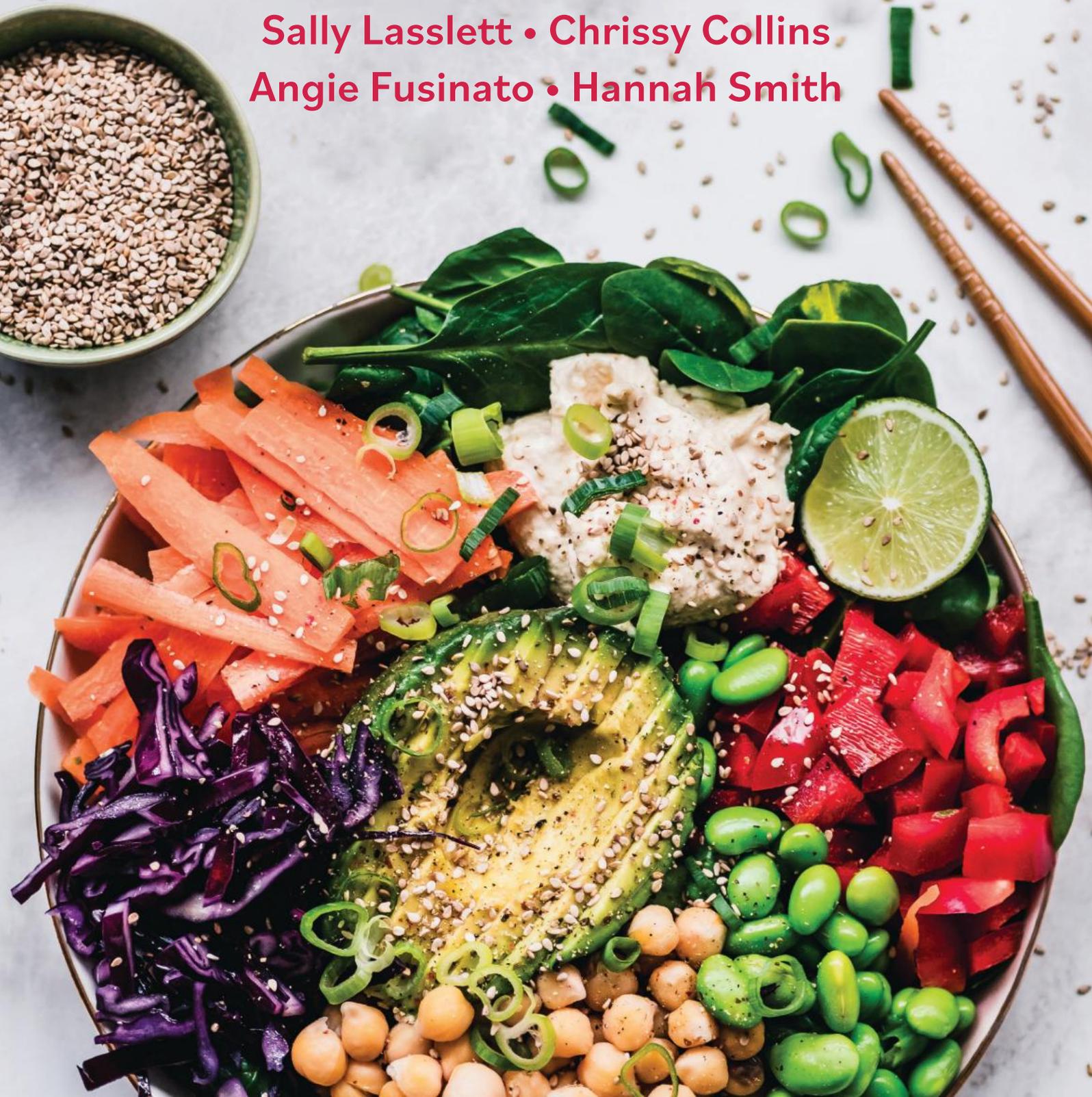


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# Food for VCE

Food Studies Units 3 & 4

Sally Lasslett • Chrissy Collins  
Angie Fusinato • Hannah Smith





CAMBRIDGE  
UNIVERSITY PRESS

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Sally Lasslett • Chrissy Collins  
Angie Fusinato • Hannah Smith



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Sally Lasslett et al.

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unique cultural and spiritual relationships to the land, waters and seas and their rich contribution to society.*

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## Overview

Being an informed and confident consumer of food is integral to the knowledge and skills developed in each individual student throughout their study of VCE Food Studies. Making well-informed food choices and then being able to prepare healthy meal options are essential to realising health and wellbeing.

The authors of *Food for VCE: Food Studies Units 3 & 4* understand the importance of practical and applied learning. We have developed a textbook that is hands-on, practical and allows for important discussions of key issues. The richly illustrated, full-colour text seeks to ensure that you are interested by

the subject content and want to extend your food knowledge and skills and explore further concepts in a self-directed manner. Ultimately, you will be well prepared for VCE success.

The student textbook is supported by an Interactive Textbook with additional resources to help you to revise and prepare for the end-of-year exam. Further to this, we hope that this textbook excites in you a passion for all things food, allowing you to explore further training and employment opportunities in the fields of home economics, food technology, food manufacturing and hospitality.



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# How to use this resource

## Structure

This textbook Food for VCE: Food Studies Units 3 & 4 has been designed to closely follow the 2023 VCE Food Studies Study Design and support your learning in a variety of ways.

It provides comprehensive curriculum coverage, including the cross-study specifications, which are embedded throughout the textbook. Practical advice on *How to unpack exam questions* is included.

This textbook covers two Units of Study, and each Unit contains two Areas of Study.

## Chapter features:



**Key Knowledge and Key Skills** – each chapter opens by stating the learning objectives, taken directly from the Study Design.



**Get Knowledge Ready** – these are three questions designed to prompt you to evaluate your prior knowledge of the topic, and connect the Key Knowledge to your own experiences.



QR codes are included in every chapter for easy access to the Chapter Overview videos.

## Activities

**Activity elements:** There are several different activity types: *Inquiry, Practical and Recipes*.

These allow you to apply and extend your learning in a variety of ways.

**Recipe feature pages** – included to support the Practical Activities, these are laid out in a visual style to aid in classroom use and include questions for evaluation of the activity.

**Glossary terms** are defined in the margin and in the glossary at the end of the book.



**Let's Talk** – you'll see these appear to raise class discussion points or ideas to consider.

There are a range of graphical elements throughout the text including text boxes, mind maps and graphic organisers, to help you understand each concept.

The following icons are used throughout the textbook to indicate different types of activities.



**Activity: (Inquiry)** – these are research or investigation activities which provide an opportunity to practice these skills for your School-assessed Coursework task.



**Activity (Practical)** – these activities enable you to apply and demonstrate the key knowledge and key skills in practical ways.



**Case Study** – these activities explore real world examples that illustrate and enhance your understanding of the chapter content.



**Data Analysis** – these activities provide source material and questions asking you to relate this to the chapter topic.



**Practice exam questions** – these exam-style questions are included to apply your learning and help you practice for your end-of-year examination.

## Chapter review

The end of chapter review activities include a combination of tasks to help consolidate your learning:

**Chapter revision** dot points, a summary of the important information from the chapter.

The **Apply your knowledge** questions at the end of each chapter help to check your recall and understanding of the content in the chapter.

Every chapter ends with three **Practice exam questions** to apply your learning and help you practice for your end-of-year examination.

At the end of each Area of Study, you will find an additional exam-style **extended response**

**question** including the **Let's unpack it** feature.



**Let's unpack it** - a guide to breaking down the **extended response question**, this feature includes a sample response showing you how to tackle the question and obtain full marks.

## Digital resources

For a list of links to all the websites referred to in this book, go to:

<https://www.cambridge.edu.au/foodforvce34>

## Further digital resources are available in the Interactive Textbook and on Cambridge GO:

- **Additional activities** for extra practice and learning.
- **Auto-marked quizzes** allow you to quickly check your recall and understanding of content.
- **Videos to** consolidate and extend your knowledge.
- **QR codes** in the print textbook provide instant access to the Chapter Overview videos, ideal for homework use.
- **Roll-over definitions to** immediately define key terms.
- **Links to external websites** for additional information, data and other resources.
- **Access to the Offline Textbook**, a downloadable version of the student text with note-taking and bookmarking enabled.

