, crushed

½ teaspoon fresh oregano, chopped

1 tablespoon extra-virgin olive oil

1 anchovy fillet, chopped

½ red capsicum, cut in 1-centimetre slices

½ yellow capsicum, cut in 1-centimetre slices

100 grams canned cherry tomatoes

¼ cup pitted black olives, halved

3 teaspoons red wine vinegar

1 teaspoon brown sugar

METHOD

1. Place the salted capers in a small bowl and cover with cold water. Soak for 1 minute then drain. Repeat soaking and change the water three times to remove excess salt.
2. Peel the onion and cut into 1-centimetre slices.
3. Heat the oil in a heavy-based pan over low heat. Add the sliced onion, garlic and oregano and sauté for about 8 minutes, until the onion is soft. Stir the pan regularly.
4. Add the drained capers and anchovy and stir over heat for 1–2 minutes. Add the sliced capsicum and cherry tomatoes and simmer, covered, for about 15 to 20 minutes, until the capsicum is soft. Add a few tablespoons of water if the moisture has evaporated before the capsicum is soft. Remove from the heat.
5. Stir through the olives, red wine vinegar and brown sugar.
6. Place in a serving bowl.

SERVES 2

EVALUATION

1 Describe the sensory properties of the peperonata – appearance, aroma, flavour and texture.
2 Classify the ingredients used in the peperonata on a diagram of the Australian Guide to Healthy Eating.
3 Use the data from question 2 to evaluate the nutritional value of the recipe according to the guidelines of this food selection model.
4 Justify why, according to the nutritional rationale of the Australian Dietary Guidelines, it is important to include a wide range of vegetables in the diet.
5 Explain why Australia has very strict biosecurity laws that prevent travellers to Australia from bringing in vegetable seeds or seedlings.



Mark Fergus Photography

Green bean and buckwheat salad

Buckwheat is a seed from a plant related to rhubarb and sorrel, and can be grown in soils with low nutrient values. In food preparation, it is often classified as a cereal, as it can be cooked in similar ways to grains, and the seeds can be ground into flour. Buckwheat is high in dietary fibre and has a low glycaemic index (GI). It is also gluten free and, when ground into flour, is a healthy alternative to more commonly used gluten-free flours such as rice flour and potato starch.

SALAD

1 red onion
2 teaspoons olive oil
¼ cup buckwheat
150 grams green beans, trimmed and cut in half
¼ cup fresh mint leaves, chopped
¼ cup flat leaf parsley, chopped
¼ teaspoon dried chilli flakes
¼ teaspoon salt
2 teaspoons olive oil for tossing the salad ingredients

YOGHURT DRESSING

½ garlic clove, crushed
pinch of salt
¼ cup (50 grams) Greek-style yoghurt
2 teaspoons olive oil
1 teaspoon lemon juice
⅛ teaspoon dried mint

METHOD

Making the salad

1 Preheat the oven to 200 °C.
2 Peel the onion, cut it in half lengthwise, then cut each half into 3 wedges. Place the onion wedges in a bowl and toss with two teaspoons of olive oil.
3 Line a baking tray with baking paper and place the onions on the tray. Roast for approximately 18 minutes, until cooked through and golden brown. Allow the onions to cool on the tray.
4 Fill a medium saucepan with water, add a pinch of salt and bring to the boil. Add the buckwheat and cook for 12 minutes, until al dente. Drain the buckwheat, refresh under cold water, then drain well and set aside.
5 Fill a small saucepan with water and bring to the boil. Add the beans and cook for 3 to 4 minutes with the lid off. The beans are ready when they are bright green and still have a little crunch. Drain and refresh the beans under cold water, then drain again.
6 In a large bowl, combine the onion wedges, buckwheat, green beans, mint, parsley, chilli flakes and salt. Toss through with 2 teaspoons of olive oil, then transfer to a serving bowl.

Making the yoghurt sauce

1 Crush the garlic with a pinch of salt and work it into a paste using the flat side of a knife.
2 In a small bowl, combine the yoghurt, garlic paste, olive oil, lemon juice and dried mint, then transfer to a small bowl, ready to serve with the green bean and buckwheat salad.

SERVES 2

EVALUATION

1 Describe the sensory properties of the green bean and buckwheat salad – appearance, aroma, flavour and texture.

2 Classify the ingredients used in the green bean and buckwheat salad on a diagram of the Australian Guide to Healthy Eating.

3 Use the data from question 2 to evaluate the nutritional value of the recipe according to the guidelines of this food selection model.

4 Justify why, according to the nutritional rationale of the Australian Dietary Guidelines, it is important to include a wide range of grains in the diet.

5 Outline two strategies commercial vegetable growers could follow to preserve biodiversity and maximise the yield of vegetables such as French beans.



Mark Fergus Photography

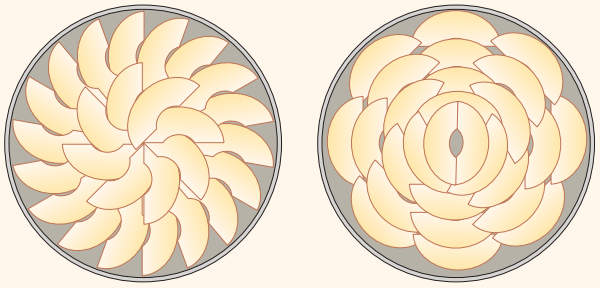
Apple tarte tatin

This delicious apple tarte is a classic French dessert. The appeal of this dish is the delicious combination of caramel, warm, soft apple and crisp pastry. The traditional flaky pastry could be prepared in a previous lesson and frozen, or for a time-saving alternative, buy frozen sheets of butter puff pastry from the supermarket. Apples are used as the basis of this dessert, providing a good source of vitamin C and dietary fibre. However, the sugar and butter used to make the toffee syrup increases the fat and sugar content of the recipe. Covering the apple with butter puff pastry also significantly increases the fat content of the dessert. It should therefore be considered a sweet treat, and only eaten sometimes and in small amounts.

3 Golden Delicious apples
100 grams vanilla sugar
1 tablespoon lemon juice
¼ cup water
15 grams unsalted butter
1 sheet butter puff pastry

METHOD

1. Preheat oven to 200 °C. Grease and line an 18-centimetre round cake tin with baking paper.
2. Peel and core the apples and cut each apple into eight pieces.
3. Combine 50 grams of the vanilla sugar with the lemon juice and toss the apple pieces through the mixture until they are completely coated.
4. In a large saucepan or frying pan, add the remaining 50 grams of vanilla sugar and ¼ cup of water.
5. Stir over low heat until the sugar dissolves. During this process, wash down any sugar crystals on the side of the pan using a pastry brush dipped in cold water.
6. When the sugar has dissolved, increase the heat to medium and cook for about 5 minutes, or until the sugar caramelises to a light golden brown.
7. Stir in the butter and the apple mixture and cook gently for 10–12 minutes, until the apple is partially cooked and still retains its shape. After 5–6 minutes, turn the apples once so that the other side takes on colour and the apples become tender.
8. Using tongs, arrange the hot apple in the lined tin, then pour the remaining liquid over the top. Allow to cool.



Possible arrangements of apple in cake tin

9. Trim the pastry so it is slightly larger than the cake tin. Lay the pastry over the apple, fold in the excess and press lightly so the pastry is touching the apple.
10. Place the cake tin on a baking tray in case the caramel bubbles over during baking.
11. Bake for approximately 20 minutes, or until the pastry is golden brown.
12. Remove from oven and rest for 5 minutes. Turn onto a serving plate, keeping the apple on the top.
13. Serve warm with ice-cream or cream.

SERVES 4

EVALUATION

1 Describe the sensory properties of the apple tarte tatin – appearance, aroma, flavour and texture.
2 Classify the ingredients used in the apple tarte tatin on a diagram of the Australian Guide to Healthy Eating.
3 Use the data from question 2 to evaluate the nutritional value of the recipe according to the guidelines of this food selection model.
4 Explain when and how this recipe could be included as part of a meal according to the Australian Guide to Healthy Eating.
5 Explain why some consumers might choose to purchase organic apples and organic butter to make this recipe.



Mark Fergus Photography

FOOD WASTE

- Australians throw away more than 20% of their food – or one in five of every bag of fresh food – purchased every year.
- Food that is wasted is estimated to be worth over $8 billion. This equates to every Australian household spending more than $1000 on food that is wasted.
- For each Australian, approximately 300 kg of food is put into the rubbish bin every year.



FOOD WASTE HIERARCHY

AVOID
Packaging initiatives can improve shelf life

REUSE
Food rescue donations

RECYCLE
Composting, worm farms

REPROCESS
Conversion to pharmaceuticals or cosmetics

ENERGY RECOVERY
Incineration and anaerobic digestion for energy recovery

DISPOSE
Landfill

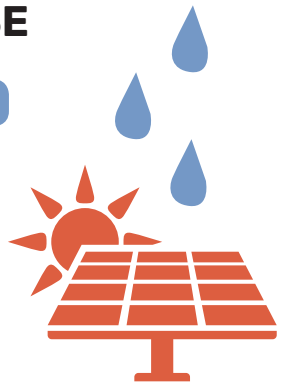
STRATEGIES USED BY FOOD PROCESSORS AND RETAILERS TO REDUCE ENERGY AND WATER USE

STRATEGIES TO REDUCE ENERGY

- Increasing use of renewable energy - e.g. using solar panels, bio-mass and process by-products
- Using automatic sensors that turn off equipment and lights when not in use
- Improving insulation and maintenance of equipment to reduce emissions

STRATEGIES TO REDUCE WATER

- Assessing and reducing the volume of water used in processes and operations
- Employing strategies to limit water waste and increase water recycling
- Installing smart meters and rainwater collection systems



14

FOOD PROCESSING, MANUFACTURING AND THE ENVIRONMENT



FOOD MILES

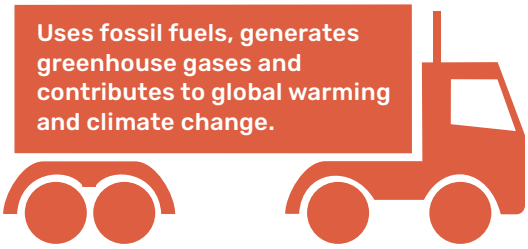
1 In summer, locally grown tomatoes in Victoria travel 165 km on average.

2 In winter, most tomatoes are grown in Queensland and trucked to Melbourne, a distance of approximately 3000 km.

3 Bananas travel 2700 km from Queensland to Melbourne.

TRANSPORTATION

Uses fossil fuels, generates greenhouse gases and contributes to global warming and climate change.



FOOD PACKAGING AND THE ENVIRONMENT

- Every year more than 1.9 million tonnes of packaging is thrown away rather than being recycled.
- Plastic packaging is not always biodegradable, and produces methane as it breaks down in landfill.
- Renewable and biodegradable bioplastics are made from plant material such as corn and wheat.
- Bioplastics use 65% less energy and produce 68% less greenhouse gas emissions than conventional methods.



KEY TERMS

Australasian Recycling Label (ARL) Program an on-pack labelling scheme that helps consumers recycle correctly and supports brand owners to design packaging that is recyclable at end-of-life

biogas a gas that is produced by the action of bacteria on organic material such as corn or wheat

bioplastics made from plant material such as corn and wheat; bioplastics are renewable and biodegradable

carbon footprint a measure of all the carbon dioxide produced to get food from paddock to plate, including growing, processing, manufacturing, packaging and selling the food

food waste hierarchy a program that lists strategies for food waste management in their order of importance, beginning with avoiding food waste and followed by reusing, recycling, reprocessing, energy recovery and waste disposal

food miles the term used to estimate the distance food travels from its point of production through to its point of consumption; that is, from paddock to plate

Resources
Study Design
links
Infographics
Flashcards

The environmental impact of food processing and retailing

All aspects of the food system, including food processing and food manufacturing, affect the environment. **Food processing** turns raw food products into ingredients for use in food manufacturing; for example, olives into olive oil, or wheat into flour. **Food manufacturing**, by contrast, involves producing value-added food products, such as pre-cooked rice, chilled or frozen meals, canned or dehydrated soup, or pre-prepared baby food products. The production of any food item, regardless of whether it is a container of fruit juice, a packet of fresh salad mix, a frozen pizza, a litre of milk or a jar of peanut butter, uses energy and water and adds to that item's **carbon footprint**. Most of the food we purchase is packaged, and must be transported safely from the producer to the point of sale. The amount of carbon dioxide (CO_2) produced during the production, packaging, transportation and sale of the food product is used to calculate its carbon footprint. An equally challenging environmental issue is that food waste is generated at almost every point of the food system.

As a result, producers, retailers and consumers must all look for strategies to minimise the environmental impact of food processing and manufacturing and food retailing to ensure the long-term sustainability of our food supply and the health of the planet.

As food citizens we can support the environmental sustainability of the food system through the choices we make. By making sure that the food we purchase is produced and packaged in ways that support environmental sustainability, we can ensure the health of the planet.

Energy use

Research has shown that all sectors of production, distribution, consumption and disposal of food generate greenhouse gases and therefore have an impact on the environment. In the processing and retailing sectors, most greenhouse gas emissions are the result of energy use or the release of emissions such as methane and nitrous oxide during different stages of production and manufacturing.

FOOD PROCESSING AND MANUFACTURING

In food processing and manufacturing plants, energy is used for a wide range of purposes, including:

- operation of food processing equipment such as mixers, meat grinders, dough pressing machines, food graters and slicers
- refrigeration and freezing units
- ovens and fryers for all cooking processes
- assembly line and food packaging conveyor belts
- lighting, heating and air-conditioning facilities
- warehouse and storage facilities
- computer systems for stock inventories, ordering systems, collating sales figures and so on
- staff facilities
- transportation.

FOOD RETAILING AND FOOD SERVICE

Energy use is also an essential component in ensuring that the food sold in supermarkets or fresh food markets or served in cafes and restaurants is safe to consume. Energy is used in food retailing and food service in many ways:

- Large banks of refrigerated and freezing cabinets store fresh and frozen products; refrigeration is very energy intensive, and accounts for approximately 40 per cent of all electricity used by supermarkets.
- Lighting ensures that products are highly visible and the supermarket or restaurant environment is safe for customers. Lighting makes up approximately 25 per cent of all supermarket electricity use.
- Air-conditioning keeps the supermarket or restaurant at an ambient temperature –not too hot and not too cold – so that customers can shop or dine in comfort.
- Check-out systems and other computer systems essential for running the supermarket or restaurant, such as stock control, ordering systems and accounting systems, depend on a reliable electricity supply.
- Transporting grocery items between bulk storage facilities and supermarkets or restaurants uses energy to fuel delivery trucks.
- Home-delivery or take-away service from the supermarket or restaurant uses fleets of small trucks fuelled by petrol, diesel or gas.



Alamy Stock Photo/martin berry

Lighting in Australian supermarkets is energy intensive.

STRATEGIES TO IMPROVE ENERGY USE IN FOOD PROCESSING AND RETAILING

A wide range of energy-efficient strategies have been developed by mechanical, electrical and process engineers to help reduce the environmental impact of food production and retailing processes.

Food processors

- Australian food processors are able to use equipment more efficiently by installing engineering controls that switch the equipment off automatically when it is not being used.
- Many food processors have installed occupancy sensors in storage rooms, offices and low-traffic areas. Lights automatically switch off if the space is not occupied, reducing energy use.
- The development of waste-heat recovery systems is reducing carbon emissions. This involves capturing heat that would normally be lost in the exhaust system of processing equipment and reusing it for other heating purposes. Heat recovery units can be retrofitted to most processing equipment, such as diesel engines and gas turbines. The recovered heat can then be used to produce heat for cooking and drying, or to provide heating for staff work areas.
- Food processors are encouraged to minimise the heat that is lost from cooking and pasteurising equipment in order to reduce the level of air-conditioning required in production areas.
- Ensuring that refrigeration units, hot-water systems and air-conditioning units are well insulated will reduce the amount of energy used and will, therefore, reduce greenhouse gas emissions.
- It is essential that all equipment is well maintained and that refrigerators and coolrooms are regularly checked to ensure that seals are intact. The temperature settings on refrigeration units should be adjusted to ensure they are not running at a lower temperature than necessary. Cleaning the cooling coils on all refrigeration units also increases efficiency.
- Refrigeration and compressed air systems used in food processing can be upgraded to more energy-efficient systems.
- Food processors can use fuel sources that produce lower carbon dioxide emissions, such as energy produced from biomass and process by-products.
- Solar panels can be installed to heat water for staff facilities.

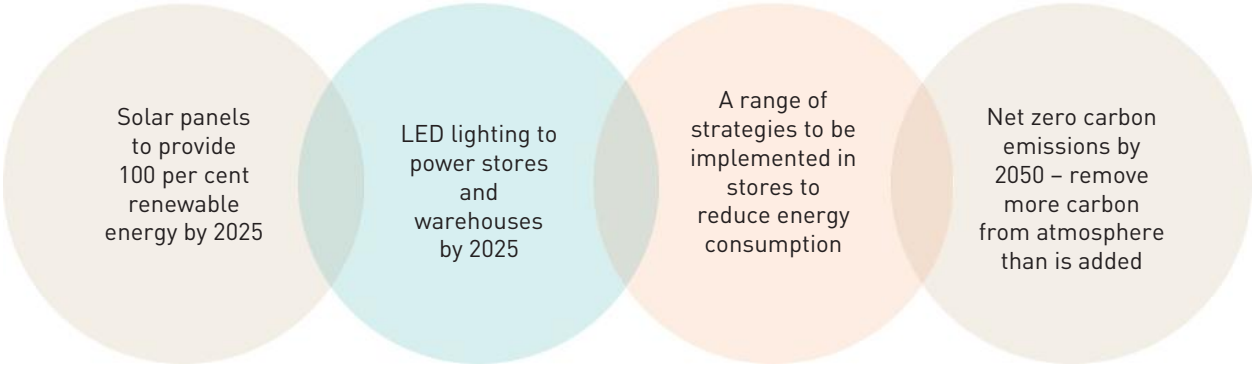


FIGURE 14.1 Supermarkets have committed to a range of strategies to reduce their energy consumption.

Food retailers

Major Australian supermarkets including Coles, Woolworths and Aldi have all committed to reducing their energy use and improving their environmental sustainability by 2025.

- Supermarket buildings can be retrofitted with more energy-efficient lighting systems such as LED lights.
- Internet of Things (IoT) can connect refrigeration units to ensure they run efficiently, minimising power use.
- Master switches can be installed and timed to turn off the power overnight.
- Inefficient open freezers can be replaced with self-closing door freezers.
- Ovens can be well insulated to prevent heat loss; this will also reduce the need for air-conditioning.
- Outdated equipment can be replaced with more energy-efficient equipment, such as solar hot water systems.
- Staff can be educated about the importance of turning off light switches, air-conditioning units and exhaust fans when they are not use.
- Automated blinds can be installed on open refrigerator cabinets.



Alamy Stock Photo/Martin Diebel/fStop Images GmbH

Self-closing refrigerator cabinets are more energy efficient than open refrigerated displays.

Water use

Water is a significant resource in food processing. In fact, the processing of food uses more water than any other Australian industry, accounting for approximately 34 per cent of all the water used by industry.

Water is used in food processing in a variety of ways. A small proportion of the water used is added as an ingredient to the processed foods and is used in washing or preparing raw foods. However, most of the water used in food processing does not come into direct contact with the food; it is used in cleaning and sterilising equipment and premises, or in cooling processes to ensure that the food produced is safe to consume. In food retailing, the use of water to clean the premises and to maintain the safety and hygiene of food service areas is essential.

Food processors and food retailers in Australia are examining strategies for more environmentally sustainable water use. Community pressure, the cost of treating water for use in the factory and the cost of wastewater disposal are also driving this change. Consequently, both the volume of water used and the ability to recycle water within their production area have become important considerations for food processors.

SUSTAINABLE WATER USE

To ensure the environmental sustainability of this limited natural resource, both food producers and food retailers are actively developing strategies to reduce their water use, including:

- ensuring that equipment requiring the use of water is working as efficiently as possible
- recirculating used water for cooling processes or for suppression of dust
- improving cleaning practices in the production area; for example, using alternative cleaning processes such as vacuuming and high-pressure trigger hoses
- reducing water pressure to minimise the amount of water lost through leakage
- undertaking regular maintenance on water pipes to prevent any blockages, leaks or overflows
- ensuring that only low-flow taps are installed, to limit water waste
- installing rain-harvesting systems so that rainwater can be collected and stored, and reused on site
- using water-efficient ultra-rinse spray guns for cleaning
- installing smart meters to track water use and improve water efficiency
- developing more environmentally sustainable uses of wastewater; for example, through developing a partnership with a road construction group that can use wastewater when building roads.

Understanding the Text

1 Explain what is meant by the term 'carbon footprint' and how this impacts on the health of the planet.

2 Draw a knowledge map to demonstrate some ways energy is used in a food manufacturing plant.

3 Identify three ways in which energy is used by supermarkets and explain the impact these have on the customer experience.

4 Draw a knowledge map to summarise how a food processor could become more sustainable in their use of energy.

5 Explain how a heat recovery system would help reduce greenhouse gas emissions.

6 What commitment have the three major Australian supermarkets made to becoming more energy efficient and to improving their environmental sustainability?

7 Outline three strategies that food retailers could use to become more energy efficient.

8 Make a list of the ways water is used in food processing.

9 List three of the main driving forces behind food producers' search for more sustainable methods of using water.

10 Draw a knowledge map to identify six key strategies being developed by food producers and food retailers to minimise their use of water.

Answers
Understanding the Text

Improving environmental sustainability in marketing, retailing and food service

Consumers are developing a greater understanding of food citizenship and their ability to effect change in the food system. As a result, food producers, food marketers, food retailers and the food service sectors are themselves becoming more conscious of the need to practise environmental sustainability.

FOOD MARKETING

Food marketers are very aware of the growing consumer demand for products that are environmentally sustainable. In order for the products they promote to be acceptable and appealing to the purchasing public, they need to highlight messages of sustainability. A wide range of terms linked to a product's environmental credentials now appear regularly in marketing campaigns and on food packaging.

RETAIL

Both Coles and Woolworths have developed extensive sustainability strategies to address their environmental impact. In its 2021 Sustainability report, Coles Group states, 'We understand our responsibility to minimise our environmental footprint and to show leadership in protecting our planet and climate.'

Through its Together to Zero and Better Together strategy, Coles is working towards minimising its impact on the environment, stating, 'At Coles, we recognise the importance of our sustainability responsibilities and believe that our ambitions can create momentum and activate change. We have a clear ambition to become Australia's most sustainable supermarket.'

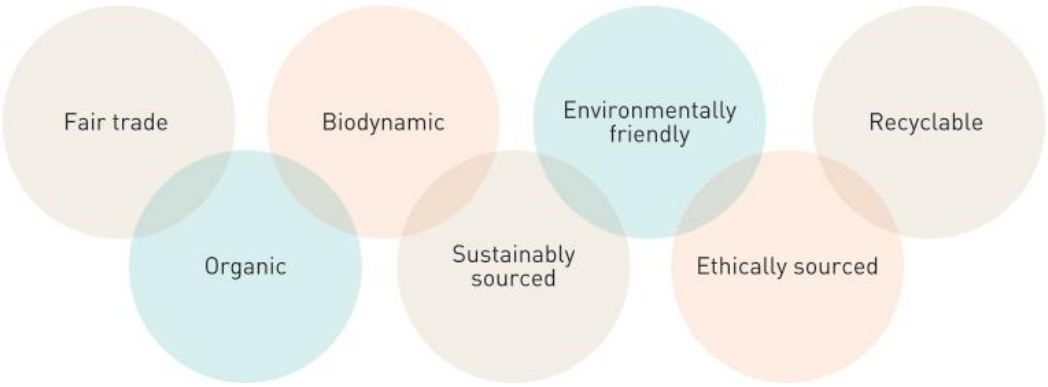


FIGURE 14.2 Promoting sustainability in food marketing



Coles Group Limited

Coles Group's 2021 Sustainability Report identifies the company's strategies to become environmentally sustainable.

Coles has a target to divert 85 per cent of the company's solid waste from landfill by the end of the 2025 financial year, while continuing to focus on reducing food waste. By working with food manufacturers and food suppliers as well as customers, Coles intends to minimise the impact of food waste on the environment.

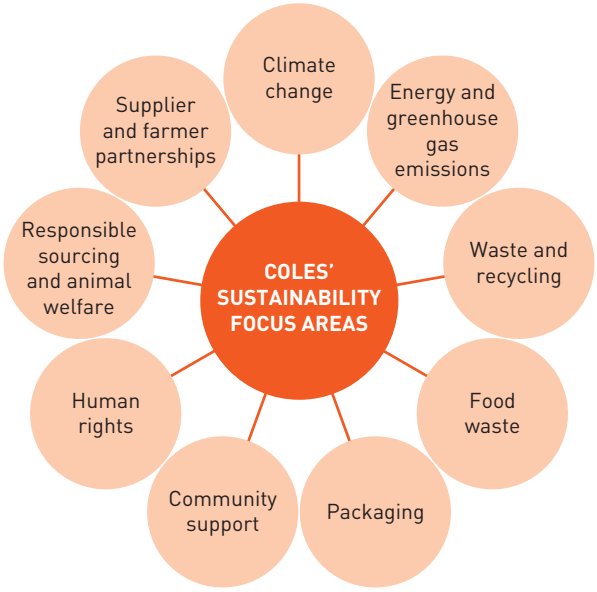


FIGURE 14.3 Coles' sustainability focus areas

Additionally, in collaboration with its food suppliers, Coles donates edible unsold food from its supermarkets and distribution centres to food rescue organisations, to reduce food waste.

Similarly, Woolworths is addressing its responsibility to become more environmentally sustainable. The Woolworths Group's 'Sustainability Plan 2025' identifies a range of goals to improve the company's environmental sustainability. The goals outlined in the report are to ensure:

- 100 per cent green electricity by 2025
- zero food waste to landfill by 2025
- net positive carbon emissions by 2050
- practise responsible stewardship of natural resources.



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Woolworths is taking steps to ensure its stores are more environmentally sustainable.

FOOD SERVICE – RESTAURANTS AND CAFES

Just as the food retail sector is moving to become more environmentally sustainable, so too are cafes and restaurants. Many people will demonstrate their food citizenship by patronising those businesses that demonstrate their commitment to environmental sustainability, and avoiding those that don't.

There are many strategies the food service sector can implement to demonstrate their environmental credentials and ensure environmental sustainability. Reducing energy consumption in restaurants and cafes through the installation of energy efficient refrigeration units, water-efficient taps, rainwater tanks and solar panels will ensure fewer greenhouse gases are emitted into the atmosphere and will improve the health of the planet.

Minimising the significant amount of food waste generated by restaurants and cafes is an equally important step towards environmental sustainability. Many cafes and restaurants have committed to ensuring that any food that is not sold is donated to food rescue organisations. Others may

arrange for any waste to be composted, either on-site or through a commercial organisation, reducing the amount of food that enters the waste stream.

Many food supplies are delivered to restaurants or cafes in polystyrene boxes that once would have been sent to landfill. Today, these boxes are returned to the supplier to be reused, or recyclable packaging is used instead. Cooking oil is also collected as part of the waste stream and used to produce biofuel.

Many restaurants have taken up the challenge of using only ethically sourced or organic ingredients, highlighting their environmental sustainability credentials.

The Merri Cafe is one cafe that bases its food service on environmental sustainability and the health of the planet. It is part of the CERES Community Environment Park in Brunswick, on Wurundjeri Country, Melbourne. The food in the cafe is all organic and sustainably sourced, either from onsite gardens or from Victorian farmers and producers. This approach supports 'a localised food system that gives back to those who care for the earth, their produce and animals. All of the meat and dairy products on our menu are organic, free range and cruelty free.'



Nicolle Kennedy

The Merri Cafe at CERES bases its food service on environmental sustainability.

Activity 14.1

Consumer trends heavily impacted by sustainability

Read the article that follows, then answer these questions:

1. Evaluate the validity of the news article by assessing the source, purpose, context, presentation of evidence and language used. Alternatively use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this news article.
2. Explain why 55 per cent of Australians are likely to want to purchase environmentally sustainable products.
3. What are the economic implications of not taking action on climate change?
4. Describe the three key issues consumers associate with sustainability.
5. Discuss the implications you think consumer concern about sustainability will have on the food manufacturing, food packaging and food retail sector in the near future.
6. Explain how, by purchasing environmentally sustainable food products, consumers are demonstrating food citizenship.

CONSUMER TRENDS HEAVILY IMPACTED BY SUSTAINABILITY

New research conducted by IRI shows consumers are more likely to look for environmentally sustainable products than ever before.

The research showed that 55 per cent of those surveyed try to purchase environmentally friendly products. Through extensive analysis, consultation and market testing, IRI has identified seven key areas of action needed for businesses to meet the demands of shoppers with a sustainability mindset, which it has dubbed the seven 'R's of sustainability – recycle, reduce, remove, relationships, range, reassure and representation.

The study showed that climate action and economic growth are not mutually exclusive and the two must go hand-in-hand, with a forecasted economic growth loss of $3.4 trillion by 2070 if they do not.

The previously relatively stable climate has enabled economic growth, but with climate change currently taking a toll on the earth and shoppers realising this and actively making purchasing decisions based on their concerns, businesses will have to adapt.

Daniel Bone, Insights Director, Asia Pacific said: 'The results pose challenges and opportunities for manufacturers and retailers to meet the fast evolving needs of shoppers. While COVID has captured the attention of many, sustainability has become a critical issue for Australian shoppers. Our research shows that Australian shoppers do care about sustainability and they are actively making purchasing decisions based on their concerns.

'68 per cent of shoppers connect packaging with sustainability. Interestingly, they also prioritise waste reduction. When we asked shoppers to pick the top three things they most closely associate with sustainability, 53 per cent said their number one issue is reducing by-product/waste, followed by minimising environmental impact at 47 per cent and thirdly, a commitment to using renewable resources at 38 per cent.'

This eco-friendly mindset not only impacts what consumers are buying but where they are buying from, with 50 per cent of shoppers stating that it is important to them that the outlet they shop with offers a range of sustainable products.

'Shoppers have spoken in the strongest possible terms about their views on sustainability – they want to save the planet and feel that they can help do this on a daily basis by making informed and proactive purchasing decisions with their food and grocery shopping,' said Bone.

Australians, due to lockdowns and environmental disasters, have realised they are on the forefront of the impact of climate change.

'A sense of eco-anxiety is being felt by Australians now. We feel uniquely vulnerable if we think about some of our national treasures that have been impacted by climate change such as the Great Barrier Reef and of course the devastating impact on our nature of those bushfires.

'And because of the lockdown, grocery growth has creeped back up into double digits which equates to more packaged goods consumption in our homes which increases our waste footprint and becomes more visible to us,' Bone added.

'Consumer trends heavily impacted by sustainability', Tom Oakley-Newell, *Convenience and Impulse Retailing Magazine*, 23 September 2021, https://www.c-store.com.au/consumer-trends-heavily-impacted-by-sustainability/

Food packaging and the environment

It is well recognised that packaging plays a key role in the food supply chain. Packaging helps to ensure that the food we eat is safe to consume by reducing spoilage and preventing contamination, as well as extending the shelf life of many products. Packaging also helps to contain the product and provides people with important labelling information, as well as protecting the food and enabling efficient transport.

ENVIRONMENTAL ADVANTAGES OF FOOD PACKAGING

Food packaging is an essential component in today's food system. Without it, handling food would be messy, inefficient and costly. By protecting food from damage or spoilage during transportation, in storage, in the supermarket and before consumption, packaging prevents more waste than it creates. In Australia, about 60 per cent of packaging is for the protection and preservation of food.

Food processors use a range of packaging systems and strategies to minimise the impact of packaging on the environment. Some types of packaging enable retailers and householders to keep food for longer before it begins to deteriorate, reducing food waste. For example:

- The packaging of leafy greens such as spinach or salad mix modifies the air inside the packet, ensuring that the correct mix of oxygen, carbon dioxide and water vapour is maintained to extend the shelf life and reduce waste.
- Vacuum packaging of cheese removes any air from the package, preventing mould from growing on the cheese and causing it to spoil.

Food processors also package foods in varying sizes to cater to customers' changing consumption patterns. For example, family-sized packets are available in many products, while single-serve products are becoming more popular with people who live alone or who want a small serve to take to school or work for lunch.

THE ENVIRONMENTAL CHALLENGES OF PACKAGING

Food packaging creates a range of problems for the environment.

- Various types of packaging materials are made from non-renewable resources such petroleum, which is used in the production of plastics, and timber, used to manufacture paper and paperboard. When the packaging is disposed of, these natural resources are lost.
- The production of packaging also uses significant amounts of water, coal and natural gas; all vital non-renewable resources.
- Much of the food packaging produced in Australia ends up in landfill. According to Environment Victoria, more than 1.9 million tonnes of packaging is thrown away rather than recycled every year.
- Plastic packaging creates specific problems because, while it is cheap to produce, it is not always biodegradable, and can take hundreds of years to break down. As it degrades, plastic packaging produces greenhouse gases, particularly methane, damaging the environment further.
- Food packaging is often discarded, increasing the amount of waste that is sent to landfill or creating litter that pollutes the environment. This rubbish pollutes our rivers, streams and landscapes, and can be hazardous for marine life and freshwater mammals such as the platypus.
- Single-use plastics are a major environmental problem, making up approximately 30 per cent of all litter that pollutes our streets and waterways.
- Overpackaging of food products adds to the problem by using additional resources and creating more waste. For example, foods such as lemons, which come in their own sturdy, environmentally friendly package (their peel), are often placed on a polystyrene tray and covered with plastic cling wrap. Individual or single packs all generate far more packaging than is used to package larger quantities of the same product.



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Individually wrapped slices of cheese and large blocks of cheese are packaged in plastic, which is not biodegradable.

IMPROVING THE ENVIRONMENTAL SUSTAINABILITY OF FOOD PACKAGING

Research has shown that much of the material used to package food either is not or cannot be recycled. In 2021, a survey undertaken by World Wildlife Australia in conjunction with other organisations showed that less than 20 per cent of all food packaging can be recycled in home recycling bins. That means that more than 80 per cent of the material used to package food cannot be recycled.

These problems are well recognised by industry and by all levels of government in Australia.

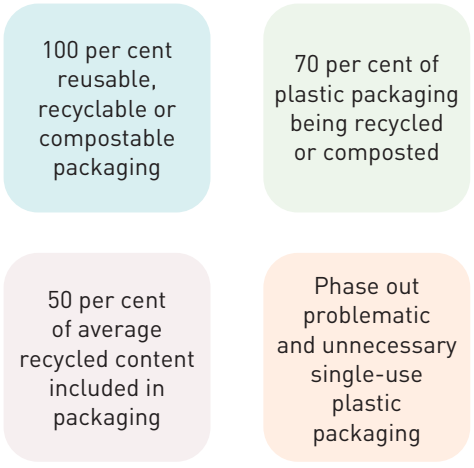


FIGURE 14.4 The Australian Packaging Covenant Organisation's 2025 Targets

Source: Australian Packaging Covenant Organisation

The National Packaging Covenant, which includes more than 1500 Australian business and industry groups, has developed 'The 2025 National Packaging Targets' to ensure that all packaging that is made, used and sold in Australia is sustainable.