## The Teacher Resource Package includes:

- **Suggested answers and marking criteria**
- **Sample tasks and assessment**
- **PowerPoint presentations**
- **Planning documents**

# Common Australian cooking measurements

## Cups

30 mL .....	1/8 cup
60 mL .....	1/4 cup
80 mL .....	1/3 cup
125 mL .....	1/2 cup
180 mL .....	3/4 cup
250 mL .....	1 cup
310 mL .....	1 1/4 cups
375 mL .....	1 1/2 cups
430 mL .....	1 3/4 cups
500 mL .....	2 cups
625 mL .....	2 1/2 cups
750 mL .....	3 cups
1 L .....	4 cups
1.25 L .....	5 cups
1.5 L .....	6 cups
2 L .....	8 cups
2.5 L .....	10 cups



## Spoons

1.25 mL .....	1/4 teaspoon
2.5 mL .....	1/2 teaspoon
5 mL .....	1 teaspoon
10 mL .....	2 teaspoons
20 mL .....	1 tablespoon (4 teaspoons)
30 mL .....	1 1/2 tablespoons (6 teaspoons)
40 mL .....	2 tablespoons (8 teaspoons)
50 mL .....	2 1/2 tablespoons (10 teaspoons)
60 mL .....	3 tablespoons (12 teaspoons)



## About the authors



### Sally Lasslett

Sally has been an educational leader in a variety of school settings and roles for over 25 years. Sally is an advocate for successful pathways and transitions for disengaged young people. She is a leading Principal in the Independent Flexible Senior School setting and has been innovative in the way that she ensures that essential wellbeing supports are provided in this setting.

Sally is also an active Home Economics professional with a passion for developing real-life skills. Sally has been a lead author on numerous VCE and other secondary level textbooks, and a board member of Home Economics Victoria.

Sally has a keen interest in assisting students to find a passion for learning and ensuring that they are successful in developing post-school pathways.

*Thank you to my family, Grahame, Callum and Hudson, for their never-ending support and patience during yet another period of writing.*



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Chrissy is an experienced Food Studies and Health and Human Development teacher, teaching longer than her Year 12 students have been alive. She has been an author for Cambridge University Press since 2007, developing junior and senior Food Studies and Health and Human Development textbooks.

Chrissy regularly presents at professional development events; her presentations focus on student engagement, pedagogy and exam success. She is also an experienced VCAA exam assessor and writer of trial exams and support material.

Chrissy aims to motivate and inspire her own students by sharing her love of learning and passion for her subject areas, by working with each student to help them reach their full potential.

*Thank you to my amazing family, Paddy, Leighton and Mason, for their endless understanding, support and encouragement so I can continue to write and immerse myself in the professional activities I love.*



### Angie Fusinato

Angie has taught VCE Food Studies since its inception. She is also a teacher of VCE Health and Human Development. She has worked with subject associations, the Department of Education and universities to support students and staff with developing their curriculum knowledge and examination skills.

Angie has had various roles with the VCAA and Home Economics Victoria, including exam preparation and marking, chief examination assessor and developing teaching resources, and has presented at numerous professional development sessions.

Angie is currently employed as a leading teacher. She aims to inspire her students to be passionate about food and to recognise the influence that our actions have on the planet.

*Thank you to my friends, family and partner for all of your encouragement and support.*



### Hannah Smith

Hannah is a passionate Food and Technology, Food Studies and Health and Human Development teacher at a major regional school. She is an active Home Economics professional and has presented at numerous professional learning days, with a focus on practical cooking skills, practical classroom management and exam success.

Hannah is an experienced VCAA exam assessor, author of curriculum resource material, practice assessment tasks and sample exam papers. She is passionate about providing knowledge and guidance to new teachers in the field of Health and Home Economics in her role as a Postgraduate Trainer for Home Economics Victoria. Hannah aims to inspire and teach her students skills for life through her love of sharing and cooking food.

*To my family, especially Terry, Maggie, Owen, Jimmy and Phoebe. Thank you for giving me time, encouragement and inspiration for this project.*

# How to unpack exam questions

This guide may help you with the practice exam questions in each chapter. You will need to refer to this guide when looking

at the 'Extended response question – Let's unpack it' feature at the end of each area of study.

## A Annotate the command word

Before writing anything, read the question carefully and completely to work out exactly what it is asking you to do.

- Identify the **command word** (for example, 'discuss', 'evaluate', 'analyse'). This will inform the structure of your response.

## B Brackets around different parts of the question

Does the question ask you to do more than one thing? If it does, put brackets around the separate elements.

## C Count the marks

Look at the **marks available**. Think about what you need to include to get all of the available marks.

- Consider the command word. This might highlight that the question is one mark per point.
- Questions with five or more marks are often holistically marked.
  - Consider how you can construct an in-depth response.

## D Determine key words to use

Identify **key concepts** in the question so you can identify the **key terms** you need to use.

- Ask yourself: what is the question about?
- Identify the key knowledge the question is drawing on and ensure that relevant terms are used.

## E Evidence

*If required*

**Use the stimulus.** If the question states 'using the data' or 'using the diagram', ensure that your response contains information from this stimulus.

Provide evidence to support your evaluation or justification to add complexity to the response.

## Exam question

**Identify a key behavioural principle and explain its role in establishing healthy diets in children. 3 marks**

Unpack the question using the guide on page xv.

( Identify a key behavioural principle ) and ( explain its role in establishing healthy diets in children. ) 3 marks

### **Command words**

**Identify:** state the name of the principle

**Explain:** provide a detailed assessment about the key behavioural principle

### **Brackets around different parts of the question:**

- Identify a key behavioural principle
- Explain its role in establishing healthy diets in children

### **Key words and concepts:**

#### **Key behavioural principle:**

- Repetition
- Modelling
- Exposure

#### **Healthy diets in children:**

- Focus on this context
- Provide a relevant example

### **Count the marks:**

#### **3 marks**

- 1 = identify
- 2 = explain

## Sample response

**Modelling:** This helps create healthy diets as children learn by examples set by their parents and often will imitate their actions. Parents should demonstrate healthy eating behaviours, such as consuming fruits and vegetables as a snack, to their children.

# Command terms

Understanding the meaning of the command term when answering a question in your Food Studies program will help you to answer exactly what you're being asked. This glossary is designed to be used as a reference

when answering practice questions. Use this glossary to help you to consider what you are being asked to do in the question and help to formulate how you will respond.

Term	Explanation
analyse	Identify components/elements and the significance of the relationship between them; draw out and relate implications; determine logic and reasonableness of information.
apply	Use; employ in a particular situation or context.
assess	Make a judgment about, or measure, determine or estimate, the value, quality, outcomes, results, size, significance, nature or extent of something.
clarify	Make a statement or situation more comprehensible.
compare	Recognise similarities and differences and the significance of these similarities and differences.
construct	Make, build, create or put together by arranging ideas or items (e.g. an argument, artefact or solution); display information in a diagrammatic or logical form.
demonstrate	Show ideas, how something can be done or that something is true by using examples or practical applications, or by applying algorithms or formulas.
describe	Provide characteristics, features and qualities of a given concept, opinion, situation, event, process, effect, argument, narrative, text, experiment, artwork, performance piece or other artefact in an accurate way.
discuss	Present a clear, considered and balanced argument or prose that identifies issues and shows the strengths and weaknesses of, or points for and against, one or more arguments, concepts, factors, hypotheses, narratives and/or opinions.
evaluate	Ascertain the value or amount of; make a judgment using the information supplied, criteria and/or own knowledge and understanding to consider a logical argument and/or supporting evidence for and against different points, arguments, concepts, processes, opinions or other information.
examine	Consider an argument, concept, debate, data point, trend or artefact in a way that identifies assumptions, possibilities and interrelationships.
explain	Give a detailed account of why and/or how with reference to causes, effects, continuity, change, reasons or mechanisms; make the relationships between things evident.
identify	Recognise and name and/or select an event, feature, ingredient, element, speaker and/or part from a list or extended narrative or argument, or within a diagram, structure, artwork or experiment.
investigate	Observe, study or carry out an examination in order to establish facts and reach new conclusions.
justify	Show, prove or defend, with reasoning and evidence, an argument, decision and/or point of view using given data and/or other information.
summarise	Retell concisely the relevant and major details of one or more arguments, text, narratives, methodologies, processes, outcomes and/or sequences of events.

Source: VCAA, *Glossary of Command Terms*

## Cross-study specifications

The following information provides detail on key concepts underpinning the VCAA Food Studies course. Food Studies students need to ‘develop the ability to use and apply these concepts when responding to questions, discussing, interpreting, analysing and evaluating issues related to primary food production, processing and packaging, distribution and access through the retail and food service sectors, media and marketing, consumption and waste management’.

*Source: VCAA Study Design 2023–2027, VCE Food Studies, ‘Cross-study specifications’, p. 9*

### Aboriginal and Torres Strait Islander knowledge, culture and history

Aboriginal and Torres Strait Islander peoples are the first Australians, and the oldest, continuous living cultures in human history. They have diverse cultures, social and kinship structures and unique, complex knowledge systems. VCE Food Studies provides opportunities for students to develop understandings of the significant contributions of Aboriginal and Torres Strait Islander peoples’ connection to Country, Place and culture through food and cooking knowledge, growing and food preparation practices, and the social and kinship act of sharing meals together.

Aboriginal and Torres Strait Islander peoples historically worked with the land to preserve rich biodiversity, provide nutritious foods and be resilient to climate. This was essential for food security and food sovereignty as well as cultural identity, spiritual wellbeing and land stewardship. Their food systems were highly productive, sustainable and equitable. This understanding helps support cultural learning, encouraging students to make connections between their own world and the worlds of others, encourage collaboration, develop

empathy with others, and provide students with the insight to understand themselves as part of a diverse and global community.

Teachers are encouraged to include Aboriginal and Torres Strait Islander knowledge and perspectives in the design and delivery of teaching and learning programs related to VCE Food Studies. Many local Aboriginal and Torres Strait Islander communities have protocols that they have developed in relation to education. The Victorian Koorie community-preferred education model enables teachers to focus inclusively on supporting students to consider Victorian Koorie education matters, and systematically support students to learn about local, regional, state and national Indigenous perspectives. VCE studies involve a focused extension of this model and include a broader application of national and international perspectives.

*Source: VCAA Study Design 2023–2027, VCE Food Studies, ‘Cross-study specifications’, p. 9*

### Food citizenship

An emerging movement in relation to food is the concept of food citizenship, which encourages individuals to not just think of themselves as consumers of food but to take a more active role to shape food systems for the better. It highlights that as a collective, individuals can influence and guide food systems towards one that is fair and resilient for all, be it for people, animals or the planet. Food citizenship can be described as the shared practice of encouraging food-related behaviours that support the development of democratic, socially and economically just, and environmentally sustainable food systems.

Individuals make food choices on a regular basis; we all engage in eating as part of life. Food citizenship involves individuals having

various rights in relation to food but also having responsibilities. For example, we have the right to adequate nutrition, a safe food supply and accurate food product information. The practice of food citizenship includes the individual's responsibilities when considering the implications of their actions on food systems and when making ethical decisions about food choices. Food citizenship also encompasses supporting sustainability, which includes protecting the natural environment and supporting the human rights of food producers. Students develop an understanding of their place in both the local and the global food systems, including how the decisions made by individuals have a broad global impact. Food citizenship emphasizes that individuals are not consumers at the end of food systems, but participants in the food system as a whole.

VCE Food Studies enables students to develop food citizenship by reflecting on the rights and responsibilities associated with making considered and informed food choices.

*Source: VCAA Study Design 2023–2027, VCE Food Studies, 'Cross-study specifications', pp. 9–10*

## Food security and food sovereignty

The term food security is often thought of in terms of developing/low income countries. However, issues including hunger, obesity, access to sustainable food sources and vulnerability to natural disasters caused by climate change, are prevalent and increasingly visible in developed/high income countries such as Australia. Food security is defined 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.'

*Source: Australia and Food Security in a Changing World, The Prime Minister's Science, Engineering and Innovation Council, 2010, Canberra, p. 1.*

Food security has five dimensions:

- Availability – sufficient supply of food for all people at all times
- Accessibility – physical and economic access to food at all times, which means equity of access to food
- Acceptability – access to culturally acceptable food which 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.

*Source: Australia and Food Security in a Changing World, The Prime Minister's Science, Engineering and Innovation Council, 2010, Canberra, p. 9.*

Food security seeks to address the issue of food availability, accessibility, acceptability, adequacy and stability through current food practices.

Food sovereignty, on the other hand, seeks to address the basic issues of food and hunger by challenging the control of the food supply by large corporations, and aims to give farmers greater control of the decisions that affect their ability to produce food ethically and sustainably. Food sovereignty promotes everyone's right to access culturally appropriate and nutritious food grown and distributed in ethical and ecologically sound ways, and the right to democratically determine their own food and agriculture systems. Food sovereignty focuses on ensuring that the health of people and the health of the planet is considered in the food systems, including primary production, processing and packaging, distribution and access through the retail and food service sectors, media and marketing, consumption and waste management of food.

In this study, the focus of food security and food sovereignty relates to Australian issues.

Source: VCAA Study Design 2023–2027, VCE Food Studies, 'Cross-study specifications', p. 10

## Food systems

Food systems refers to the many components and activities involving the primary production, processing and packaging, distribution and access, media and marketing, consumption and waste management of food, all of which can affect food accessibility in different ways, and subsequently affect health. A food system analyses raw commodities, from farm to consumer, and includes supply of agricultural inputs, primary food production, processing and manufacturing sectors, packaging, food distribution, food retailing and marketing, food catering and domestic food. The various ways consumers eat (prepare and consume) and dispose of and/or recycle food is also part of the food systems. The Support materials have more information about the activities of the components of the food systems.

Source: VCAA Study Design 2023–2027, VCE Food Studies, 'Cross-study specifications', pp. 10–11

## Healthy eating

### *Eat for Health Program*

The National Health and Medical Research Council developed the Eat for Health Program, which includes the Australian Dietary Guidelines (including the Australian Guide to Healthy Eating). The Eat for Health Program was developed to promote health and wellbeing and to reduce the risk of diet related diseases in healthy populations. The Australian Dietary Guidelines provide advice at the population, not individual, level. They apply to all healthy Australians, as well as those with common health conditions such as being overweight. They do not apply to people who need special dietary advice for a medical condition, or to the frail elderly. Across the study, the importance of healthy eating is implicit when learning about food and when designing practical activities. The

selection of practical activities should ensure that student learning is consistent with the healthy eating recommendations of the Australian Dietary Guidelines.

Source: VCAA Study Design 2023–2027, VCE Food Studies, 'Cross-study specifications', p. 11

## Innovations and technologies

Food industries and food products are subject to widespread change in light of the development of new technologies and innovations. Innovations can occur at any stage of the food systems, such as primary food production, processing and packaging, distribution and access through the retail and food service sectors, media and marketing, consumption and waste management. Innovations can result in new or improved food products in response to nutritional, health, environmental, sociocultural, political and economic influences of the community. Examples of innovations in food production include dolphin-friendly tuna, plant-based substitutes for meat, genetic engineering or editing of plant and animal products used for food, and 3D printing of food products. Examples of new technologies not previously used in food production include ultrasounds and shockwaves, Internet of Things network in the food supply chain, use of big data and artificial intelligence to manage primary production of food, augmented reality to enhance consumer understanding about food and new packaging materials and innovations to manage food waste.