To minimise the environmental impact of packaging waste, food processors, retailers, and consumers must adopt strategies to reduce, refuse, reuse, repurpose and/or recycle packaging material.



FIGURE 14.5 Reduce, refuse, reuse, recycle

Reduce

In 2019, the Victorian Government introduced a ban on single-use plastic bags, including those made from degradable, biodegradable or compostable plastic, in an effort to reduce the impact of these products on the environment. Lightweight single-use plastic bags are now banned in every state in Australia.

In 2021, federal, state and environment ministers identified 'problematic and unnecessary' plastic products that should be phased out by 2025. These include single-use straws, cutlery, plates, drink-stirrers, expanded polystyrene food and drink containers, and cotton bud sticks. Along with other state and territory governments, the Victorian Government has moved to ban the sale or supply of these products by February 2023.



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Single-use straws, cutlery, plates and drink containers are banned in Australia.

Along with government, food producers have worked in conjunction with packaging manufacturers to minimise the amount of material used to package food products. Developments have led to a reduction in the total amount of material used to package food by:

- reducing the wall thickness of containers
- using light but strong packaging materials
- producing products in concentrated form, which means smaller quantities of the product need to be purchased, and so less packaging is used
- producing larger unit sizes to reduce the package-to-product ratio.

George Weston Foods is an Australian food manufacturing company that has successfully reduced its use of cartons by re-engineering its packaging operations. This was achieved by improving the design of cartons and improving pallet configuration. The company also increased the percentage of recycled content in the cardboard used, without increasing its thickness or density. These changes have led to reduced freight and storage costs. The company has committed to ensuring that by 2025 all of its packaging will be recyclable, reusable or compostable.

In another initiative to reduce the amount of single-use plastic in the supply chain, Coles supermarkets, along with its major suppliers, including Goodman Fielder, are working towards replacing plastic bread tags with tags made from 100 per cent recycled cardboard. Coles aims to use the new tags on all Coles Own Brand bread products. This strategy will remove almost 223 million pieces of plastic from landfill annually.

Australian householders can reduce the amount of single-use plastic they use by:

- storing leftovers in a plastic or glass container, rather than using a plastic sandwich bag or freezer bag
- using a 'nude food' container for school or work lunches rather than wrapping foods in plastic wrap or a plastic sandwich bag
- covering food in the refrigerator with a beeswax or soy wrap, rather than plastic wrap
- using compostable bin liners rather than plastic bin liners.

Refuse

Shopping bags are used in the final stage of the supply chain and are essential in helping shoppers transport the foods they have purchased to their home. As single-use plastic bags have been removed from the supply chain, the majority of shoppers have embraced reusable shopping bags. Where possible, refuse to purchase a reusable plastic bag from the check-out, even if you forget to bring your own bags, as these plastic bags still damage the environment.

Despite all of the measures being taken, some single-use plastic products are still available. Australians are being encouraged to 'choose to refuse' single-use plastics. This means we should:

- refuse single-use coffee cups (especially those that have a plastic liner) and take a 'keep cup' instead
- use a recyclable produce bag when shopping for fruit and vegetable items, rather than a single-use plastic produce bag
- ask for a paper straw instead of a plastic one when purchasing a soft drink or smoothie
- choose a water bottle that is made from recyclable material.



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Say no to plastic – use a reusable shopping bag instead.

Understanding the Text

Answers
Understanding the Text

11 Explain how food marketers have responded to community concern about the need for environmentally sustainable products.

12 Use a diagram similar to the one below to highlight three commitments made by Coles and Woolworths to ensure their company is more environmentally sustainable.

Coles	Woolworths

13 Explain how consumers can express food citizenship when purchasing a coffee or lunch from a cafe.

14 Draw up a mind map to highlight the strategies the food service sector can use to improve their environmental sustainability.

15 Explain how food packaging can benefit the environment.

16 Draw a knowledge map to identify the main environmental problems associated with food packaging.

17 What is the National Packaging Covenant and why was it established? Identify two key targets identified by the covenant.

18 Explain why many Australian state governments have moved to ban single-use plastics. Give examples of the types of products that will no longer be available to consumers due to this ban.

19 List four ways that food packaging can be reduced.

20 Suggest two strategies, other than those listed in the text, to demonstrate how consumers could refuse single-use plastic products that are still available.

Recycle

Recycling is an important component in minimising the amount of packaging waste sent to landfill. In Australia there is strong public support for recycling. A report completed in 2021 by the Australian Packaging Covenant Organisation (APCO) and Planet Ark, titled 'Australasian Recycling Label Consumer Insights Report 2021', highlighted that '76 per cent of Australians believe that recycling is the most positive thing they can do for the environment.' We regularly check the packaging logo on food products to determine what is recyclable and what is not, and put it in the appropriate bin for kerbside collection.

The main confusion with recycling packaging is associated with plastic packaging materials. Recycling of plastic packaging is lower than for other materials, and currently only 32 per cent of all plastic packaging that is produced is recycled. This low level of plastic recycling is linked to the wide range of plastic materials used, and confusion about which types of plastic can be recycled and which can't.

In 2018 the Australian Packaging Covenant Organisation (APCO) launched a new recycling labelling program for use in Australia and New Zealand. According to APCO, the **Australasian Recycling Label (ARL) Program** is an on-pack labelling scheme that is helping consumers recycle correctly and supporting brand owners to design packaging that is recyclable at end-of-life. The new labelling system aims to remove the confusion about recycling, and to ensure that recycling material is not contaminated and does not end up in landfill.

The new labelling system is based on three symbols:

- Recyclable – this product can be placed in kerbside recycling.
- Conditionally recyclable – this product can be recycled ONLY if the conditions below the label are followed. Otherwise, this item is not recyclable.
- Not recyclable – this item cannot be placed in kerbside recycling. Please dispose of it in your rubbish bin.

Soft plastic

Soft plastics are those that will scrunch up when squeezed in the hand, such as plastic shopping bags, bread bags, cereal box liners, fresh produce bags, frozen food bags and ice-cream wrappers. Soft plastic makes up 20 per cent of the rubbish placed in household bins. However, recycling soft plastics is more difficult than rigid plastics, as they cannot be put in the recycling bin for kerbside collection. Their light weight makes them difficult to collect and transport for recycling because they blow around and can jam the automated recycling machines.



The Australasian Recycling Label (ARL) Program is administered by the Australian Packaging Covenant Organisation in partnership with Planet Ark Environmental Foundation and PREP Design.

The Australasian Recycling Label (ARL) Program aims to reduce confusion about which materials are recyclable.

A Melbourne-based recycling organisation, RED Group, has developed a recycling program called REDcycle, to recover and reuse soft plastics. The group is working with Coles and Woolworths and some of the major food suppliers to make it easy for shoppers to recycle their soft plastic packaging. REDcycle collection bins are located near the check-out in most major supermarkets, so shoppers can drop off their soft plastics when they are in the store.



Christodoulou

Soft plastics can be recycled by placing them in the REDcycle bins in supermarkets.

Recycling paper and paperboard

Approximately 72 per cent of the paper and paperboard used for packaging in Australia is collected annually for recycling. Research shows that recycling cardboard and paperboard has significant environmental advantages. Using recycled material to produce cardboard uses approximately 99 per cent less water and 50 per cent less energy than when new material is used, and reduces the chemicals used in production by 90 per cent. In addition, recycling cardboard packaging instead of sending it to landfill prevents methane from being released into the atmosphere. However, there is a limit to the number of times paper and cardboard can be recycled, as recycling it reduces the strength of the individual fibres that give it its structure.

Aluminium cans

Another method of recycling packaging used in many Australian states is a deposit system imposed on some aluminium, glass and plastic beverage containers. The aim of the program is to reduce litter and solid waste, and to conserve non-renewable resources. The deposit, which is paid as part of the purchase price, is refundable, and encourages people to return the containers in order to receive their refund. The containers are then reprocessed or recycled. Approximately 80–90 per cent of all containers covered by this strategy are returned.

One of the benefits of aluminium as a packaging material is that it can be continuously recycled. This is a significant environmental advantage, because the production of new aluminium cans from recycled material uses only 5 per cent of the energy required to produce the same cans from new material.

Reuse

The Australian food processing industry has taken up the challenge to reuse packaging material that is placed in recycling bins. Approximately 83 per cent of all paper that is recycled is now used to make new packaging material. Reusing recycled cardboard to make new packaging not only reduces the amount of packaging going into the waste stream, but also reduces the need for timber harvesting. It also has the additional benefit of saving vast quantities of non-renewable resources, such as timber, gas, electricity, oil and water.

As well as being made into new cardboard or paperboard products, recycled cardboard and paperboard can be reused as a soundproofing or insulation material. New developments in manufacturing technology are now producing environmentally sustainable construction board made from recycled cardboard and paperboard packaging. These new products will replace traditional materials such as plywood, particle board and plaster board in the building industry. Other uses of recycled cardboard and paperboard include the production of products such as toilet paper, egg cartons and packaging filler.

Soft plastics, too, can be reused as a resource to make sturdy plastic products such as outdoor furniture, bollards, signs, fence posts and even some gym equipment.



iStock.com/joannatkaczuk

Recycled-paper underfloor insulation

MAKING PLASTIC PACKAGING GREENER

The scientific community, along with packaging engineers, has developed a range of new packaging materials that are more environmentally friendly and therefore more sustainable than traditional plastics. Many of these new packaging materials, called **bioplastics**, are made from plant material such as corn and wheat, and are renewable and biodegradable. The new packaging materials are beginning to replace traditional plastic packaging made from diminishing fossil fuel resources.

The production and use of bioplastics for food packaging has many environmental advantages over traditional petroleum-based plastic. For example:

- Bioplastics are made from plant material, which is a renewable resource.
- The process for making bioplastics uses 65 per cent less energy than conventional methods.
- The production of bioplastics produces 68 per cent less greenhouse gas emissions than conventional plastic production.

Bioplastic packaging in Australia

Plantic Technologies, an Australian-based company, has developed an environmentally friendly 'green' bioplastic suitable for use as a food packaging material. The bioplastic is made from a cornstarch with a high amylose content.



Elizabeth Hunter/Plantic Technologies Ltd

Plantic bioplastic packaging is used to package meat.

Plantic bioplastic packaging has several environmental benefits:

- The cornstarch used as the main material in its production is a completely renewable and sustainable resource.
- Bioplastics made from Plantic high-amylose cornstarch use 40 per cent less energy in their production than plastics made from traditional materials such as petrochemicals.
- Many Plantic-based bioplastic products provide a gas barrier for highly perishable products such as meat and poultry, which can extend their shelf life by up to 40 per cent, reducing food waste.
- Plantic bioplastics are biodegradable.

The Plantic bioplastic can be used to make both rigid and flexible packaging. Plantic bioplastic is used to package fresh products including meat, poultry, seafood, cheese, fresh salads and fresh pasta, and several major food manufacturers have chosen Plantic packaging for their food products. For example, chocolate manufacturers Haigh's and Cadbury Schweppes use this new packaging for many of their chocolate products. Arnott's packages many of its sweet biscuits using bioplastic.



Mark Fergus Photography

Arnott's uses Plantic bioplastic to package many of their sweet biscuits.

Case study

BioPak

BioPak is a carbon neutral company and one of Australia's leading producers of sustainable packaging. BioPak has developed a range of single-use packaging products for the food-service industry. The products are plant-based, biodegradable and environmentally sustainable. One of BioPak's key aims is to reduce carbon emissions by using sustainable raw materials to produce packaging products, rather than relying on fossil fuel resources.

BioPak makes a wide range of single-use products from environmentally friendly materials, including paper cups for both hot and cold drinks, plates, bowls, trays, takeaway food containers, cutlery and supermarket checkout bags. The company uses a range of materials.

- *Bioplastics* are an environmentally friendly form of packaging made from vegetable oils, cellulose, starches and carbohydrates. Most of the bioplastics produced by BioPak are more environmentally friendly than conventional plastics, and produce 75 per cent less greenhouse gases in their manufacture. Bioplastics are used to produce double-wall cups for hot beverages, bowls and cutlery. Some bioplastics are compostable, reducing the waste sent to landfill and ultimately reducing greenhouse gas emissions.

Weblink
Biopak

- *Sugarcane pulp* is used in the production of BioPak's takeaway containers, clamshells, plates, bowls and trays. The sugarcane pulp is produced by crushing the stalks of the sugar cane after the juice has been extracted. It is renewable and biodegradable and is able to be composted, biodegrading at the same rate as garden waste; that is, in approximately 60–90 days. It can also be regrown each year.

Source: BioPak, http://www.biopak.com.au



BioPak

BioPak double-wall cups

BioPak

BioPak picnic products



BioPak

BioPak plates

Food transportation

Much of the food we purchase in Australia is grown in farming communities in regional areas. It is then transported to a food producer or distributor before reaching the supermarket or fresh food market where we shop. This can mean that some of our fresh food is grown a long way from the point of sale. For example, bananas grown in Queensland must be transported to southern states such as Victoria or Tasmania. However, some of our processed food is imported, increasing the distance it is transported.

Moving food through the food system, from 'paddock to plate', is based on logistics; that is, the management and control of goods from their point of origin to the customer. In Australia, most food is transported by truck, because it is the most efficient and reliable method of transporting goods quickly between the food processor, distribution centre and supermarket. Some rail transport is also used to move food in Australia, but this makes up a much smaller proportion of the food transportation system.

Processed food products with a long shelf life that are imported may be shipped on large container ships. Air transport is often used to transport imported products that have a short shelf life, such as fresh vegetables.

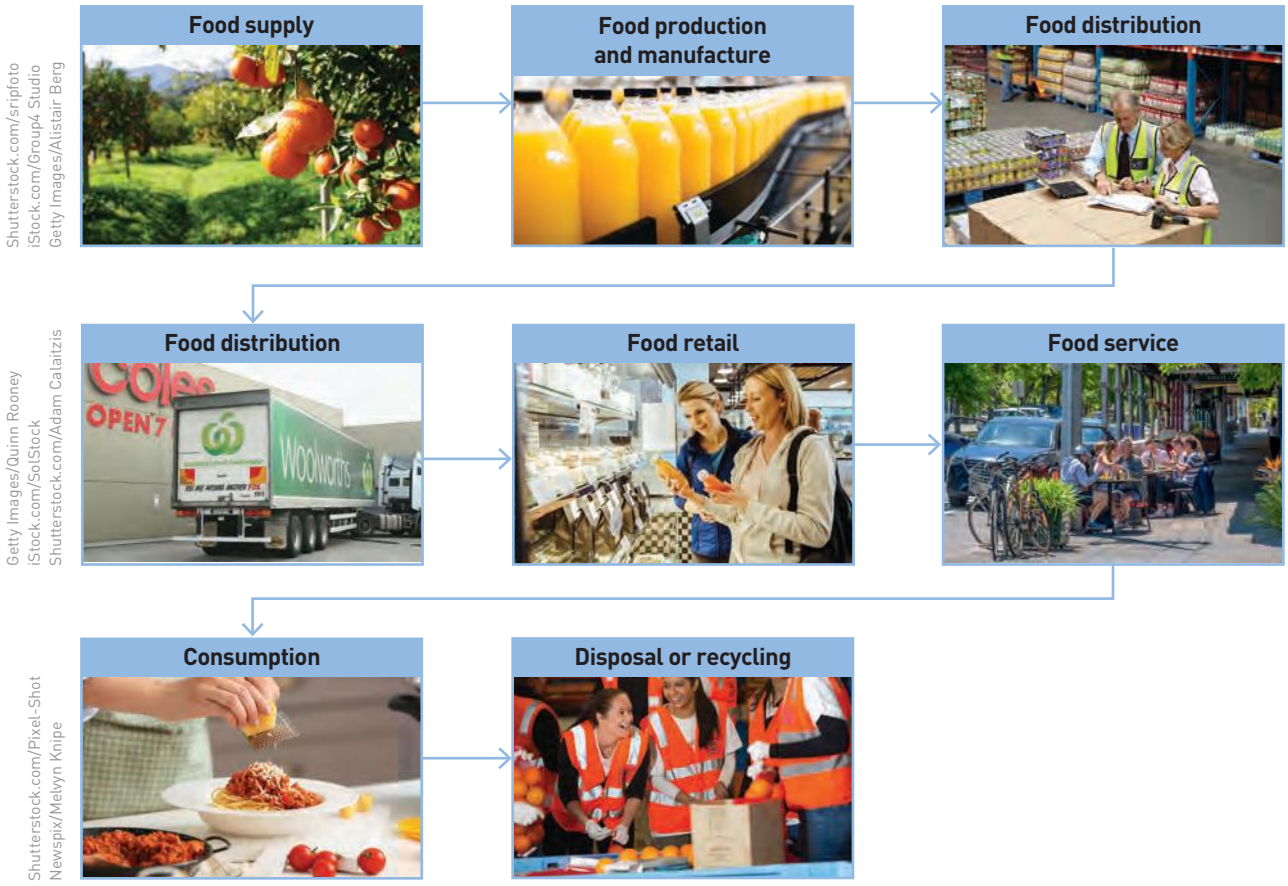


FIGURE 14.6 Overview of transportation in the food system

ENVIRONMENTAL EFFECTS OF FOOD TRANSPORTATION

Regardless of the mode used – road, rail, sea or air – all food transportation has a negative impact on the environment. Each form of transport uses fossil fuels – oil, petrol, diesel or gas – which are all non-renewable resources. Burning these fuels generates greenhouse gas emissions, the majority of which are carbon dioxide (CO_2). The production of greenhouse gases has been shown to contribute to global warming and climate change.