Source: VCAA Study Design 2023–2027, VCE Food Studies, 'Cross-study specifications', p. 11

## Issues in food

This study requires students to explore a range of contemporary issues related to the supply and consumption of food. Many aspects of food are subject to public scrutiny and to government action and regulation. Some aspects are contentious and/or politicised in public discourse and are

therefore seen as issues. Through engaging with and analysing issues associated with food, students consider relevant sustainability, legal, economic, psychological, sociocultural, health, political and ethical viewpoints.

*Source: VCAA Study Design 2023–2027, VCE Food Studies, 'Cross-study specifications', p. 11*

## Sustainability

Sustainability is presented throughout this study as a complex, holistic concept comprising three dimensions: environmental, economic and social.

The environmental dimension focuses on ensuring that the resources of the planet are available for future generations and includes how the primary production, processing and packaging, distribution and access, media and marketing, consumption and waste management of food contribute to maintaining biodiversity as well as reducing waste, water usage and carbon emissions.

The economic dimension is about using resources efficiently so that economic

growth continues over time; this includes the contribution of food industries to the Australian and global economies, the creation of employment opportunities and the ability of individuals and families to access affordable food that is nutritious and culturally appropriate.

The social dimension is about ensuring that future generations have access to social resources such as human rights, education, political empowerment and connection to community. It includes the impact on human rights of growing and producing food, food as a prerequisite for human health and wellbeing, accommodating a variety of culturally diverse eating patterns that includes the cooking and sharing of food, as well as individuals having the right to be educated to enable informed food choices. Social sustainability extends to land custodianship that is considerate of the broad community and future generations.

*Source: VCAA Study Design 2023–2027, VCE Food Studies, 'Cross-study specifications', pp. 11–12*

# The nutritional rationale underpinning the Eat for Health Program

The Eat for Health Program groups foods primarily on the basis of their type and nutrient contribution. The main distinguishing nutrients for each of the Five Food Groups are shown in Table 1, although foods within each group also make significant contributions of other dietary components. Note that the grouping system is a simplification for educational purposes and the foods within each group can vary.

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 amounts recommended for consumption were determined using the Food Modelling System and are based on the nutrient requirements for each age and gender group of different height and activity levels in the population.

**Table 1:** Nutritional characteristics of the Five Food Groups

Food Group name	Grain (cereal) foods, mostly wholegrain and/or high cereal fibre varieties	Vegetables and legumes/beans	Fruit	Milk, yoghurt, cheese and/or alternatives, mostly reduced fat	Lean meat and poultry, fish, eggs, tofu, nuts and seeds, legumes/beans
<b>Main distinguishing nutrients</b>	carbohydrate protein iron dietary fibre thiamin folate iodine	beta-carotene and other carotenoids vitamin C folate dietary fibre	vitamin C dietary fibre	calcium protein riboflavin vitamin B <sub>12</sub>	protein iron zinc vitamin B <sub>12</sub> (animal foods only) long chain omega 3 fatty acids
<b>Other significant nutrients*</b>	energy magnesium zinc riboflavin niacin vitamin E	carbohydrate (potato, sweet potato, sweet corn, legumes) magnesium iron potassium	carbohydrate folate beta-carotene potassium	energy fat carbohydrate magnesium zinc potassium	dietary fibre (plant foods only) energy essential fatty acids niacin vitamin E (seeds, nuts)

\*Some foods from the Five Food Groups (such as some bread, breakfast cereal and most cheese) can also contribute significant amounts of sodium

## *Messages and visuals used in the Eat for Health Program*

### **Enjoying healthy choices**

The message to enjoy a wide range of nutritious foods and to drink plenty of water recognises the importance of appreciating the social, sensory and personal aspects of food and drink.

This message also emphasises that foods should be chosen from a range within and across each of the Five Food Groups on average every day (for example, averaging out over a week and across different times of the year). Eating healthy food should be an enjoyable experience.

Following the key recommendation to ensure variety is important for several reasons including:

- 1** Eating from a variety of food groups on average every day, in the proportions recommended, is likely to result in a diet containing sufficient amounts of all nutrients essential for health. This will also decrease the risk of consuming too much of any particular food component and minimise intakes of foods that should be eaten less often. It is not necessary to eat from each food group at every meal.
- 2** The foods in each food group vary in the amount of particular nutrients and other beneficial components they provide, and so achieving nutritional adequacy also depends on eating a variety of food from within each group. For example, in the vegetables and legumes group, orange vegetables such as carrots and pumpkin contain significantly more beta carotene than potatoes. Similarly, kangaroo, beef, lamb, mussels and oysters are a better source of iron than most of the other foods in the meat, fish, poultry, eggs, tofu, nuts and seeds, legumes/beans group. Nuts and seeds have more vitamin E and several other nutrients compared

with animal foods in this same group. By selecting a variety of foods each day, over the week and at different times of the year, there is a greater likelihood of obtaining sufficient quantities of all nutrients.

- 3** Eating a variety of foods of different biological origin is also believed to be beneficial to health in many ways, such as:
  - Dietary fibre is a constituent of plant foods that contributes to health, for example, dietary fibre from oats or barley may be beneficial in causing a modest reduction in blood cholesterol level whereas dietary fibre from wheat may assist bowel function.
  - Eating cruciferous vegetables such as broccoli, cabbage, cauliflower, brussels sprouts and bok choy may be associated with protection against some cancers.
  - Some foods containing saturated fat may increase blood cholesterol levels, with high levels being a risk factor for cardiovascular disease. Choosing foods from a variety of biological sources (both animal and vegetable) helps ensure a variety of fats in the diet and a balance of the different types of fats.

### **What about ‘healthy’ fats such as unsaturated spreads and oils?**

Fats can increase the taste and textural pleasure of food and some oils made from fruits, seeds, grains or nuts contain fatty acids that are essential for health. Foods containing essential fatty acids may also provide vitamins A, D and E. The types of fats we include have different effects on our health, but all fats are high in kilojoules, so the types and amounts of foods containing fat should be chosen carefully.

All Australians should include some foods that contain unsaturated fats in their usual dietary patterns. The amounts depend on individual energy needs. The dietary modelling used to inform the Eat for Health Program included an allowance for unsaturated spreads and oils to be included in the diet.

## What are ‘discretionary choices’?

*Foods in this category should be used only sometimes and in small amounts.* Foods included as ‘Discretionary choices’ are not needed to meet nutrient requirements and do not fit into the Five Food Groups. Many discretionary choices are also high in kilojoules, saturated fat, added sugars, added salt or alcohol. However, they can contribute to the overall enjoyment of eating, often in the context of social activities and family or cultural celebrations. To help avoid gaining excessive weight, most Australians need to be thoughtful about portion sizes of discretionary choices. These foods should always be considered as ‘extras’ in the context of energy requirements and when selecting a healthy eating pattern.

## Where does water fit in?

Water is an essential dietary component and can be obtained from a wide variety of sources including plain water, tea and coffee, liquid foods such as soups. Solid foods also supply water, especially many vegetables. More fluid is needed with physical activity and in hot weather. Plain water is the best way to quench thirst, and tap water that meets NHMRC [National Health and Medical Research Council] Australian Drinking Water Guidelines is the most appropriate and affordable choice.

## Proportion of the Five Food Groups in the diet

The foods that form the basis of a healthy diet are shown in the AGTHE [Australian Guide to Healthy Eating], where the size of each

segment of the circle is a visual representation of the recommended proportion of the diet from each food group, based on the average recommended daily serves for men and women 19–50 years of age.

These proportions do not equate to the relative weight of foods to be eaten each day as food group serve sizes vary across groups. For example, vegetable serves are 75 g while fruit serves are 150 g.

## Foods illustrated for each of the Five Food Groups

The ranges of foods illustrated in the Five Food Groups in the Eat for Health Program were chosen to:

- reflect foods commonly consumed in Australia
- represent the range of foods within each food group
- be affordable
- reflect the nature of the food supply, including fresh and packaged foods
- offer ideas for shifts towards healthier eating, that include increasing variety and using wholegrain and lower fat products
- be consistent with the recommendations for choosing foods that are high in dietary fibre, low in saturated fat, without added sugars and minimal or no added salt.

*Source: National Health and Medical Research Council, Australian Dietary Guidelines Educator Guide, NHMRC, Canberra, 2013*

# Revisiting health and safety

The preparation of food relies on safe and hygienic food production. It is essential that at all times when preparing food, we ensure that it is safe to eat, and that injury and accidents are avoided during the preparation of the food.

## *Safety in the kitchen*

The design of a kitchen and the tools and equipment that are used in this space are important considerations.



### Let's talk

Discuss why occupational health and safety (OH&S) must be thought about all of the time during the preparation of food.

## Tools of the trade



Good food preparation requires great tools, and the sharper the better! Think about all the possible ways in which the equipment in the kitchen can be a safety concern.



### Let's talk

Discuss with your partner the safety considerations required when using, cleaning and storing a knife.

Kitchens are busy places, often with lots of people moving around. Accidents are common but can be avoided when we remember to think about:

- kitchen operations and organisation
- electrical safety and the possibility of electrocution
- heat, gas or flames and their potential to cause injury
- the importance of preventing falls, slips and cuts by ensuring that equipment is put away and spills are cleaned up immediately.



## Protective clothing

Protective clothing and footwear are essential in the kitchen. Kitchen clothing, including an apron, is important to protect our street clothing or school uniforms, but it also ensures that the food we are preparing does not



become contaminated. Clothing worn in the kitchen should always be clean, and free from pockets and straps that could pose a safety risk.

### Washing your hands

Did you know that there are between two and 10 million bacteria found between your fingertips and elbows, with the number of bacteria doubling after you use the toilet? Before preparing food, after going to the toilet, handling raw meat or having a break, be sure to rewash your hands.

**hygiene**  
the practice or principles of cleanliness in order to preserve health and prevent the spread of disease

### Hygiene in the kitchen

A high standard of personal **hygiene** is important in the kitchen. It helps to prevent the spread of bacteria and micro-organisms, which can live and multiply both on food and on kitchen benches and equipment.

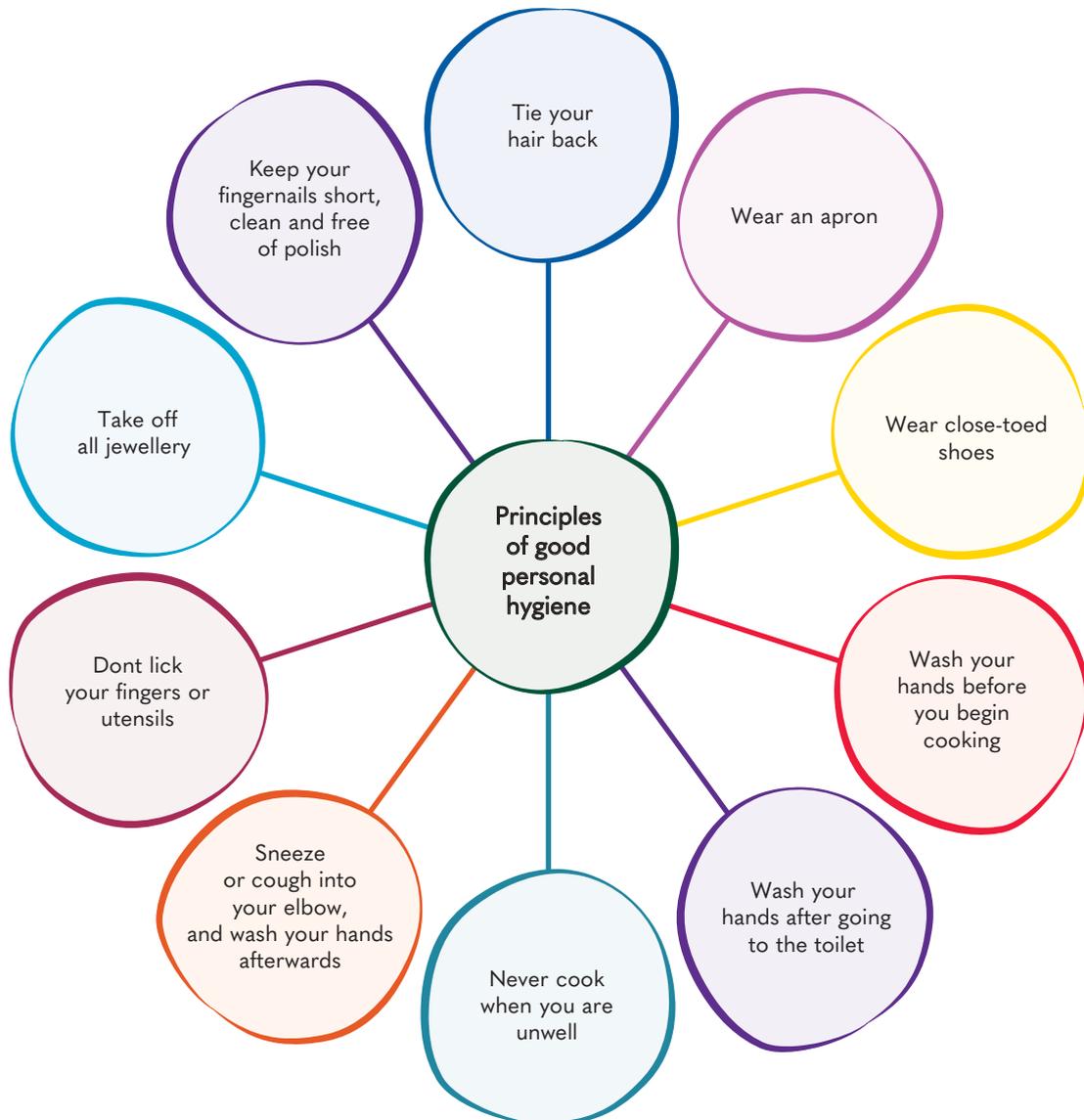
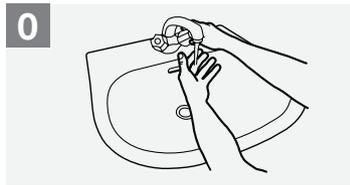


Figure 001: The principles of good personal hygiene

# How to Handwash?

WASH HANDS WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB

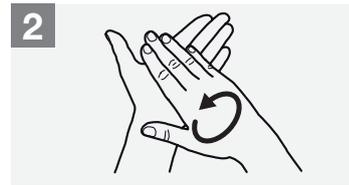
 **Duration of the entire procedure: 40–60 seconds**



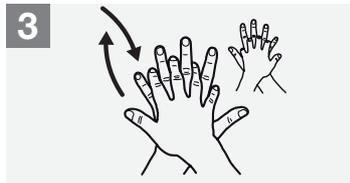
Wet hands with water;



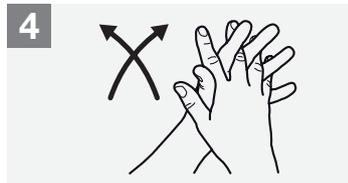
Apply enough soap to cover all hand surfaces;



Rub hands palm to palm;



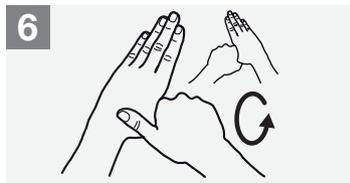
Right palm over left dorsum with interlaced fingers and vice versa;



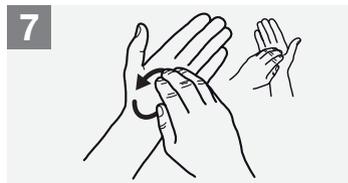
Palm to palm with fingers interlaced;



Backs of fingers to opposing palms with fingers interlocked;



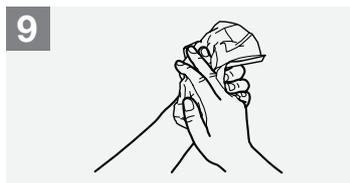
Rotational rubbing of left thumb clasped in right palm and vice versa;



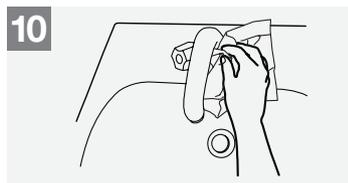
Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;



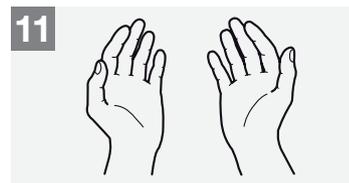
Rinse hands with water;



Dry hands thoroughly with a single use towel;



Use towel to turn off faucet;



Your hands are now safe.