In Australia, transporting food using large trucks generates approximately 5 per cent of our national CO_2 emissions. All perishable food in Australia, such as milk, dairy products and meat, is transported in refrigerated trucks. These trucks use additional energy to run the refrigerated storage unit, and so emit an even greater volume of CO_2 into the atmosphere.

While road transport generates a significant amount of greenhouse gas emissions, air freight uses far more energy than other forms of transport, and therefore creates far more CO_2 emissions.

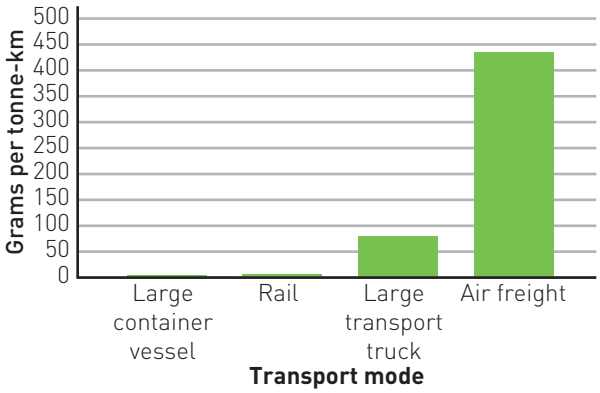


FIGURE 14.7 A comparison of the CO_2 emissions produced by different modes of transport

The use of new forms of technology, particularly the ability for shoppers to order their groceries online and have the order home delivered, may reduce CO_2 emissions considerably. A study undertaken in the United States found that the use of a supermarket delivery service could cut food transport–related greenhouse gas emissions by approximately 50 per cent compared with individual household trips to the

store. The report stated that fully laden trucks that delivered to homes in nearby neighbourhoods were far more energy efficient than shoppers each driving their own car to and from the supermarket.

FOOD MILES

The concept of **food miles** is often used to estimate the distance food travels from its point of production through to consumption – that is, from 'paddock to plate'. Food miles are another issue linked to sustainability, and one that is of concern to many people.

Calculating the distance food travels is an indicator of how environmentally friendly the food is. The fewer kilometres (or miles) a food has to travel, the better it is for the environment. Increasing globalisation has led to most countries importing food that is not easily produced by their own farming communities. This has increased the food miles of numerous food products.

Consider the following examples:

- Rice grown in the Riverina in New South Wales travels 380 kilometres to Melbourne consumers. In comparison, basmati rice grown in India travels over 12 500 kilometres to reach consumers in Sydney.
- Milk produced in Australia travels an average of 550 kilometres to reach customers.
- In summer, locally grown tomatoes in Victoria travel on average 165 kilometres. However, in winter most tomatoes are grown in Queensland and trucked to Melbourne, over a distance of 3000 kilometres.
- Bananas are grown in Queensland, so the average distance they travel to reach consumers in Melbourne is approximately 2700 kilometres.
- Lettuce is grown on the outskirts of Melbourne, so the average distance it travels to Melbourne is approximately 55 kilometres.
- Australian-grown oranges from the Riverina travel approximately 450 kilometres to Melbourne. In comparison, oranges imported from California travel 12 800 kilometres.



FIGURE 14.8 The food miles that oranges travel

However, most environmental scientists think that we should not only consider the distance food travels, but also its **carbon footprint**. A carbon footprint measures all of the carbon dioxide produced to get the food from paddock to plate; that is, as it is grown, processed, manufactured, packaged and sold. This gives a more complete picture of its energy footprint and the amount of greenhouse gases emitted throughout the whole of the food system. Research has shown that food transportation is a relatively small contributor of greenhouse gas emissions in the food system, and that growing, processing, storing and shopping for food all make a far greater contribution than transportation.

Understanding the Text

21 What is the Australasian Recycling Label (ARL) Program and how will the use of the new recycling symbols assist consumers to recycle packaging?

22 Explain why recycling soft plastics is so difficult. Outline the key features and benefits of the REDcycle system to consumers.

23 List the environmental advantages of recycling paper and paperboard.

24 Outline the advantages of using a deposit system on beverage containers.

Answers
Understanding the Text

25 Prepare a table like the one below to demonstrate the environmental advantages of reusing packaging materials and how recycled packaging is being reused by industry.

Environmental advantages of reusing packaging	Reuse of packaging material by industry

26 What are bioplastics? Outline the main environmental advantages of using bioplastics to produce food packaging.

27 Draw a Venn diagram to demonstrate the similarities and differences between the bioplastics produced by Plantic and those produced by BioPak.

28 What is meant by the term 'logistics'? Identify the main types of transport used to move food around the country and from overseas.

29 Prepare a PMI (plus, minus interesting) chart on the impact of food transportation on the environment.

IMPACT OF FOOD TRANSPORTATION ON THE ENVIRONMENT		
Plus	Minus	Interesting

30 Explain the meaning of the term 'food miles' and explain why many consumers are becoming concerned about this issue.

Food waste

Food waste is recognised as having social, economic and environmental implications throughout the world. A report released in March 2021 by the United Nations Food and Agriculture Organization (FAO) estimated that 931 million tons, or approximately 17 per cent of all food produced globally, is wasted. The report also showed that more than 61 per cent of food waste occurred in the home. The food service sector accounted for a further 26 per cent of food wasted, and retailers were responsible for 13 per cent of food waste.

Collaborative Activity

Like other developed nations, Australians waste a large proportion of the food we produce and purchase. According to the Department of Agriculture, Water and the Environment, Australians throw away more than 7.3 million tonnes, or approximately 300 kilograms of food per person annually. This equates to one in five of every bag of fresh food we buy every year. As every family knows, food is not cheap, and the food that is wasted is estimated to be worth over $8 billion. Foodbank, an Australian hunger relief charity, reports that 'On average, each Victorian household throws away $2,136 in food waste each year – that's $42 a week in food waste!'

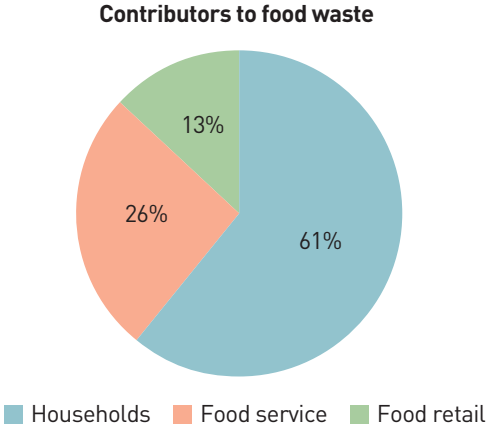


FIGURE 14.9 Households, food service and food retail all contribute to food waste

ENVIRONMENTAL EFFECTS OF FOOD WASTE

As well as having financial implications for individual families and commercial food businesses, food waste also creates problems for the environment. It is estimated that every year, 8.2 million tonnes of food waste is generated annually. Most of this waste is disposed of in landfill, accounting for more than 5 per cent of Australia's greenhouse gas emissions.

When food waste breaks down in landfill it emits carbon dioxide and methane, which are both greenhouse gases. Research shows that methane is 25 times more damaging to the environment than carbon dioxide, and therefore makes a significant contribution to global warming.

However, greenhouse gases are not only released when organic material such as food breaks down. When food is grown, processed, refrigerated, stored and transported, energy is used. This energy releases greenhouse gases that are damaging to the environment, so when we throw food away, the energy that was used to produce the food is simply wasted.

The transportation of food waste to landfill sites also contributes to greenhouse gas emissions. Significant amounts of diesel fuel, a non-renewable resource, are used to fuel the trucks that transport waste to landfill.

Valuable resources, including water, nutrients in the soil, energy and agricultural chemicals used to grow the food we eat are also lost when food is wasted.

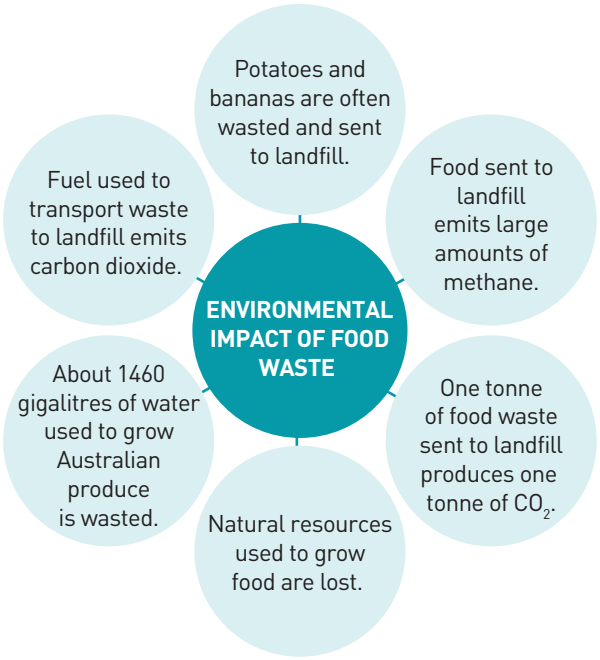


FIGURE 14.10 The environmental impact of food waste

AUSTRALIA'S FOOD WASTE HIERARCHY

In 2017 the federal government developed the 'National Food Waste Strategy – Halving Australia's food waste by 2030'. The strategy includes a **food waste hierarchy** that 'prioritises waste management practices in favouring food waste avoidance over resource reuse, recycling, reprocessing, and energy recovery, followed by waste disposal.'

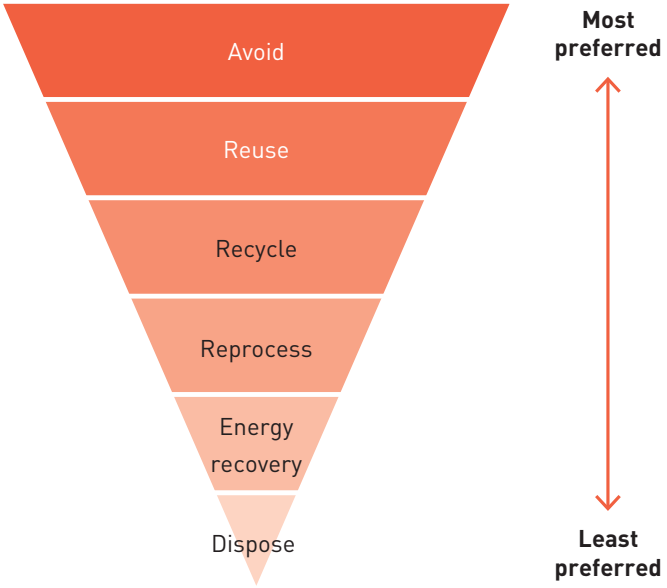


FIGURE 14.11 The food waste hierarchy

Avoid
- Education campaigns
- Research and development to support more efficient production methods
- Packaging initiatives to improve shelf life

Reuse
- Food rescue donations
- Repurposing aesthetically imperfect food (for example, as packaged carrot sticks)
- Repurposing without processing for animal feed

Recycle
- Composting
- Soil conditioners
- Worm farms
- Biotechnology solutions for animal feed

Reprocess
- Conversion to pharmaceuticals and nutraceuticals
- Conversion to cosmetic products

Energy recovery
- Incineration and anaerobic digestion for energy recovery

Dispose
- Landfill
- Incineration for non-energy recovery
- Food waste going to sewer

FIGURE 14.12 Strategies to reduce food waste

AVOIDING FOOD WASTE

Avoiding food waste in the first place is the best way to minimise the amount of waste sent to landfill. Australian households generate enormous volumes of food waste. Educating both children and adults about the impact of food waste on both the environment and the economy will provide them with the knowledge and skills to minimise food waste in their household. New packaging technologies that will extend the shelf life of food are also important in minimising food waste.

Avoiding household food waste

In terms of the volume of food we send to landfill, it is estimated that every Australian household throws away approximately 4.9 kilograms of food every week. The majority of food that we waste is fruit and vegetables, but leftovers from family meals are another major contributor.

There are a variety of reasons Australians waste food:

- Food spoilage – food may not be stored correctly or may get 'lost' in the refrigerator or pantry, and may spoil before it can be used.
- Lack of understanding about use-by and best-before dates – many people do not understand the difference between the different types of date marking on food products. Many people presume that if a food is labelled with a 'best before' date it cannot be eaten after that date, when in fact the food may have lost some quality, but is still safe to consume.
- Preparing more food than is needed – preparing larger meals than family members can eat means that leftovers are often thrown away. Another concern for some people is not knowing how to reheat leftovers safely.
- Over-purchasing – buying products that are not usually consumed within the household, or buying more food than usual when it is 'on special' can lead to having more food in the refrigerator or pantry than can be used during the week. Purchasing more take-away food than can be consumed is another cause of food waste.
- Lack of meal planning – planning for most of the weekly meals and preparing a shopping list can minimise food waste. Many people forget what ingredients are in the refrigerator or pantry, so buy extra 'just in case'. Food wastage can also occur if too much of a particular ingredient is purchased, and so partially used ingredients are thrown out.



FIGURE 14.13 Strategies to avoid food waste in the home

Supermarkets also find they are faced with food waste when, for example, a product is discontinued, labelling regulations change, or a fresh product such as bread or cheese passes its 'use-by' or 'best-before' date. Major supermarkets also reject entire crops of perfectly edible fruit and vegetables before they even reach the supermarket shelf because they don't meet the consumer demand for unblemished produce and market standards of size, shape and appearance. Furthermore, sales promotions encourage shoppers to purchase excessive quantities of perishable food, which is often wasted.

Like supermarkets, restaurants also have a problem with food waste. Approximately 25 per cent of all the food purchased for restaurant meals is either not used or is not eaten by the customer, and ends up being thrown away. Other food waste occurs when we buy food from takeaway outlets and don't eat it all.

Practical Activity 14.2

Creating and responding to a design brief: Food waste warriors

Design brief

At the end of each week, the refrigerator in some homes is full of leftovers and the family often throws out meat, bread, fruit and vegetables that have gone mouldy, soggy, slimy or are past their use-by date. You have decided you need to educate families on the issues surrounding food waste.

The table below contains an example of a variety of food items in a family's refrigerator that need to be used immediately to avoid becoming food waste. Your aim is to create a main meal for your family that has appealing sensory properties, utilising as many of these foods as possible. Try to be more creative than your usual everyday meals, and take this opportunity to showcase your food production skills.

While studying VCE Food Studies you have developed your understanding of the rationale that underpins the Australian Dietary Guidelines, so your meal should reflect the recommendations of the Australian Guide to Healthy Eating. You must be able to prepare and cook the meal in 90 minutes. Your pantry is available to supplement the perishable foods from the refrigerator.

1. Identify the specifications in the design brief.
2. Develop five criteria for success questions to assess the success of your food waste meal.

Investigating

Research suitable ideas that will incorporate at least five of the food waste products and will appeal to your family's food preferences. Other pantry items may be available at the discretion of your teacher.

A SELECTION OF INGREDIENTS FROM THE REFRIGERATOR THAT ARE LIKELY TO BE WASTED	PANTRY AND OTHER ITEMS AVAILABLE
1 bag lettuce	eggs
2 chicken breasts OR 200 grams beef mince	butter/oil
broccoli	flour
2 carrots	spices
fresh herbs	rice or pasta
1 onion	salt and pepper
2 cups grated tasty cheese	prepared puff pastry sheets or filo pastry
1 cup Greek yoghurt	4 potatoes
½ opened can kidney beans	tinned tomatoes
4 slices bread	other items as negotiated with your teacher

Generating

1. Develop two recipe ideas for a main course meal.
2. Discuss how well each option meets the specifications in the brief.
3. Identify the preferred option for the meal and justify your choice.

Planning and managing

Complete a food order.

Producing

Produce the main meal following all safety and hygiene procedures.

Evaluation

1. Evaluate the success of your meal based on your previously developed criteria questions.
2. Complete a 10-point checklist to place on a family's refrigerator suggesting ways to reduce food waste.

Activity 14.3

Want to reduce your food waste at home? Here are the six best evidence-based ways to do it

Read the article that follows, then answer these questions:

1. Evaluate the validity of the news article by assessing the source, purpose, context, presentation of evidence and language used. Alternatively use the CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) to evaluate the validity of this news article. See pages 193–94 for additional information on completing a CRAAP test.
2. Describe the impact of food waste on the environment.
3. How much food is wasted by Australian households annually, and what impact does this have on household budgets?
4. The article identifies three strategies that families could implement to minimise food waste. How easy do you think it would be for households to implement these strategies? Justify your answer.
5. Explain how making a shopping list and planning meals for 3–4 days could help to reduce food waste in the home.

WANT TO REDUCE YOUR FOOD WASTE AT HOME? HERE ARE THE 6 BEST EVIDENCE-BASED WAYS TO DO IT

From the farm to the plate, the modern-day food system has a waste problem. Each year, a third of all food produced around the world, or 1.3 billion tonnes, ends up as rubbish. Imagine that for a moment – it's like buying three bags of groceries at the supermarket then throwing one away as you leave.

Wasting food feeds climate change. Food waste accounts for more than 5% of Australia's greenhouse gas emissions. And this doesn't include emissions from activities required to actually produce the food in the first place, such as farming and transport.

One of the largest sites of food waste is the home. In Australia, households throw out about 2.5 million tonnes of food each year. That equates to between A$2,000 and $2,500 worth of food per year per household.