**World Health Organization**

**Patient Safety**

A World Alliance for Safer Health Care

**SAVE LIVES**

Clean Your Hands

May 2009

**Figure 002:** Recommended handwashing technique

Source: World Health Organization

## Ensuring that food is safe for consumption

When preparing food for consumption, it is important to consider:

- temperature
- time
- storage
- cross-contamination.

### Temperature

#### The danger zone

The danger zone is the temperature at which bacteria multiply rapidly. Food that can give you food poisoning should be kept below 5°C if it is to be stored cold or above 60°C if it is to be stored hot.

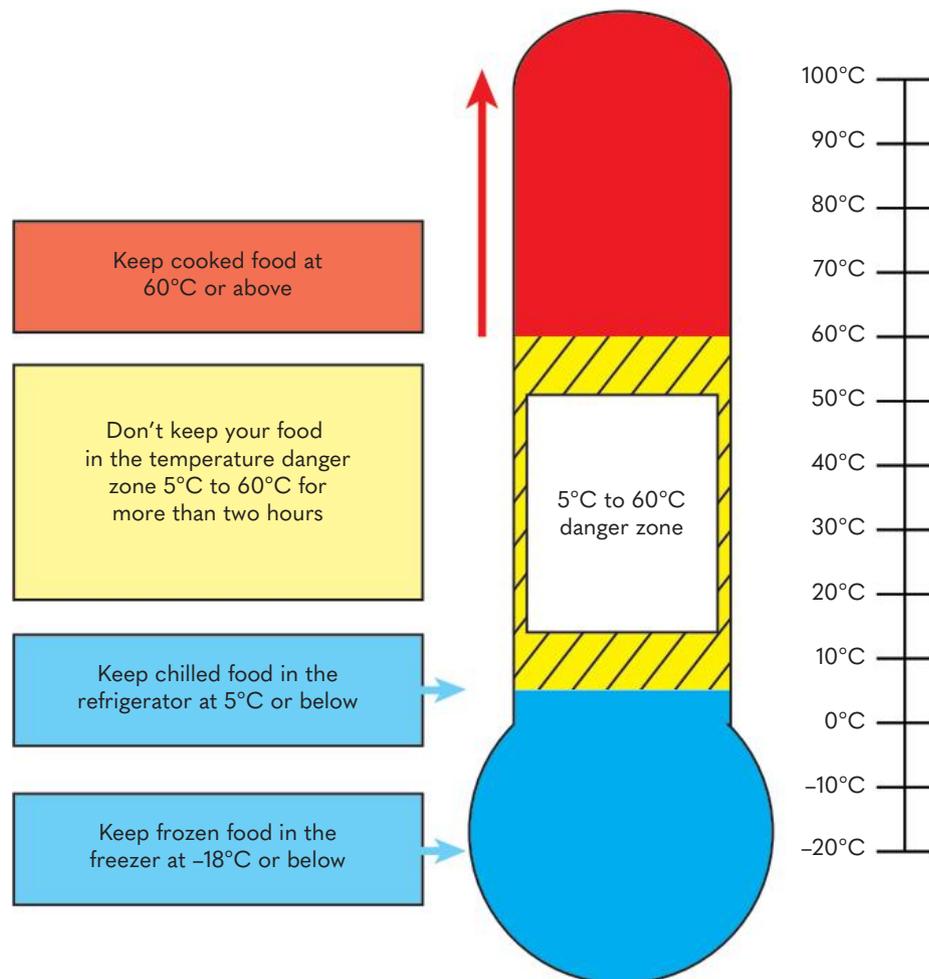


#### Let's talk

An estimated 4.1 million cases of food poisoning occur in Australia each year, resulting in:

- 31 920 hospitalisations
- 86 deaths
- one million visits to doctors.

Explain how food poisoning can occur. What can you do when purchasing, preparing and storing food to avoid food spoilage and contamination?



**Figure 003:** The range between 5°C and 60°C is known as the temperature danger zone.

## Time

Always think about the **two hour – four hour rule**. This will help you to avoid food poisoning.



**Figure 004:** The two hour – four hour guide for food in the danger zone

## Storage

Remember to separate and store. This will help you to stop the growth and multiplication of bacteria in the right conditions. It is important to:

- check the label for storage instructions and follow them – even when the food product has been opened
- separate raw and cooked foods when they are delivered or after purchase, and reduce the temperature of those foods that require it as quickly as possible
- cover all food when storing and be sure to store raw foods on the bottom of the fridge
- keep cooked meat off surfaces where raw meats are or have been
- store foods for the right length of time, at the right temperature and in the right place
- remember, if in doubt throw it out.

## Cross-contamination

Cross-contamination occurs when **bacteria** and **viruses** on a contaminated surface are moved to a surface that was previously not contaminated.

The bacteria and viruses that cause food poisoning can be transferred from humans, kitchen equipment, work surfaces and other foods.



### Let's talk

How can these coloured chopping boards prevent cross-contamination?



### **bacteria**

a single-celled micro-organism responsible for decay, fermentation and ultimately food spoilage

### **viruses**

microscopic parasites that are food-borne or water-borne. They cause viral infections that result in illnesses in humans



## Unit 3

# Food in daily life

### Area of Study 1: The science of food

In this area of study students focus on the science of food, underpinned by practical activities. They investigate the science of food appreciation, physiology of digestion, absorption and utilisation of macronutrients: carbohydrates, including dietary fibre, fats and proteins. Students develop their capacity to analyse advice on food choices through investigating food allergies and intolerances, and the science behind the nutritional rationale and evidence-based recommendations of the Australian Dietary Guidelines. They apply this knowledge in the exploration of diets, which cater for a diverse range of needs, and in the analysis of practical activities. They explain the influence of diet on gut microbiota and how gut health contributes to overall health and wellbeing.

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# Appetite, satiety and sensory

## Key knowledge

- The physiology and conditioning of appetite, satiety and the sensory appreciation of food.

## Key skills

- Explain appetite, satiety and the sensory appreciation.

VCE Food Studies Study Design extracts © VCAA; reproduced by permission

Food and water are needed by everyone; they are a basic human need. The body is a complex system; it knows when it needs to be refuelled. This feeling of **hunger** is the physiological response to the body's need for food. Without both food and water, we cannot survive.

A gland called the hypothalamus monitors the nutrient levels in our bloodstream and sends out messages that create feelings of hunger or thirst when the nutrient levels fall below what our body needs to function. Hunger for food may be satisfied, but an **appetite** may remain.

Our body is not able to tell us *what* to eat. One of the factors that determine *what* we eat is our appetite. The decision about how to appease our appetite is an individual choice. We can control and can also ignore this response to food. Consider the choice between a block of chocolate and a carrot. Our appetite and our own desire or want for a particular food control the choice we make.

When you have eaten enough food, you have a feeling of **satiety**. This is the body's signal to you to stop eating. Often, though, we do not stop consuming food at this feeling of satiety. For many of us, we move on to a feeling of fullness or overload. Getting the food quantity

just right can determine our feeling of satiety or full to bursting! Have you ever experienced that 'just right' feeling after a meal – where you have eaten just the right amount? *What about the opposite when you move from just right to an uncomfortable feeling like you are bursting with food?* There are a number of emotional and social factors that can impact the amount of food we consume. Celebratory occasions such as birthdays or Christmas lunch can often lead to the overconsumption of food.