But there's some good news. Our Australian-first research, released today, identified the six most effective behaviours anyone can do to reduce food waste. Combined, these relatively small changes can make a big difference.

What we did

Food waste by households is a complex problem influenced by many factors. Some, such as food type, package size and safety standards, are out of a consumer's control. But some are insignificant daily behaviours we can easily change, such as buying too much, forgetting

about food at the back of your fridge, not eating leftovers and cooking too much food.

We wanted to better understand the complex nature of household food waste. Together with Australia's leading food rescue organisation OzHarvest, our research sought to identify and prioritise evidence-based actions to reduce the amount of food Australians throw away.

What we found

Our research identified the three top behaviours with the highest impact in reducing food waste, which are also relatively easy to implement:

- Prepare a weekly meal at home that combines food needing to be used up
- Designate a shelf in the fridge or pantry for foods that need to be used up
- Before cooking a meal, check who in the household will be eating, to ensure the right amount is cooked.

Despite these actions being relatively easy, we found few Australian consumers had a "use it up" shelf in the fridge or pantry, or checked how many household members will be eating before cooking a meal.

Experts considered a weekly 'use-it-up' meal to be the most effective behaviour in reducing food waste. Many consumers reported they already did this at home, but there is plenty of opportunity for others to adopt it.

Some consumers are more advanced players who have already included the above behaviours in their usual routines at home. So for those people, our research identified a further three behaviours requiring slightly more effort:

- Conduct an audit of weekly food waste and set reduction goals
- Make a shopping list and stick to it when shopping
- Make a meal plan for the next three to four days.

Our research showed a number of actions which, while worthwhile for many reasons, experts considered less effective at reducing food waste. They were also less likely to be adopted by consumers. The actions included:

- Preserving perishable foods by pickling, saucing or stewing for later use
- Making a stock of any food remains (bones and peels) and freeze for future use
- Buying food from local specialty stores (such as greengrocers and butchers) rather than large supermarkets.

'Want to reduce your food waste at home? Here are the 6 best evidence-based ways to do it', Mark Boulet, *The Conversation*, 29 September 2021

Activity 14.4

Recognising and addressing food waste

Work in a small team to brainstorm answers to the following questions about food waste.

1. What types of food are most commonly wasted among 16–18-year-olds?
2. What types of food would most commonly be wasted in your home?
3. What are the reasons that families waste food?
4. What strategies could families easily implement to minimise food waste?

REUSING FOOD

Reusing perfectly safe and edible food by donating it to food rescue organisations to help individuals and families in need, or repurposing it by repackaging it or processing it into new products, prevents the food from ending up in landfill and damaging the environment by generating methane as it breaks down.

Food rescue

More than 4 million people in Australia struggle to afford enough fresh food each day to stay healthy. Instead, they rely on the services of four main food rescue agencies: Foodbank, SecondBite, OzHarvest and FareShare. These organisations accept donations from a wide range of organisations in the food system, including primary producers, food processing companies, food distribution companies, supermarkets, restaurants and caterers. Food rescue agencies then redistribute the food through welfare agencies or community food programs, to people who struggle to find enough money to meet their basic food needs. These food rescue organisations not only help people in need but, through the provision of these services, they assist the environment by diverting food from landfill.

Foodbank is Australia's largest food relief organisation and operates in all states in Australia. It acts as a warehousing and distribution centre for more than 2400 national charities.

SecondBite supports over 1400 community food programs that provide assistance to families in crisis,

homeless people, young people at risk, Indigenous communities and asylum seekers. SecondBite has developed a partnership with Coles supermarkets, farmers and other food manufacturers to supply it with food that would normally be considered waste but is still perfectly safe to be consumed.

In 2020, SecondBite reported that its food recovery program had rescued more than 437 000 kilograms of food, using it to prepare more than 868 000 meals. These meals fed more than 120 000 Australians and prevented the food from entering the waste stream and ending up in landfill. Its report states that this equates to 'saving 37 million kilograms of greenhouse gases'.

Repurposing imperfect food

Both Woolworths and Coles have committed to reducing the amount of food waste sent to landfill throughout their food supply chain to zero.

One strategy both companies have adopted is to sell fruit and vegetables that previously might have ended up as waste, at a reduced price. According to Woolworths, approximately 25 per cent of fresh produce is rejected because of imperfections or cosmetic damage. Woolworths' 'The odd bunch' and Coles 'I'm perfect' product ranges enable customers to buy perfectly nutritious, fresh produce at a reduced price. The greatest benefit of this strategy is that farmers can sell more of their fresh produce, reducing their on-farm food waste. The advantage to the environment is that less food ends up in the waste stream and being sent to landfill. Woolworths estimates that it has diverted 204 000 tonnes of fruit and vegetables from landfill since 2015 by selling fresh fruit and vegetables that are slightly flawed.

Collaborative Activity



Shutterstock.com/Olga Leschenko

Woolworths 'The odd bunch' range offers imperfect produce at a cheaper price.



AAP Image/Medianet Images/Coles

Coles works with SecondBite to rescue excess food and support Australians in need.

Another strategy being adopted by both Coles and Woolworths is to work with food processors and food manufacturers to use fresh produce that would normally have been wasted to make value-added items for purchase. For example, overripe bananas are used to make banana bread and banana muffins, and sold under the company's home-brand label.

Similarly, vegetable growers are using fresh produce with imperfections to produce convenience products for families such as carrot and celery sticks, diced pumpkin, shredded carrot, zucchini or sweet potato noodles, and broccoli and cauliflower rice. This helps farmers reduce the amount of waste produce that leaves the farm and prevents it from going to landfill.

RECYCLE FOOD WASTE

Many municipal councils collect household food waste and send it to industrial composting facilities to produce organic compost that can be used in Australian farms, local parks and gardens. The compost helps the soil to retain water, reducing the amount needed to grow crops. Similarly, a number of large-scale commercial composting facilities have been developed to recycle the green waste produced by Australian households. In addition, many Australian families have their own backyard compositing system and/or worm farm to dispose of waste such as fruit and vegetable peelings.

Food waste can also be utilised to produce nutrient-rich soil conditioners for use in a domestic garden or in public parks and gardens.

Biotechnology solutions for animal feed

Many companies now use what in the past would have been considered the 'waste stream' to produce new products to be used for animal feed. Developments in biotechnology mean the waste from fruit and vegetables and the sugar industry, as well as animal and fisheries waste, is converted into nutrient-rich food for animals.

- Waste from vegetable processing, bread baking and dairy processing is used to produce stockfeed, providing a source of fibre, protein and energy for the dairy and pork production industries.
- The peel and pulp from processing fruit such as apples and oranges into fruit juice are used to produce cattle feed and fertiliser.
- The trimmings from processing meat are used as an ingredient in pet food and to make fertiliser.
- The heads and internal organs of fish are used as an ingredient in pet food and as fish bait.
- The heads of poultry are used to produce animal feed and as an ingredient in pet food, while chicken feet are used in the preparation of gelatine.
- The shells of packaged nuts are made into mulch for mushroom growing and are used to produce fertiliser.

REPROCESS FOOD WASTE

Minimising waste and developing by-products from the waste generated during the production of food makes environmental and economic sense.

The manufacture of food products inevitably results in some waste being created. Fruit and vegetables, for example, used in the manufacture of other food products such as fruit juice, canned soups or frozen meals, must be peeled, cored and trimmed. These processes create 16 kilograms of solid waste for every tonne of finished product. Furthermore, this practice is not sustainable, as land to use for the disposal of solid waste is limited.

Australian Harvest, a company located in Coldstream, Victoria, produces a range of delicious organic fruit pastes, including a plum and grape paste and a fig and grape paste, from the waste resulting from its wine production process – bio-grape. These pastes are made from skins and seeds removed from the grapes after they have been crushed to make wine. The organic fruit pastes are popular to serve as part of a cheese board. The company also uses the bio-grape to produce horseradish vinegar, mustards, jams, chutneys and sauces.



Bio-grape products

Australian Harvest Fine Foods

ENERGY RECOVERY

The production of **biogas** from solid waste is a strategy developed to minimise the impact of waste on the environment. Biogas can be produced from livestock effluent from dairy farms and piggeries, as well as meat processing waste. Food and beverage industry waste, for example from vegetable processing, fruit canning and the production of confectionery can all be used as an energy source for biogas.

Biogas digesters or fermentation tanks capture the methane from the solid waste and convert it into energy, reducing its impact on the environment. Research shows that biogas provides a reliable source of renewable energy that can be established in many local areas. According to the Australian Renewable Energy Agency, biogas production has the potential to prevent more than 9 million tonnes of CO_2 being emitted into the atmosphere annually.

Braebrook Pastoral in western Victoria is a family-based farming business that produces crops including canola, wheat, barley and oats, as well as sheep and pigs. In 2021, the Coles Nurture Fund granted funds to Braebrook Pastoral to install a biogas system on their property. The biogas system will capture methane and carbon dioxide from the pig waste and convert it into energy, providing sustainable energy and reducing the farm's greenhouse gas emissions.

Berrybank Farm in central Victoria began producing biogas in 1991 by collecting methane from their piggery waste. The energy produced is used to generate electricity for the farm, and any excess energy is put back into the national energy grid. Berrybank Farm plans to extend its biogas production in the future, enabling it to provide heating to keep piglets warm during cold weather and to provide cooling during the summer. Berrybank farm has expanded the use of piggery waste from biogas production, and now also produces garden potting mix and fertiliser. The production of both biogas and potting mix and fertiliser from pig waste not only reduces the amount of methane emitted into the atmosphere, but it has also significantly reduced the amount of water used annually on the farm.



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Bioenergy digester on Berrybank Farm

Understanding the Text

31 Draw a mind map to summarise the issues associated with food waste in Australia.

32 Outline four reasons food waste is an environmental concern.

33 What is a 'food waste hierarchy' and how can it help in reducing food waste?

34 Summarise two key reasons food is wasted by Australian households. How is food waste generated by Australian supermarkets?

35 Explain how organisations involved in 'food rescue' can reduce food waste and benefit the community. Use examples to support your answer.

36 Draw up a mind map to highlight the strategies being used by the supermarket sector to repurpose food that would otherwise go to waste.

37 Describe a strategy being implemented by some municipal councils to recycle the food waste in their local community.

38 Outline two examples of how biotechnology is being used to recycle food waste into animal food.

39 Why do food manufacturers seek out opportunities to develop by-products when processing food? Give an example of a new food product reprocessed from food waste.

40 What is biogas and how can its production enhance the environmental sustainability of primary food production?

Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

Applying knowledge

Write six questions to ask a food processor about the use of non-renewable resources in their production processes. Focus your questions on the sustainability issues highlighted in this chapter.

Worksheet

Analysing information

Summarise the advantages and disadvantages of sending food waste to landfill.

Evaluating concepts

The recycling symbol is often found on cartons and other packaging used in the food industry. Present an argument for and against the usefulness of these symbols when consumers are considering the environmental impact of food packaging.

EXAMINATION-STYLE QUESTIONS

Answers
Examination-style questions

Resources
Preparing for exams support

Question 1 (5 marks)

Discuss the impact of food citizenship on the food manufacturing and food retail sectors.

Question 2 (7 marks)

Transporting dairy products such as milk and cheese throughout all stages of the food system has an impact on the environment.

a Outline three ways that the transportation of milk and cheese has an impact on the environment. [3 marks]

b Describe two strategies that the supermarket sector or consumers could use to minimise the environmental impact of transporting food. [4 marks]

Question 3 (9 marks)

The United Nations Food and Agriculture Organization reports that more than one third of all food produced for human consumption is wasted.

a Describe the impact of food wastage on environmental sustainability. [3 marks]

b A significant amount of food waste is created in all stages of the food system. Complete the table below:

i Identify two stages in the food system in which waste is created.

ii Explain how food is wasted in each of the stages identified in part (b.i).

STAGE IN THE FOOD SYSTEM [1 + 1 = 2 marks]	EXPLANATION OF HOW FOOD IS WASTED IN THIS STAGE [2 + 2 = 4 marks]
1	
2	

Question 4 (8 marks)

Australian households are responsible for creating a large amount of the food waste in our food system.

1 Discuss strategies Australian households could implement to avoid food waste. [4 marks]

2 An important tier in the Food Waste Hierarchy is 'reuse'. Identify and explain two strategies that could be implemented within the food system to reuse fresh, edible food in order to minimise food waste. [4 marks]

Green pockets

Green pockets are a great snack food. They are similar to gozleme, but have a thicker, softer dough. Take the opportunity to experiment with different leafy green vegetables, soft leafy herbs and different types of cheeses packaged within a quick dough.

Acids in the yoghurt and vinegar tenderise the dough by disrupting the formation of the gluten network during kneading, so the final product is soft and fluffy on the inside.

FILLING

½ tablespoon olive oil

50 grams green leafy vegetables such as English spinach, kale or silverbeet, finely sliced

¼ cup parsley, finely chopped

¼ cup mint leaves, finely chopped

50 grams ricotta or grated mozzarella

100 grams feta, crumbled

⅓ cup grated parmesan

¼ red onion, finely diced

1 clove garlic, crushed

¼ teaspoon ground cumin

1 tablespoon olive oil, extra (for frying the pockets)

DOUGH

½ cup Greek style yoghurt
2 teaspoons olive oil
½ teaspoon white wine vinegar
1¼ cups flour
½ teaspoon bicarbonate soda

TO SERVE

½ lemon, cut into wedges

METHOD

Making the filling

1 Heat the olive oil in a medium saucepan with a tight-fitting lid, over a moderate heat.
2 Add the finely sliced green leaves and sauté until the leaves begin to wilt. Remove from heat and allow to cool.
3 Combine the parsley, mint, cheeses, onion, garlic, cumin and wilted green leaves in a mixing bowl. Set filling aside while making the dough.

Making the dough

1 Whisk the yoghurt, oil and vinegar together into a medium bowl.
2 Sift the flour and bicarbonate of soda and then stir into the yoghurt mixture to form a soft dough.
3 Turn the dough out onto a lightly floured bench and knead for 8–10 minutes, until very smooth.
4 Divide the dough into 4 pieces and knead each piece into a ball. Cover the dough with a damp tea towel.
5 Roll each ball of dough into a 17-centimetre diameter circle.

Assembling and cooking the green pockets

1 Divide the filling mixture into four equal portions and spread over half of each round of dough.
2 Fold the dough over to form a semi-circle and pinch the edges to seal.
3 Gently pat the pockets flat so the surface is even for cooking.
4 Heat half of the extra olive oil in a frying pan over medium heat, then reduce the heat to low. Pan fry the pockets one or two at a time, depending on the size of the frying pan. Allow 3–4 minutes for each side, until the pockets are golden brown.
5 Serve with lemon wedges.

Note: The green pockets can be reheated in the oven at 160 °C for 10 minutes, or in a sandwich press.

SERVES 2

EVALUATION

1 Describe the sensory properties of the green pockets – appearance, aroma, flavour and texture.
2 Classify the ingredients used in the green pockets on a diagram of the Australian Guide to Healthy Eating.
3 Use the data from question 2 to evaluate the nutritional value of the product according to the guidelines of this food selection model.
4 Explain why serving green pockets to children as a snack food is a practical way to support the nutritional rationale of the Australian Dietary Guidelines.
5 Explain why purchasing and using vegetables for this recipe from the 'odd bunch' section of the supermarket helps to reduce food waste.



Mark Fergus Photography

Middle Eastern chicken

In this recipe, the chicken pieces are coated in spices, then pan-fried to develop the flavour of the spices. Using dried fruit such as currants adds a touch of sweetness to balance the citrus flavours of the lemon. This recipe is high in protein and very low in fat. The vegetables also provide a range of vitamins and minerals to the diet. Serving the recipe with couscous balances the meal by providing a source of carbohydrate.

2 chicken thigh fillets, skin removed
½ teaspoon salt
½ teaspoon ground cumin
½ teaspoon ground cinnamon
¼ teaspoon ground black pepper
¼ teaspoon ground turmeric
2 tablespoons olive oil
½ brown onion, cut into slices
25 grams fresh ginger, julienned
1 clove garlic, crushed
½ fresh red chilli, finely chopped
½ tomato, diced
¼ teaspoon cumin seeds
2 sprigs thyme
½ lemon, zest and juice
2 teaspoons honey
2 tablespoons currants
½ vegetable stock cube
2 tablespoons fresh coriander to serve
rice or couscous to serve

METHOD

1 Cut each chicken thigh fillet into four portions. Combine the salt and ground spices in a plastic bag, add the chicken and shake to coat with the spice mix.
2 Heat the oil in a frying pan or heavy-based saucepan and brown the chicken pieces over high heat. Remove the chicken and reduce the heat to medium.
3 Add the onion, ginger, garlic and chilli to the frying pan and cook for 3 minutes, until the onion begins to soften. Add the diced tomato, cumin seeds and thyme, and cook for 2 minutes.
4 Return the chicken to the pan and add the lemon zest and juice, honey, currants, stock cube and just enough water to cover the chicken.
5 Cover with a lid and simmer over medium heat for 10 minutes. Remove the lid and simmer un-covered for 10–15 minutes, or until the chicken is tender and cooked through and the sauce is slightly reduced.
6 Garnish with fresh coriander leaves and serve with couscous or rice.

SERVES 2

EVALUATION

1 Describe the sensory properties of the Middle Eastern chicken – appearance, aroma, flavour and texture.
2 Classify the ingredients used in the Middle Eastern chicken on a diagram of the Australian Guide to Healthy Eating.
3 Use the data from question 2 to evaluate the nutritional value of the product according to the guidelines of this food selection model.
4 Recommend some other food products that could be served with the Middle Eastern chicken in a shared family meal that would increase the nutritional value of the dish.
5 Select one of the strategies supermarkets focus on to promote sustainability (see page 374). Identify two ingredients from the recipe and explain the connections between these ingredients and how the strategies improve the environmental sustainability of food processing and manufacturing.



Mark Fergus Photography

Fresh ginger cake

This light, moist cake uses fresh ginger rather than dry, ground ginger as the main flavour and is supported by the other spices to mask some of the bitterness of the bicarbonate of soda. As oil is used instead of butter, this recipe contains monounsaturated fat rather than saturated fat, making it a better choice for good health. However, there is sugar in the cake and icing sugar in the lemon icing, so this cake should only be eaten as an occasional treat.

CAKE BATTER

1 cup plain flour

½ teaspoon ground cinnamon

pinch of ground cloves

½ cup golden syrup

⅓ cup caster sugar

⅓ cup vegetable oil

1 teaspoon bicarbonate of soda

50 grams fresh ginger, peeled and grated

1 large egg, lightly beaten

LEMON ICING

1 cup soft icing sugar, sifted

20 grams butter, softened

zest and juice from ½ lemon

1–2 teaspoons boiling water, if needed

METHOD

Making the cake

1 Grease and line the base of an 18-centimetre round cake tin. Preheat oven to 170 °C.
2 Sift the flour, cinnamon and cloves.
3 In a large bowl, combine the golden syrup, sugar and oil. Stir the ingredients until thoroughly mixed, although they will separate while they stand.
4 Bring half a cup of water to the boil in a covered saucepan. Add the bicarbonate of soda and then pour the mixture into the large bowl containing the golden syrup, caster sugar and oil. Stir through the grated ginger.
5 Use a whisk to beat in the sifted dry ingredients and the egg.
6 Pour the cake batter into the prepared cake tin and bake for approximately 35 minutes. The cake will be cooked when a skewer inserted into the centre comes out clean.
7 Stand the cake for 3–5 minutes, then turn out onto a wire rack. Cool before icing.

Making the lemon icing

1 Combine the sifted icing sugar, softened butter and lemon zest. Stir to combine, then gradually add the lemon juice until a spreadable consistency is achieved. Add a little boiling water if extra liquid is needed.

EVALUATION

1 Describe the sensory properties of the fresh ginger cake – appearance, aroma, flavour and texture.
2 Why is it necessary to line the base of the cake tin as well as grease it with melted butter or oil spray?
3 Why is it important to rest the cake in the tin for a few minutes before turning it out onto a cake rack?
4 Explain why vegetable oil is a healthier choice of fat compared with butter.
5 Recommend some other food products that could be served with the fresh ginger cake to increase the nutritional value of this discretionary food.



Mark Fergus Photography

GLOSSARY

accuracy the reliability and correctness of content

advergames video games that contain an advertisement to promote a particular brand, product or message by integrating and embedding it into the play

appetite the desire for food

aquaculture the farming of captive-bred fish stock

Australian Dietary Guidelines guidelines that were developed to guide and promote good nutrition and health, and reduce diet-related disease

Australian Guide to Healthy Eating a practical pictorial guide for food selection

Australasian Recycling Label (ARL) Program an on-pack labelling scheme that helps consumers recycle correctly and supports brand owners to design packaging that is recyclable at end-of-life

bile a chemical produced in the liver that is released into the duodenum to physically break down or emulsify fat

biodiversity the vast array of living organisms that inhabit the planet, and the interactions between them

biogas a gas that is produced by the action of bacteria on organic material such as corn or wheat

biomarker a measurable biological parameter that is predictive of the risk of a serious disease when present at an abnormal level in the human body

bioplastics made from plant material such as corn and wheat; bioplastics are renewable and biodegradable

biosecurity the protection of people, animals and the environment from infectious disease, pests and other biological threats

body image the perception a person has about their physical self and the thoughts and feelings that result from that perception. These feelings can be positive, negative or both, and are influenced by individual and environmental factors.

bycatch the incidental capture of non-targeted fish species and other marine life

carbon footprint a measure of all the carbon dioxide produced to get food from paddock to plate, including growing, processing, manufacturing, packaging and selling the food

cattle feedlot a managed facility for the purpose of producing beef of a consistent quality and quantity

chemical digestion the breakdown of food using chemicals such as enzymes and acids

cholecystokinin (CCK) a hormone produced in the small intestine that suppresses the appetite after eating a meal high in fat

chronic disease a condition that is lasting, with persistent effects that impact on the quality of people's lives

clean eating the consumption of minimally processed whole foods such as fruits, vegetables, lean proteins, wholegrains and healthy fats

climate change a change in the pattern of weather, and related changes in oceans, land surfaces and ice sheets, occurring over timescales of decades or longer

comfort eating eating that is driven by the desire to make ourselves feel happy rather than to satisfy hunger

connectedness linking a family together and creating a family bond

conservation farming a term used to describe farming practices that conserve the soil and the capacity of the soil to retain water, thereby improving the conditions for plant growth

context the background or setting to a statement or idea so that the reader can understand where the information came from

CRAAP test a test that uses criteria to evaluate and validate sources of information

currency refers to how valuable and timely the information is to the topic

data analytics a process of examining raw data to draw conclusions about that information

digestion a process by which food is converted into substances that can be absorbed and utilised by the body

discretionary food choices food and drink choices that do not necessarily provide nutrients the body needs

emotions relate to the mind and are often described as psychological factors or influences

energy required in the body for metabolic processes, physiological functions, muscular activity, heat production, and growth and synthesis of new tissue

energy-dense foods foods that are high in energy, usually because of their high fat and sugar content

environmental stewardship involves taking responsibility to protect the natural environment through conservation efforts and by implementing sustainable practices in growing and producing the food we consume

enzymatic hydrolysis a chemical digestive process that breaks down food by breaking the bonds that hold together the molecular 'building blocks' within the food

ethics a set of principles that are motivated by ideas of right and wrong, or good and bad

fad diets weight reduction diets that either eliminate one or more of the essential food groups, or recommend consumption of only one type of food

fertilisers widely used in agriculture to improve crop yields

FODMAP an acronym that stands for fermentable oligosaccharides, disaccharides, monosaccharides

food allergy an abnormal immunological reaction to food caused by a foreign substance, usually protein; can be life-threatening

food citizenship individuals participating in, and making informed choices about, issues such as sustainability, ethics or health in any stage of the food system

food fad refers to a food or ingredient that people are interested in for a short period of time, such as chia, quinoa, teff or kale

food gatekeepers the members of the household who make decisions about the food that is purchased and consumed

food insecurity when people do not have adequate physical, social or economic access to food

food intolerance a chemical reaction to particular foods; an intolerance is not an immune response, so is not a true allergy

food miles the term used to estimate the distance food travels from its point of production through to its point of consumption; that is, from paddock to plate

food security when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life

food sovereignty challenges the control of the food system and food supply by large corporations, and returns the decision-making back to farmers and individuals who produce and consume food, in order to ensure it is produced ethically and sustainably

food system a complex series of activities that enables food to move from farm to consumer and includes growing, harvesting, processing, transporting, manufacturing, consuming, disposing and recycling food

food trends general changes or movements in food purchasing and consumption behaviours, towards a new result or pattern

food waste hierarchy a program that lists strategies for food waste management in their order of importance, beginning with avoiding food waste and followed by reusing, recycling, reprocessing, energy recovery and waste disposal

free-range poultry birds that are not closely confined and have some access to the outdoors

free-range pork production producing pigs that are born and raised with free access to the outdoors

functional foods foods that provide a health benefit beyond that of basic nutrition

gene technology a process that alters the genetic material of plants or animals by duplicating, removing or inserting one or more new genes to improve its characteristics

general-level health claim a nutrient or substance in a food and its effect on a health function

ghrelin an appetite-stimulating hormone produced by the stomach

glycaemic index (GI) a measure of how fast and how much a food raises blood glucose levels

groundwater surface water that has migrated from the surface through the ground and is stored in porous soils and rocks

health claim a relationship between a food and health, rather than a statement of content

healthy diet a diet that follows the principles of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating

herbicides chemicals used to kill weeds that compete for nutrients in the soil needed by food crops such as wheat, oats, rice and barley

high-level health claim 'a nutrient or substance in a food and its relationship to a serious disease or to a biomarker of a serious disease'*

individual identity refers to qualities, beliefs, likes and dislikes that make a particular person different from others

intensive egg production stocking chickens in much more dense and crowded populations than is the case with other types of animal husbandry

irrigation salinity occurs if groundwater reaches the surface and salt emerges through the topsoil

kilojoule (kJ) a unit for measuring energy intake or expenditure

kombucha a sweetened black or green tea drink, fermented with yeasts and bacteria

leptin a hormone produced by cells that store fat, which suppresses appetite

lifestyle diseases diseases that are associated with an individual's diet or level of physical activity, such as obesity, type 2 diabetes and cardiovascular disease

macronutrients the essential nutrients required by the body in large amounts

mechanical digestion the use of physical force to break down food, such as chewing or the squashing movement of the intestines

media the technology used to communicate information to the public through avenues including social networks, television, radio, newspapers, magazines and billboards

microbiota microscopic living organisms such as bacteria, yeast and viruses that live in the small and large intestine of all human beings

nutrient supplement provides concentrated nutrients, most often vitamins and minerals, that may otherwise not be consumed in sufficient quantities

nutrition content claim a claim made about the presence or absence of certain nutritional properties of food

obesity carrying excess body weight in the form of fat

objective fair, impartial, independent and not biased

organic farming farming practices that produce crops and animals without the use of artificial chemicals, instead using natural systems

organic food production growing and producing food without the use of synthetic chemicals such as pesticides and artificial fertilisers

peptide YY (PYY) a hormone produced in the lower part of the small intestine that sends a signal to the brain, telling it to decrease the appetite

pesticides chemicals that are sprayed on specific crops to control a particular pest, such as grasshoppers, so that they do not destroy the crop

physical activity body movements (light, moderate or vigorous) that cause the muscles to work and use more energy than the person would use if resting

principles of research include credible sources, evidence-based information, accurate analysis of data

purpose the reason the information is being written

relevance how valuable the information is to the topic

restrictive dieting often referred to as fad dieting, restrictive dieting is a pattern of eating that bans certain foods or food groups, and promises quick, dramatic results

satiety a state or feeling of fullness after eating food

sensory appreciation of food the information humans get from their senses about food and how they interpret that information – sight, smell, taste, touch and hearing

*Source: Food Standards Australia New Zealand

sensory properties the characteristics of foods as they are perceived by the senses – appearance, aroma, flavour and texture

social roles the parts people play as members of a social group

sociocultural factors include concern for family traditions, culture, peers, religious beliefs

soil acidification occurs when plants take up nutrients and release acidic waste from their roots

source the person or institution who wrote or published the article

sustainability in agriculture refers to farming practices that help maintain the land to ensure it is available for future generations

sustainable seafood species that are caught or farmed in a way that ensures the long-term health and stability of that species, as well as the greater marine ecosystem

tillage farming includes farming practices such as direct drill and no-till farming that minimise damage to the soil structure and improve the conditions for plant growth

trans fats fats that are created artificially by a process called hydrogenation

unsaturated fats monounsaturated or polyunsaturated fats

values those things that we see as important to us and that motivate and guide our decisions in life

RECIPE INDEX

A

apples
  Apple and custard filling 236
  Apple tarte tatin 366–7
Asian slaw 188

B

bacon, Spinach, bacon and red capsicum roulade 308–9
beef
  Curry sauce 306
  Paprika meatballs 128–9
  Spicy meat filling 110
biscuits
  Monte Carlo biscuits 158–9
  Wholemeal chocolate biscuits 310–11
bread
  Monkey bread 184–5
  Pide with two fillings 110–11
  Sweet bread plait 236–7
Broccolini and snow pea salad 154–5
Brunch curry with poached egg 26–7
buckwheat, Green bean and buckwheat salad 364–5

C

cakes
  Chocolate, pear and raisin cake 282–3
  Fresh ginger cake 400–1
  Lemon feather cake 74–5
cannellini beans, Pasta and cannellini bean soup 338–9
capsicums
  Capsicum pesto 72
  Peperonata 362–3
  Spinach, bacon and red capsicum roulade 308–9
carrots, Fragrant lentil, carrot and sweet potato soup 206–7
celery, Spicy Shaanxi-style stir-fried lamb and celery 342, 343
cheese
  Cheese sauce 186
  Cheese and spinach filling 110
  Green pockets 396–7
chicken
  Chicken, lemon and pea risotto 106–7
  Chicken noodle salad 50–1, 318–19
  Chicken sliders with soy and ginger glaze 23
  Coconut chicken bowl 188–9
  Green-tea noodles with chicken and edamame beans 152–3
  Middle Eastern chicken 398–9
  Pasta, zucchini and chicken roll-ups 208–9
  Spicy chicken satay skewers 230–1
  Steamed coriander chicken balls 108–9
  Sticky chicken wings 156–7
chocolate
  Chocolate, pear and raisin cake 282–3
  Wholemeal chocolate biscuits 310–11
Coconut chicken bowl 188–9
Coconut rice 188
Cooking grains 232–3
coriander
  Coriander chicken balls 108–9
  Spinach and coriander sauce 152
curry
  Brunch curry with poached egg 26–7
  Curry sauce 306
  Japanese-style curry 306–7
  Vegetable curry 26

D

Dhal 276–7
Dipping sauce 108
dressings 50, 154, 342
  Yoghurt dressing 364

E

edamame beans, Green-tea noodles with chicken and edamame beans 152–3
Eggplant and lamb sauce 280
eggs, Brunch curry with poached egg 26

F

fennel, Salmon and fennel 340–1
Fragrant lentil, carrot and sweet potato soup 206–7
Free-form pumpkin tart with olive oil pastry 278–9
freekeh, cooking 232
Fresh ginger cake 400–1
Fresh pasta 124–5
frittata, Vegetable frittata 54–5

G

ginger, Fresh ginger cake 400–1
Grain and lentil salad with salmon and fennel 340–1
Green bean and buckwheat salad 364–5
Green pockets 396–7
Green-tea noodles with chicken and edamame beans 152–3

I, J, L

icing 158
  Lemon icing 400
jams, Raspberry jam 158
Japanese-style curry 306–7
lamb
  Eggplant and lamb sauce 280
  Moroccan lamb hotpot 210–11
  Spicy Shaanxi-style stir-fried lamb and celery 343
lemons
  Chicken, lemon and pea risotto 106–7
  Lemon curd 130
  Lemon feather cake 74–5
  Lemon icing 400
lentils
  Dhal 276–7
  Fragrant lentil, carrot and sweet potato soup 206–7
  Grain and lentil salad with salmon and fennel 340–1
lettuce, San choy bow 234–5

M

marinades 156
mayonnaise 24
meatballs, Paprika meatballs 128–9
meringues 130
Middle Eastern chicken 398–9
Mini lemon tarts 130–1
Monkey bread 184–5
Monte Carlo biscuits 158–9
Moroccan lamb hotpot 210–11
Moroccan spice mix 210
Moussaka 280–1

mushrooms
Mushroom sauce 128–9
Tomato and mushroom sauce 186
Tomato sauce 208

N, O

noodles
Chicken noodle salad 50–1, 318–19
Green-tea noodles with chicken and edamame beans 152–3
Soba noodles with Asian dressing and spicy Shaanxi-style stir-fried lamb and celery 342–3
Spinach and pork ramen 70–1
Teriyaki salmon with zucchini noodles 52
Okonomi sauce 24
Okonomiyaki with mayonnaise 24–5
Olive oil pastry 278

P

Paprika meatballs 128–9
pasta
Fresh pasta 124–5
Pasta and cannellini bean soup 338–9
Pasta, zucchini and chicken roll-ups 208–9
Spinach and pine nut cannelloni 186–7
pastry
Apple tarte tatin 366–7
Olive oil pastry 278
Shortbread pastry 130
pears, Chocolate, pear and raisin cake 282–3
peas, Chicken, lemon and pea risotto 106–7
Peperonata 362–3
Pide with two fillings 110–11
pine nuts, Spinach and pine nut cannelloni 186–7
plain rice
absorption method 232
rapid boil method 232
pork
Chicken sliders with soy and ginger glaze 23
Paprika meatballs 128–9
San choy bow 234–5
Spinach and pork ramen 70–1
Steamed won tons 108
pumpkin, Free-form pumpkin tart with olive oil pastry 278–9

Q, R

quinoa, cooking 232
raisins, Chocolate, pear and raisin cake 282–3
Raspberry jam 158
rice
Chicken, lemon and pea risotto 106–7
Coconut rice 188
cooking 232
Steamed rice topped with crispy ginger, garlic and peanuts 52