## Sensory properties of food

Consider how your appetite can be tricked by your senses. What happens when you head to Bunnings and smell the sausage sizzle cooking? What about your sense of appetite when after a big meal you feel full, but then the dessert arrives? Do you 'squeeze' it in? Our senses play a big part in the foods that we choose to eat and how much we eat.

The **sensory properties of food** are related to the five human senses: sight, smell, sound, touch and taste. All of these are important in the way we develop a like or dislike for foods. Our perception of food is ruled by these senses, as is our appreciation of food.

### hunger

the physiological need by the body to eat

### appetite

the desire to eat

### satiety

the feeling of being full after consuming an adequate amount of food

### sensory properties of food

the characteristics of food that are detected by the senses



### Let's talk

What do you think of when you imagine these foods – what is your perception of them?

- Squid
- Baklava
- Ice cream
- Popcorn
- Apple
- Hot chips
- Brussels sprouts
- Sausage cooking



**Figure 005:** The appearance of a food can tell us if it is safe to eat.

### Appearance

Appearance relates to the sight of food. What does it look like? This is the dominating sense when it comes to food choices. If the food does not look appealing to you, then do you want to eat it?

continue to eat it? Or would you think there might be something wrong with it? If a food item does not taste right, it can mean the sensory properties of that food have been altered, making it no longer appealing.

### Taste

There are five basic tastes. Each of these leaves a lasting impression when we eat a food item. If, for example, the orange does not taste like you thought it would, would you

The flavour of a food item is a combination of taste and aroma. The mouth and nose send signals to the brain. This contributes to whether we like or dislike a food. The flavour or taste of the food is determined by our taste buds on the tongue.

**Figure 006:** The tongue can detect several different types of taste.



**Activity 0.1 (Inquiry): How food tastes**



The basic tastes are sweet, salty, bitter, sour and **umami**.

Copy and complete the table to develop a list of foods that are sweet, salty, bitter, sour or umami.

Basic tastes	List of foods
Sweet	
Salty	
Bitter	
Sour	
Umami	

**umami**

a Japanese word translated as 'pleasant savoury taste'; one of the five basic tastes



**Let's talk**

Discuss or describe the meals that you have eaten that have a variety of textures. Using examples of different meals you have eaten, discuss why texture is so important.

**Aroma**

The smell of food can either make us want to eat it or turn us right off. Consider cauliflower. It tastes nutty but can have a strong aroma when it is being cooked. Simply smelling a food item can arouse a mouth-watering response and create an appetite or feeling of hunger.

**Texture**

Feeling the texture of the food inside your mouth is so important. Consider biting into a crunchy apple or chewing a hard lolly. What about the slippery feeling of yoghurt? When we bite, chew and swallow food, this all impacts on our appreciation or dislike for a food item. A well-planned meal will have a variety of textures. This makes the consumer interested and the dining experience pleasurable.

When working with food, it is important to have a sensory word bank. This is a list of words that can be used to describe the sensory properties of the food that you are experiencing, whether that might be through taste, texture, appearance or aroma.



**Figure 007:** Think about the texture of these pistachio nuts. What do they add to the foods they are included in?



**Figure 008:** Aroma can be used to make a judgement about food and food quality. Imagine the aroma of these two types of ramen. One would almost certainly be better than the other!

# Macronutrients

Each day, we eat a range of different types of foods. These foods help us to carry out our everyday activities. We eat for pleasure, to socialise and for the satiety value – to feel full. Most importantly, food provides us with the **nutrients** that we require for health and wellbeing.



## Let's talk

Discuss why food is so important. Develop a list of the functions of food.

### nutrients

the chemical compounds found in food that are used by the body to function effectively during periods of growth or during pregnancy and to repair the body

### macronutrients

vital energy-yielding nutrients that are required in large quantities by the body; carbohydrates, including dietary fibre, fats and proteins

### micronutrients

nutrients required by the body in small amounts; vitamins and minerals

### energy

macronutrients (carbohydrates, protein and fats) in the diet provide the body with energy required for growth, metabolic processes, physiological functions, heat production and muscular activity

### simple carbohydrates

sugars composed of monosaccharides (single sugar molecules) or disaccharides (two joined sugar molecules) such as glucose, sucrose, lactose and fructose

Food provides us with **macronutrients**, which are large molecules that are required by the body in large amounts, and **micronutrients**, which are small molecules required in small amounts.

## Carbohydrates

Carbohydrates, often abbreviated to CHO, contain carbon, hydrogen and oxygen. This macronutrient is produced through the process of photosynthesis in plants. Carbohydrates are the preferred source of **energy** for the body. They provide satiety value. There are two types of carbohydrates: **simple carbohydrates** and **complex carbohydrates**.



Figure 009: Functions of carbohydrates

The best sources of carbohydrates are:

- vegetables, including different types and colours
- legumes and beans
- fruit
- grains (cereal) foods; wholegrain, high cereal fibre varieties, including breads, cereals, rice, pasta, noodles, polenta, couscous, oats, quinoa and barley.

## Focus on fibre

Fibre is an indigestible carbohydrate found in plant foods that provides satiety value and contributes to good health. Fibre assists food to move through the digestive system. Dietary fibre from oats or barley may be beneficial in causing a small reduction in blood cholesterol levels, whereas dietary fibre from wheat may assist in bowel function. There are three types of fibre: soluble, insoluble and resistant fibre.

### Soluble fibre:

- found in plant cells
- completely broken down by bacteria
- has favourable effects on blood cholesterol and blood glucose levels
- **best food sources are:** fruits, vegetables, legumes, barley and oats.

### Insoluble fibre:

- found in the structural part of the plant cell walls
- is unable to be digested by the body
- is bulky and absorbs water and makes us feel full without adding extra kilojoules
- keeps stools soft and bulky and bowels regular
- helps to prevent diverticular disease, haemorrhoids and constipation
- **best food sources are:** wholegrain breads and cereals, fruits, vegetables with the skin on, legumes/beans, nuts and seeds.

### Resistant starch:

- travels undigested to the large intestine
- is processed by good bacteria that keeps our bowel healthy
- feeds good bacteria in the large intestine
- **best food sources are:** chickpeas and lentils, rye bread and pasta (cooked al dente).

**complex carbohydrates** are built up of sugar molecules, strung together in long complex chains

## Protein

All cells in the body contain protein. Protein is made up of amino acids. Some **amino acids** can be made by your body. These are known as non-essential amino acids. There are nine amino acids that the body cannot make (essential amino acids). These must be included in your diet so that your body can function. The amount of protein required by the body is based on age, sex, weight, height and activity levels. If choosing animal protein sources, it is important to choose lean and reduced fat protein sources. These will ensure health and wellbeing and prevent the excess consumption of saturated fat.

**amino acids** organic compounds that are made up of an amino group. They are said to be the building blocks of life

### Complete or incomplete?

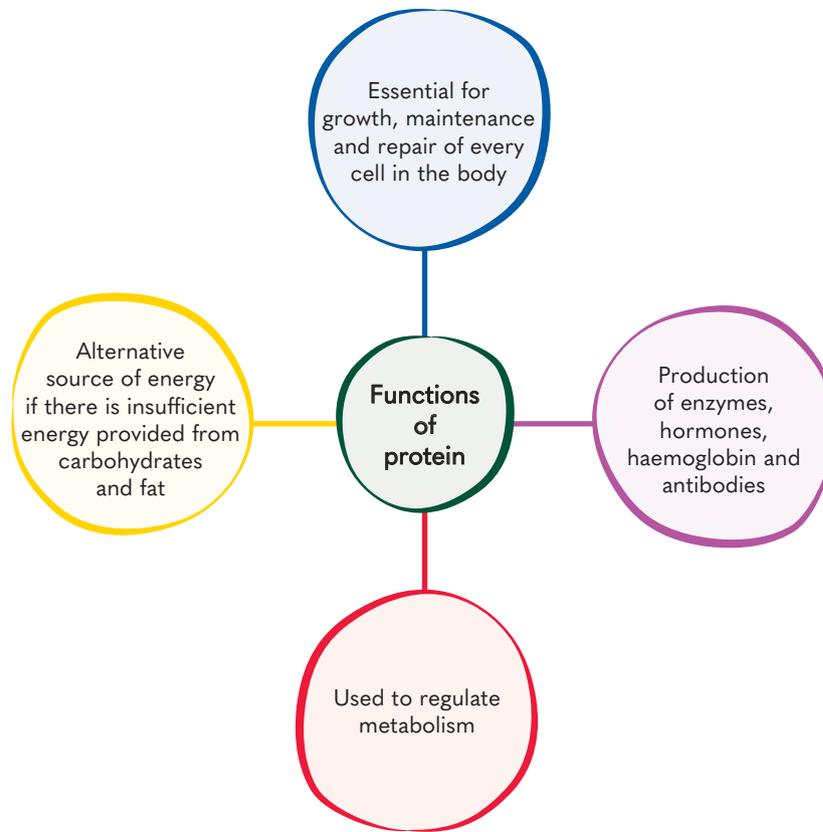
Protein foods contain complete and incomplete proteins.