S

salads
Broccolini and snow pea salad 154–5
Chicken noodle salad 50–1, 318–19
Grain and lentil salad 340–1
Green bean and buckwheat salad 364–5
salmon
Salmon and fennel 340–1
Teriyaki salmon with zucchini noodles 52–3
San choy bow 234–5
satay skewers, Spicy chicken satay skewers 230–1
sauces
Cheese sauce 186
Curry sauce 306
Dipping sauce 108
Eggplant and lamb sauce 280
Mushroom sauce 128–9
Okonomi sauce 24
Spinach and coriander sauce 152
Spring vegetable pasta sauce 126–7
Tomato and mushroom sauce 186
Shortbread pastry 130
snow peas, Broccolini and snow pea salad 154–5
soba noodles
Green-tea noodles with chicken and edamame beans 152–3
Soba noodles with Asian dressing and spicy Shaanxi-style stir-fried lamb and celery 342–3
soup
Fragrant lentil, carrot and sweet potato soup 206–7
Pasta and cannellini bean soup 338–9
Spinach and pork ramen 70–1
Soy and ginger glaze 23
Spicy chicken satay skewers 230–1
Spicy meat filling 110
Spicy Shaanxi-style stir-fried lamb and celery 342, 343
spinach
Cheese and spinach filling 110
Spinach and coriander sauce 152
Spinach and pine nut cannelloni 186–7
Spinach and pork ramen 70–1
Spinach, bacon and red capsicum roulade 308–9
Spring vegetable pasta sauce 126–7
Steamed coriander chicken balls 108–9
Steamed rice topped with crispy ginger, garlic and peanuts 52
Steamed won tons 108
Sticky chicken wings 156–7
Sweet bread plait 236–7
sweet potatoes, Fragrant lentil, carrot and sweet potato soup 206–7

T

tarts
Apple tarte tatin 366–7
Free-form pumpkin tart with olive oil pastry 278–9
Mini lemon tarts 130–1
Teriyaki salmon with zucchini noodles and steamed rice topped with crispy ginger, garlic and peanuts 52–3
tomatoes
Tomato and mushroom sauce 186
Tomato sauce 208
Turmeric yoghurt 26

V

vegetables
Green pockets 396–7
Spring vegetable pasta sauce 126–7
Vegetable curry 26
Vegetable frittata 54–5

W, Y, Z

Wholemeal chocolate biscuits 310–11
Yeast dough 236
Yoghurt dressing 364
zucchini
Pasta, zucchini and chicken roll-ups 208–9
Teriyaki salmon with zucchini noodles 52–3
Zucchini koftas with red capsicum pesto 72–3

INDEX

5:2 intermittent fasting diet 145
16:8 intermittent fasting diet 145

A

Aboriginal communities, improving food access, NT 258–9, 270
absorption
  carbohydrates 13
  fats 16
  macronutrients 12
  protein 14
accessory organs 7
accommodation, and food choices 92–3
accuracy of information 193, 194
accurate data (ADGs) 31
added salt, reducing consumption of 226, 228
added sugars
  in processed foods 36, 37, 45, 163, 226
  reducing consumption of 227
adolescence
  food choices 286
  food needs 59
adulthood, food needs 59
advergames 167
advertising
  of baby and toddler foods 181
  food retailers 166–70
  on media 134, 135–40
advertising industry, influence on food system 177–80
advertising to children 177–8
  arguments against mandatory regulations 178, 179
  'Brands off our kids' 178–9
  legislative control over 178
aerial spraying 321
African swine fever 347, 350
agricultural chemicals
  and environmentally sustainability 320–3
  in primary food production 320
agricultural drones 253
agricultural robots 249–50, 251–2
agriculture
  biosecurity risks 346–52
  climate change impact on 352–3
  sustainability 314–19, 321, 324, 325–35, 346
Albury/Wodonga community oven 119
alcohol 36
Aldi stores 90, 91, 272, 372
alimentary canal 7, 9–10
all-in-one kitchen machine 94
almonds production 356
aluminium cans, recycling 381
amino acids 14
anaphylactic reaction 62, 63
animal feed, biotechnology solutions 393
animal production
  and human nutritional needs 262, 263
  sustainable 329–35
  welfare concerns 288–98
anxiety 18, 19
apartment-style living 92–3
appearance of food 5
appetite 4
apple and pear industry, fire blight in 348
apples, climate-change resistant 248
aquaculture 332
  arguments in support of/against 333–4
  augmented reality to improve 254
  in Australia 333
  climate change impacts 353
  and environmental sustainability 332–4
armed conflict 242
aroma 5–6
Asian cuisines 95
Asian honey bees 347
asparagopsis (seaweed), as cattle feed 329–31
assessing validity of food information 192–4
  CRAAP test 194–5
Atlantic salmon farming 333
augmented reality to improve aquaculture 254
Australasian Recycling Label (ARL) Program 380
Australia
  biosecurity 246–50
  eating patterns 78–87
  food insecurity 241–5
  food waste 387–8
  improving food access and distribution 256–62
  role in improving food access and distribution across the globe 262–8
Australian and New Zealand Food Standards Code 221
Australian Association of National Advertisers (AANA) 178
Australian Centre for International Agricultural Research (ACIAR)
  improving food security 263–6
  research areas 264
Australian diet 33
Australian Dietary Guidelines (ADGs) 34–8, 78, 88, 96, 162, 174, 287
  applying in everyday life 224–8
  and Australian diet 33
  development 30–1
  Dietary Guideline 1 34, 35
  Dietary Guideline 2 30, 34, 35–6, 39–45, 203
  Dietary Guideline 3 35, 36–7, 226
  Dietary Guideline 4 35, 37–8
  Dietary Guideline 5 35
  nutritional rationale 32–3
  research principles 30–1
Australian farms
  biosecurity on 346–8
  biosecurity protocols 348–50
Australian Food and Grocery Council 178
Australian Food Sovereignty Alliance (AFSA) 269
Australian food supplies, climate change effects 353–4
Australian Guide to Healthy Eating 30, 34, 35, 39–45, 88, 96, 162, 174, 224, 287
  five food groups (circle model) 39, 40, 225, 226
  foods outside the circle 45
Australian health information platforms 215–20
Australian Healthy Food Guide 139, 140
Australian Institute of Health and Welfare (AIHW) 78, 96, 177
Australian International Food Security Centre (AIFSC) 266
Australian Medical Association 176, 177
Australian Packaging Covenant Organisation's 2025 Targets 377

Australian Portion Perfection Plate 224
authority of information 194
automating fruit orchards 252
autonomous agricultural systems 250–1
available time, and food choices 92–3
avian influenza 349
avoiding food waste 388–91
Ayeh Far 142

B

babies and toddlers, marketing of foods for 181
bad cholesterol 16
bananas
  golden 247
  Panama disease 347–8
barley stripe rust 347
barn-laid eggs 289
basal metabolic rate (BMR) 58
battery hens 288, 290–1
beef production 295
  difference in flavour and texture of feedlot and pasture-fed beef 296–7
  ethical beef products 298
  feedlot cattle 295–6
  pasture-fed cattle 296, 298
bees 347, 354, 355–6, 358
Bertie's Butcher 81
Bifidobacterium 17, 82
bile 9
billboards 140
biodiversity 358
  components 358
  importance to primary food production 358
  risks associated with loss of 359
  strategies to preserve 360
  threats to 358–9
biogas production 393–4
biological hazards 242
biomarkers 223
BioPak packaging 382, 383
bioplastics 381, 382
  for food packaging in Australia 382–3
biosecurity
  on Australian farms 346–8
  funding 350–1
  managing in Australia 346
  protocols on Australian farms 348–50
  what is it? 345
biotechnology 246–8, 393
Blackmores Superkids Immune Chewables 203–4
Bluey and her family 143
Body+Soul 139
body image 144–5
body mass index (BMI) 32, 217
brassicas 41
breakfast 97–8
breastfeeding 36, 37–8, 59
bridge building in Vietnam 268
broadcasting media 134, 138–9
bushfires 353–6, 358
bycatch 332

C

cafes and restaurants 374–5
cage-egg production 288, 290–1
calcium 44
cancer 32, 42, 44, 162, 163, 176, 226
capsicum 103–4
carbohydrates 12–13
  absorption 13
  digestion 10
  types of 12–13
  utilisation 13
carbon dioxide 370, 371, 385
  atmospheric 327, 328, 351, 354, 384
  from food waste 387
  from pig waste 393
  from transport 384
carbon footprint 370, 385
cardiovascular disease 30, 32, 42, 82
cartoon characters 143
Catherine Saxelby's Foodwatch website 98, 99, 218
cattle
  climate change impacts 353
  and environmental sustainability 329
  methane production minimisation 329–31
  see also beef production
cattle feedlots 295–6
cattle ticks 353
celebrating with food *see* sharing and celebrating with food
cereal crops
  threats to 348, 350, 351
  see also rice; wheat production
certified organic production 316–17
cheese 44
chemical crop spraying, impact on environmental sustainability 321
chemical digestion 7, 11
chemicals, environmentally sustainable use in primary food production 320–3
chicken meat production 288
  intensive indoor 289, 353
child labour 302
childcare, meals in 102
children
  advertising to 177–9
  cooking and preparing family meals 99
  dietary supplements for 203–4
  drinking water 100
  establishing healthy diets in 96–100, 101
  exposing to new foods and flavours 102, 103–4
  food choices 286
  food habits and physical activities 97
  food needs 58–9
  importance of repetition in developing healthy food habits 102–3
  marketing to 166–7
  mealtimes 97–8
  modelling healthy eating patterns for 97–9
  obesity/overweight 96, 167, 177, 180
  screen time 96
  shopping for food 99
  talking and learning about food 98
chlorella 195
Chloris Street, Caulfield, cooking classes 121
chlorophyll 195
Chobani products 136
cholecystokinin (CCK) 4
chronic disease 32, 175
chyme 9
clean eating 82
climate change 323, 327, 335, 351, 384
  definition 351
  farmers taking action into their own hands 357
  and food insecurity 242
  and loss of biodiversity 358, 359
  risks for primary food production 351–7
climate-change resistant apples 248
cocoa and chocolate (Fairtrade) 302
coeliac disease 63–4
Coles supermarkets 91, 93, 137, 139, 141, 176, 272, 295, 298, 372, 373–4, 378, 380, 392
colon 10

colour
  of emotions 143
  of food 5
  in marketing food 142–3
comfort eating 146–7
  consequences 147
  homemade vs commercial Monte Carlo's 147–8
  snack attack 148–9
commercial company websites 137–8
communities
  food and support for the disadvantaged 122
  sharing and celebrating with food 117–20
  supporting and connecting during lockdown 120–1
community gardens 103–4, 260–2
complete proteins 14
composting systems 392
connectedness 114, 115, 116
conservation farming 314–19
consumer activism 181
consumer organisation websites 138
consumer values, shaping 134
consumers
  animal welfare concerns 288–98
  ethical principles of concern 80–1, 288–303
  sociocultural factors in food choice 88–95, 286–8, 291–2
  trends heavily impacted by sustainability 375–6
  views on purchasing free-range eggs 291–2
  see also food citizenship
context of the information 193
convenience, desire for 84–6, 87, 93–4
conventional indoor pork production 293–4
cooking classes, Chloris Street, Caulfield 121
cooking schools, virtual 83–4
cornstarch 382
cost of food 168
COVID-19 lockdown 83, 137
  and online shopping 167
  snacking more and gain in weight 148–9, 169–70
  supporting and connecting communities during 120–1
  virtual dinner parties 116
COVID-19 pandemic 90, 96, 163, 168
  and eating patterns in Australia 80, 81, 82, 83, 86
  and food insecurity 242, 244
COVID-washing 149
cow peas 246
CRAAP test 193–5
credible sources 30–1, 192
crop production, sustainable 327–9
crop rotation 316, 317
crop stubble 314–15
crops
  biosecurity threats 346
  preservation of genetic diversity 360
  as sustainable food source 262–3
CSIRO 327, 329, 353
  Innovative Food Systems Solutions portal 262
  Taste & Learn program 215
  technological innovations 247, 249, 253, 254
culture, and food choices 95, 286–7
currency of information 193
cyclones 354

D

dairy farmers, effluent and water management 326
dairy foods 44, 122
dairy-free milk alternatives 80
dairy goats 335
'dark kitchens' 86
data analytics 141
data mapping technology 249
Deliveroo 173, 174
delivery-only kitchens 86
Department of Agriculture, Water and the Environment 262, 346, 348
depression 18, 19
diet
  influence on gut microbiota 17
  see also fad diets
dietary fibre 10, 13, 17, 175
dietary requirements across the lifespan 58–62
dietary supplements 202
  for children 203–4
digestion 7–8
digestive processes 9–10
digestive system 7, 8
  physiology 9–10, 11
digital agriculture 254
digital marketing 135–8
digital media 134, 135–8
disaccharides 13, 67
disadvantaged 93, 122
'discretionary' food choices 41, 43, 45
disposal of food waste 388
dopamine 18
Dorper sheep and environmental sustainability 331
drinking water 45, 100, 122
drones 253, 321
drought-resistant wheat 247
droughts 325, 327, 328, 351, 352, 358
duodenum 9
dysbiosis 18

E

early childhood, food needs 58
early learning centres, meals in 102
'Eat Brighter Live Lighter' strategy 216
'Eat for Health' Program 32, 34, 35, 174, 287
'eat locally' 80–1, 272
Eat Well Be Active campaign 88
eating food 4–7
eating patterns in Australia 78–87
education
  enhancing food security and food access 256–7
  and food choices 88–90, 95, 287
egg production 288, 353
  barn-laid eggs 289
  cage-free 292
  free-range 288–9, 291–2
  intensive indoor 288–9, 290–1
  organic 290
eggs 43, 122
Eid al-Fitr meal 115
emotional and psychological responses to food 114, 144–9
empowering women, to enhance food security 264–5
energy 58
  from carbohydrates 13, 32
  from fats 16
  from protein 14
energy-dense foods 32
energy drinks 33
energy recovery, from food waste 388, 393–4
energy use 370
  food manufacturing and processing 370
  food retailing 370
  strategies to improve in food processing and retailing 371–2
environmental impact
  of food packaging 376–83
  of food processing and retailing 370–2

of food transportation 384–5
of food waste 387
environmental stewardship 288, 298–301
environmental sustainability 327
animal production 329–31, 335
and aquaculture 332–4
crop production 327–9
and crop rotation 316
food packaging 377–80
in marketing, retailing and food service 373–4
and minimum tillage farming 315
and organic food production 317
and pasture cropping 315–16
risks to in Australia 346–60
and use of chemicals in primary food production 320
water use 325–6, 372
Wimmera Mallee Pipeline 324
epiglottis 9
essential amino acids 14
ethical and sustainable fast food, design brief 171–2
ethical issues in food choice 80–1, 286, 288–303
animal welfare issues 288–98
environmental stewardship 298–301
social justice issues 302
ethical products 199, 202
beef 295–8
choosing 273
pork 293–5
poultry and egg products 292–3
ethics 288
everyday food behaviours and habits, improving 225–6
evidence-based information 31, 193
evidence-based research, principles 192–5

F

Facebook 137
fad diets 196–200
definition 198
recognising 198
fair trade 302
Fairtrade 302
benefits of 302
cocoa and chocolate 302–3
products 272, 303
families
and food 98, 99
and food choice 286
sharing and celebrating with food 114–16
Family Farm Teams, PNG 265
farmers, supporting 272
fast food, ethical and sustainable, design brief 171–2
fast food outlet 'meet-ups' 116
fast food outlets 171
fat-soluble vitamins 17
fats 5, 16–17, 36–7
absorption 16
digestion 10–11
types of 26
utilisation 16–17
see also saturated fats
feeding an increasing global population 240–1
feedlot cattle 295–6, 297
fermented foods 82–3
Ferroro's Nutella hazelnut spread 300
fertilisers 317, 320, 321, 322, 323
fibre *see* dietary fibre
Filipino farmers and fishers, improving market access 267
fire blight in the apple and pear industry 348
fish 43, 95, 122, 332
fish stocks, depletion 332
fisheries
bycatch 332
climate change impacts 353
see also aquaculture
five food groups 35–6, 39, 40, 122, 225, 226
using 224
flavour 6
floods 354
FODMAP carbohydrates 67
FODMAP intolerance 63, 66–8
food
cost of 168
digestion 7–10
eating 4–7
emotional and psychological responses to 114, 144–9
role in influencing mental health 122
sharing and celebrating in communities 117–22
sharing and celebrating in families 114–15
sharing and celebrating with a peer group 116–17
social roles 114–22
why we eat it 4
food access
community gardens to improve 260–2
enhancing through education 256–7
improving for Aboriginal communities in the Northern Territory 258–9, 270
improving for small-scale farming communities 264
school breakfast clubs to improve 257–8
food access and distribution
Australia's role in improving across the globe 262–8
improved equity in 255
improving in Australia 256–62
Food and Agriculture Organization (FAO) 245, 255
food allergies 62–3
food availability, technological innovations to increase 245–54
food blogs 87
food box kits 84–5
food brands, emotional dimensions 143
food choices
ethical concerns 286, 288–303
media influencing 134–40
sociocultural factors influencing 88–95, 286–7
food citizenship 165–6, 269, 271–4, 370
Australian consumers 78, 80–1, 91, 286, 288, 291, 298, 301, 302
how to be a good food citizen 272–4
rights and responsibilities 271
food consumption 171–4
food contamination 38
food delivery apps 83, 172–4
food distribution *see* food access and distribution
food fads, trends and diets 192, 196–200
food gatekeepers 256
food information
criteria for assessing validity of 192–5
and the media 134–40
strategies used to influence 141–3
food insecurity 240
in Australia, causes of 241–5
Australians at risk of 242
global 242
solutions to 245–54
food intolerances 62, 63–8
food knowledge, ways we develop 214

food labels
  advocating for improved food labelling 274
  comparing 219–20
  nutrition content claims and health claims 221–3
Food Ladder program, Katherine, NT 258, 270
food literacy education
  accessing 247
  advantages 256
food marketing
  environmental sustainability 373
  and retailing 166–70
  using media 136–9
food miles 385
food needs at various stages of the life span 58–62
food packaging
  bioplastics 382–3
  colour 142–3
  and the environment 376–83
  environmental advantages/challenges 376–8
  improving environmental sustainability 377–80
  making plastic packaging greener 381–3
  recycling 380–1
  reducing 272–3, 378–9
  refusing single-use plastics 379
  reusing 381
  sizes 163–4
food preparation 38
food processing and manufacturing
  effects on health 162–6
  energy use 370
  environmental impact 370
  water use 372
food processors
  improving energy use 371
  packaging systems and strategies 376
food production
  beef 295–8
  chicken meat and eggs 288–92
  crops 327–9
  organic 290, 297, 316–17
  palm oil 298–300
  pork 293–5
  sustainable 314–19
  see also primary food production
food purchasing and consumption 78
  changes and trends 82–7
  recent developments 78–81
food refusal 102
food rescue 391–2
food retailers
  improving energy use 372
  sustainable water use 372
food retailing
  energy use 370
  environmental impact 370
  environmental sustainability 374–5
  and marketing 166–70
food security 269
  ACIAR improving 263–6
  design brief 244–5
  enhancing by empowering women 264–5
  enhancing through education 256–7
  food sovereignty and food citizenship 269–74
  key pillars 241, 255
  technological innovations to increase 245–54
  what is it? 241–2
food service
  energy use 370
  environmental sustainability 374–5
food sovereignty 84, 162, 269–71
  in Australia 271
  establishing 270–1
Food Standards Australia New Zealand 221, 222
food storage 38
food system 383
  behaviours and effects on health 162–74
  components 162
  political influences on 174–81
food transportation 383–4
  environmental effects 384–5
food trends 196, 197
food waste 242, 386
  Australia's strategy 387–8
  avoiding 388–91
  energy recovery 388, 393–4
  environmental effects 387
  recycling 388, 392–3
  reducing 272
  reprocessing 388, 393
  responding to a design brief 389–90
food waste hierarchy 387–8
food websites 214
Foodbank 391
FoodSwitch app 219, 227
Foodwatch website 98, 99, 218
foot-and-mouth disease 348–9
free fatty acids 9
free-range pork production 294–5
free-range poultry and egg production 289–90
  ethical and sociocultural purchasing decisions 291–2
fructose 12
fruit 41–2, 122, 216, 354, 392
fruit orchards, automating 252
functional foods 82
future crops 328–9

G

galactose 12, 13
gall bladder 9
gardening 84
gastric lipase 9
gender, and food needs 60–1
gene technology 246–8
general-level health claims 222
genetic biodiversity 359
genetic diversity
  loss of 359
  preservation 360
genetically modified food crops 246–8
ghrelin 4
global food insecurity, causes 242
global pandemic 242
global population, feeding an increasing 240–1
global warming 329, 384, 386
glucose 12, 13
gluten-free chocolate biscuits vs wheat-based chocolate biscuits 64–5
gluten intolerance 63–4
glycaemic index (GI) 4
glycerol 9
GO LOCAL FIRST 80–1
  goat production, and environmental sustainability 335
golden bananas 247
good cholesterol 16
governments, role in food education 214
Great Barrier Reef 323
greenhouse gas emissions 329–31, 335, 370, 381, 384, 385, 386, 387, 393
groundwater 322, 325
growing your own vegetables 84
gut–brain axis 18, 19
gut health 82–3
gut microbiota 10
  and mental health 18–19, 20–1
  and physical health 18
  role of diet influencing 17

H

habitat loss and degradation 358–9
hashtags 136
health, food system effects on 162–74
health awareness 82–3
health claims 221, 222–3
Health Star Rating system 90, 175–6, 219
healthier lifestyles, campaigns to encourage 216–17
healthy diet 162
  campaigns to encourage 215–18
  establishing in children 96–100, 101, 215
  importance of repetition
    in developing food habits
    in children 102–3
Healthy kids need healthy canteens! brochure 88
healthy weight 33, 35
heart disease 162, 176, 226
herbicide resistance 322
herbicides 317, 320, 321, 359
heritage animals, genetic diversity 360
high blood pressure 147, 226
high cholesterol 147
high-density lipoproteins (LPL) 16
high-fat foods 5
high-level health claims 223
high-protein foods 5
home made/home cooking 83–4
  and a desire for convenience 84–6
homelessness 93, 122
honey 355, 356
hormones, that stimulate/suppress appetite 4
household food waste, avoiding 388–91
hunger 5
Hungry Jack's iconic Whopper goes plant-based 79
hydrochloric acid 9

I

ileum 10
images, promoting food products 143
impulse buying 167
income, and food choices 90–1, 287
incomplete proteins 14
individual identity 114
industry lobbyists 175
infancy, food needs 58
infectious diseases, pests and biological threats to Australian agriculture and livestock 346
influencer marketing 142
insoluble fibre 10, 13
Instagram 136
intensive indoor chicken meat production 289, 353
intensive indoor egg production 288–9, 290–1
invasive species 359
irrigation
  in primary food production systems 323–4
  Wimmera Mallee Pipeline 324
irrigation salinity 325

J

Jamie Oliver 142
jejunum 10
junk food 173–4, 178
'Junk Food Calculator' 217

K

Kellogg's 137–8
Keto diet 145
khapra beetle 350
kidney disease 226
kilojoules 32, 36, 37, 39, 146, 147
Kitchen Garden Program 214, 287
  at Murrumbeena Primary School 89
kombucha 82, 197

L

lactase 10
lactation 36, 37–8, 59
lacteals 12
Lactobacillus 17, 82
lactose 13
lactose-free milks, taste testing 67
lactose intolerance 65–6
land temperature 351
landfill 387, 388, 391, 392
language of the information 193
large intestine 10
late adulthood, food needs 60
Latina Fresh Australia 137
lean meats 43, 122
legumes 41, 43
leptin 4
life span, dietary requirements across 58–62
lifestyle diseases 30, 32–3, 35, 60
lingual lipase 9
lipase 10
Lite n'Easy (weight-loss program) 199–200
LiveLighter® program 216, 287
  avoid sugary drinks 217
  calculate your risk 217
  'Eat Brighter' strategy 216
  Menu App campaign 218
  physical activity calculator 217
  planning 216–17
liver 9
livestock
  biosecurity threats 326
  climate change impacts on 353
  smart ear tags 254
  see also cattle; pigs; poultry; sheep
lobbyists 175
local ingredients, sourcing 80–1, 273
location, and food choices 91–2
loneliness, easing in seniors 117–18
low-cost supermarkets 91
low-density lipoproteins (LDL) 16
low-FODMAP foods 68
low-GI foods 4–5

M

McDonald's 171
macronutrients
  absorption 12, 13
  digestion 9–10
magazines 139–40
maltase 10
maltose 9
manufacturing industry, influence on food system 175–7
market gardens 103–4
marketing strategies
  by food retailers 166–70
  on media 135–9
  to children 166–7
MasterChef Australia 139
meal boxes/meal-delivery kits 84–6
meal delivery apps 218
meal planning 225–6
meal-replacement shakes 200–2
meal solutions 163
meals at school 102
mealtimes 97–8
meat consumption
  reducing 301
  see also beef production; chicken meat production; pork production
Meat Me Halfway 139
mechanical digestion 7–8, 11

media 134
  broadcasting 134, 138–9
  digital 134, 135–8
  and food information 134–40
  print 134, 139–40
  shaping consumer values 134
'Mediterranean diet' 95
mental health
  food role 122
  and gut microbiota 18–19, 20–1
Menulog 173
messina 328–9
methane emissions 335, 386, 393, 394
  reducing in cattle 329–31
metropolitan areas 91–2
micro-targeting 141
microbiota 10, 17–19
microwavable rices, nutritional and sensory properties 165–6
milk 44
mineral supplements 202
minerals 42, 43
minimum recommended serves 41, 42, 43, 44
minimum tillage farming 314–15
mobile devices 135
mobile technologies 253
monosaccharides 12, 67
monounsaturated fats 36, 37
mood 18, 20, 122
Morning Glory Farms 220
movies 139

N

nanofertilisers 252
nanoherbicides 252
nanopesticides 252
nanotechnology 252
National Health and Medical Research Council (NHMRC) 30, 31, 32, 34, 96
National Healthy Canteens Project 88, 89
natural resources, and climate change 351–2
neophobia 102
new foods and flavours, exposing children to 102, 103–4
newspapers 140
nitrogen-based fertilisers 322
nutrient supplement companies
  assessing claims made by 202
  Blackmores Superkids Immune Chewables 203–4
  strategies 198
nutrient supplements 202–4
Nutrition Australia 30, 88, 138, 215, 287
  Try for 5 campaign 215
nutrition content claims 221–2, 223
nutritional quality, evaluation 38–9, 46
nuts and seeds 43

O

Oakhill Food Justice farm 261
Obesity Evidence Hub 176, 177
Obesity Policy Coalition 176, 177, 178–9, 180, 181, 287
obesity/overweight 30, 32–3, 35, 60, 82, 147, 162, 163, 175, 176
  in children 96, 167, 177, 180, 181
  and sugar advertising 179–80
  and weight-loss programs 198–201
objective of information 194
oesophagus 9
olfactory cells 5, 6
oligosaccharides 67
online food ordering, delivery and takeaway 86
  food delivery apps 83, 172–4
online shopping 137, 167–8
orangutans 299
organic beef 297
organic food production 290, 316–17, 319
organic poultry and egg production 290
organic poultry farm, biosecurity on 349–50
osteoarthritis 157

P

packaging *see* food packaging
palm oil
  avoiding 273
  products containing 298
palm oil production 298
  cost to the environment and endangered animals 298–9
  products using only sustainably produced palm oil 300
  sustainable 299–300
Panama disease in bananas 347–8
pancreas 9, 10
pancreatic amylase 10
paper and cardboard, recycling 381
Papua New Guinea, Family Farm Teams 265
parents, children and food 98, 99, 103
'Partnership Reformulation Program' 274
pasta 137
pasture crops/cropping 315–16, 328–9
pasture-fed cattle 296, 297, 298
Pasturefed Cattle Assurance System (PCAS) 296
peanuts 62
peers
  and food choice 286
  sharing and celebrating with food 116–17
pepsin 9
pepsinogen 9
peptide YY (PYY) 4
'pester power' 143
pesticides 317, 320, 321, 359
physical activity
  calculator 217
  and food needs 61–2
physical health, and gut microbiota 18
piggery waste 393, 394
pigs
  African swine fever 347
  see also pork production
planning head (meal planning) 225–6
plant-based alternatives 43
plant-based diet 145, 273
plant-based eating 78–80
plant-based milk alternatives 80
Plantic bioplastic packaging 382
plastic packaging, making it greener 381–3
plate size 172, 224
political influences on food system 174–81
polyols 67
polysaccharides 13
polyunsaturated fats 36, 37
poor body image, behaviours and consequences 144–5
population growth
  feeding the world 240–1
  and loss of biodiversity 359
pork production 293, 353
  certified free-range 294–5
  conventional indoor 293–4
  ethically produced pork products available to consumers 295
  outdoor bred, but raised indoors on straw 295

portion control plate 224
portion sizes 172
  and packaging 163–4
poultry 43, 289–90
  see also egg production
poultry farms, biosecurity 349–50
poultry products, ethical 292–3
poverty 242, 302
prawns 63
pre-prepared
  meals 163
  ready to cook vegetables 93
  salads 94
prebiotics 17
pregnancy 36
  food needs 59–60
presentation of evidence 193
primary food production
  biodiversity's importance to 358, 359
  climate change risks 351–7
  effects on health 162
primary food production systems
  environmentally sustainable use of chemicals in 320–3
  water use 323–6
principles of evidence-based research 192–5
print media 134, 139–40
probiotics 17, 19, 82
processed foods 226
  added salt in 226, 228
  added sugar in 36, 37, 45, 163, 226
  advocating for reformulation of 273–4
product placement 167
protease 10
proteins 14
  absorption 14
  digestion 10, 11
  utilisation 14
psychological and emotional responses to food 144–9
puberty 60–1
purpose of information 193, 194

Q

QR codes 87, 220

R

recycling
  food waste 388, 392–3
  packaging waste 378, 380–1
REDcycle (soft plastics) 380
reduce (packaging) 378–9
reducing consumption of fat, salt and sugar 226–8
reducing meat consumption 301
reformulation of processed food, advocating for 273–4
refugees 95
refuse single-use plastics 379
relevance of information 193
remote areas 92
repetition in developing healthy food habits in children 102–3
reprocessing, food waste 388, 393
repurposing imperfect food 392
restaurants and cafes 374–5
restrictive dieting 145, 146
reuse
  food 388, 391–2
  packaging 381
rice 95
  growing 325, 327
  microwavable 165
  vegetable 165
Roundtable on Sustainable Palm Oil (RSPO) 299–300
RSPO Certified Sustainable Palm Oil (CSPO) 299, 300
Russian wheat aphid 348

S

salads 94
salinity 325
salivary amylase 9
salivary glands 9
salmon farming 333
salt 36, 37, 228
saltbush 328
samphire 329
satiety 4
  levels of food 4–5
satellite tracking technology 321
saturated fats 1, 36, 175
  reducing consumption of 226–7
school breakfast clubs 257–8
school canteen programs 88, 89, 287
school health programs 214
school kitchen garden programs 89–90, 102, 214, 287
school vegetable programs 215
Sconetime 117–18
screen time 96
sea surface temperature 351, 353
seafood 332
  sustainable 332–4
seaweed, as cattle feed 329–31
SecondBite 391–2
seniors, Sconetime 117–18
sensory appreciation of food 5
serotonin 18
serving sizes 164–5
Shabbat meal 115
sharing and celebrating with food
  in communities 117–22
  in families 114–16
  with peer groups 116–17
sheep
  Dorper sheep and environmental sustainability 331
  saltbush and tedera as feed 328
shopping 99
short-chain fatty acids (SCFAs) 10, 13, 18
single-use plastic bags, reduction of 378, 379
single-use plastics, refusal of 379
small-format specialty supermarkets 91
small intestine 9–10
small-scale farmers, improving mechanisation 265–6
small-scale farming communities, strategies to improve food access 263
smart livestock ear tags 254
smell, sense of 5–6
snack eating and weight gain 148–9, 169–70
social disadvantage 92
social justice issues 302
social media 87, 135–7
social media analytics 141
social media influencers 142
social role of food 114–22
  see also emotional and psychological responses to food; sharing and celebrating with food
Social Spoons 118–19
sociocultural factors influencing food choices 88–95, 286–7
sodium 37, 175
soft plastics, recycling 380, 381
soil acidification 320, 322, 352
soil fertility 315, 317
soluble fibre 10, 13
source of information 30–1, 192
soybean cyst nematode 348
special buys 166
standard serves 41, 42, 43, 44
starches 13
  digestion 9, 10

Stephanie Alexander Kitchen Garden Scheme 89–90, 287
stomach 9
stress 18
stroke 176, 226
sub-Saharan Africa, improving mechanisation for small-scale farmers 265–6
suburban areas 92
sucrase 10
sucrose 13
sugar ads 'preying on addiction' 179–80
sugar-sweetened beverages 176–7, 217
sugar tax 176–7
sugarcane pulp 383
sugars 12–13
  alternative names 163
  in foods 32, 47–8, 163
  see also added sugars
Sumatran tiger 299
supermarket chains
  and farmers 272
  see also Aldi stores; Coles supermarkets; Woolworths supermarkets
supermarket private labels 90–1
sustainability in agriculture 321, 346
  see also environmental sustainability
sustainable animal production 329–35
sustainable crop production 262–3, 327–9
sustainable farming practices 314–19
sustainable seafood 332–4
sustainable water management, improvements 325–6
sustainable water use, food producers and food retailers 372
sustainably produced food, choosing 272
sustainably produced palm oil 299–300
SwarmFarm Robotics 250–1
SWOT analysis 319

T

takeaway food 86, 163, 171
taste, sense of 5
technological innovations to increase food availability and food security 245–54
technological trends 87
tedera 328
teeth 9
television 138–9, 177
texture of food 6
TikTok 135
tofu 43
tongue 9
total sugar 175
trans fats 16, 36
trash fish 332
triglycerides 9
trypsin 10
type 2 diabetes 30, 32, 42, 44, 82, 146, 162, 163, 226
  and overweight/obesity 32–3, 176, 177
  and sugar consumption 180

U

Uber Eats 173
umami 5
unhealthy food products, marketing to children 177
unhealthy snack foods 167
unsaturated fats 16

V

v2food 79
values
  and food 114
  shaping consumer values 134
varroe mites 347
vegan diet 145
vegetable lunchbox muffins 101
vegetable rices 100
vegetables 39–41, 84, 93, 122, 354
  encouraging eating more 215, 216
  repurposing imperfect food 392
VicHealth Local Government Partnership 214
Vietnam, bridge building 268
villi in the small intestine 10, 12
Vinnies Soup Van program 122
virtual cooking schools 83–4
virtual dinners 116–17
vitamin supplements 202
vitamins 17, 41, 42, 43, 44

W

water 45, 100, 122
  see also groundwater
water use
  environmentally stable 325–6, 372
  in food processing and manufacturing 372
  in primary food production systems 323–6
websites 137–8
weight gain 32, 163, 167, 169–70
weight-loss diets, strategies used 198
weight-loss programs
  analysing claims by 198
  Lite n'Easy 199–200
  meal-replacement shakes 200–2
Welcome Dinner Project 119
What the Health 139
wheat, drought-resistant 247
wheat production 327
wheat rust 348
whole foods 17, 19
wholegrain cereals 42, 122
Wimmera Mallee Pipeline 324
Woolworths supermarkets 137, 140, 141, 142, 176, 272, 295, 298, 372, 373, 380, 392
World Bank 267
World Health Organization 176, 177, 178
world's food supply, sources 263

Y

yoghurt 44, 122, 136