Complete protein foods contain all the essential amino acids required for good health.

Incomplete protein foods have one or more of the essential amino acids missing.

**Figure 0010:** Animal sources of protein





**Figure 0011:** Functions of protein

**Table 2:** Protein sources can be provided by both animal-based and plant-based foods.

Animal-based protein sources	Vegetable-based protein sources
<ul style="list-style-type: none"> <li>Lean meats</li> <li>Lean poultry</li> <li>Fish</li> <li>Eggs</li> <li>Reduced full fat dairy products – milk, cheese, yoghurt</li> </ul>	<ul style="list-style-type: none"> <li>Legumes – chickpeas, lentils, split peas</li> <li>Tofu</li> <li>Nuts</li> <li>Sesame and sunflower seeds</li> </ul>

**Figure 0012:** A variety of vegetable-based protein sources

## Fats

There are four main types of fat:

- 1 polyunsaturated fats
- 2 monounsaturated fats
- 3 saturated fats
- 4 trans fats.

**Figure 0013:** Sources of monounsaturated fats



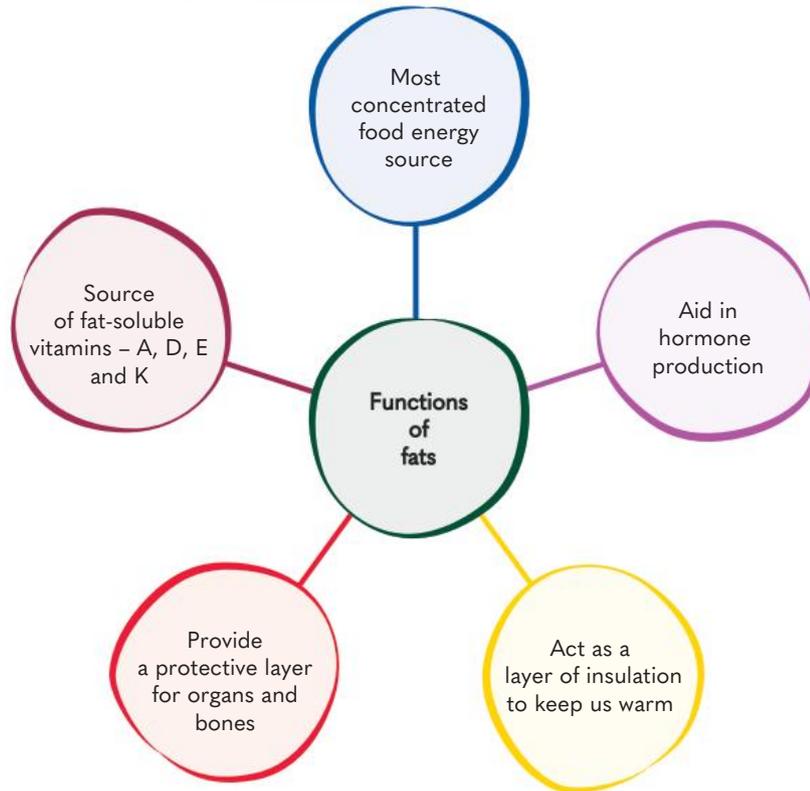


**Let's talk**

Turn to the person sitting next to you and discuss why foods that contain trans and saturated fats feature in the 'only sometimes and in small amounts' section of the Australian Guide to Healthy Eating.

Fats can increase the taste and textural pleasure of food, and some oils made from fruits, seeds, grains or nuts are essential in a healthy diet. It is important to remember that many food sources containing fat are considered **discretionary choices**.

**discretionary choices** foods that are not an essential part of our dietary needs. These foods and drinks appear in the bottom right-hand corner of the Australian Guide to Healthy Eating



**Figure 0014:** Functions of fats

The best sources of monounsaturated and polyunsaturated fats include:

- fish
- nuts
- seeds
- olive and vegetable oils
- avocado.

Sources of saturated fat include:

- bacon, ham
- butter, cream, ghee
- crisps and extruded snacks
- pastry
- processed meats
- sausages.

**Figure 0015:** Sources of polyunsaturated fats



Some foods containing fat may increase blood cholesterol levels. The types of fat we include in our diet have different effects on our health, with some fatty acids essential for good health and wellbeing.

# Chapter 1

## Digestion

### Key knowledge

- The microbiology of the gastrointestinal tract and accessory organs (tongue, salivary glands, pancreas, liver and gall bladder) in the sequential process of macronutrient digestion, absorption and utilisation, including enzymatic hydrolysis.

### Key skills

- Explain the physiology of digestion and its relationship to absorption and utilisation of macronutrients.

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Video 1.1 Chapter Overview

Digestion starts in your mouth and finishes at your anus. Why is digestion important? Because it breaks down the food you eat so that your body can use it. There are a number of organs responsible for digesting, absorbing and utilising what we eat to provide our body with the energy and nutrients we need.

### Get knowledge ready



- 1 Name the macronutrients.
- 2 Describe the difference between mechanical digestion and chemical digestion.
- 3 Explain how absorption differs from utilisation of macronutrients.

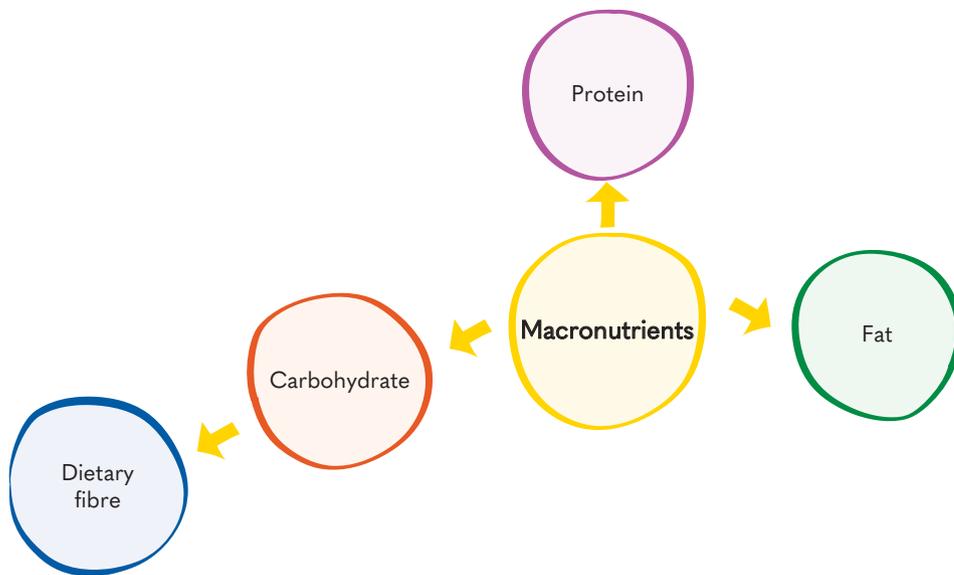
Before we learn about digestion, it is important to ensure that you understand the three macronutrients that are the focus of this topic: what they are, good food sources of each macronutrient, and their function in the body. Information about carbohydrate, protein and fat can be found on pages 8–10.



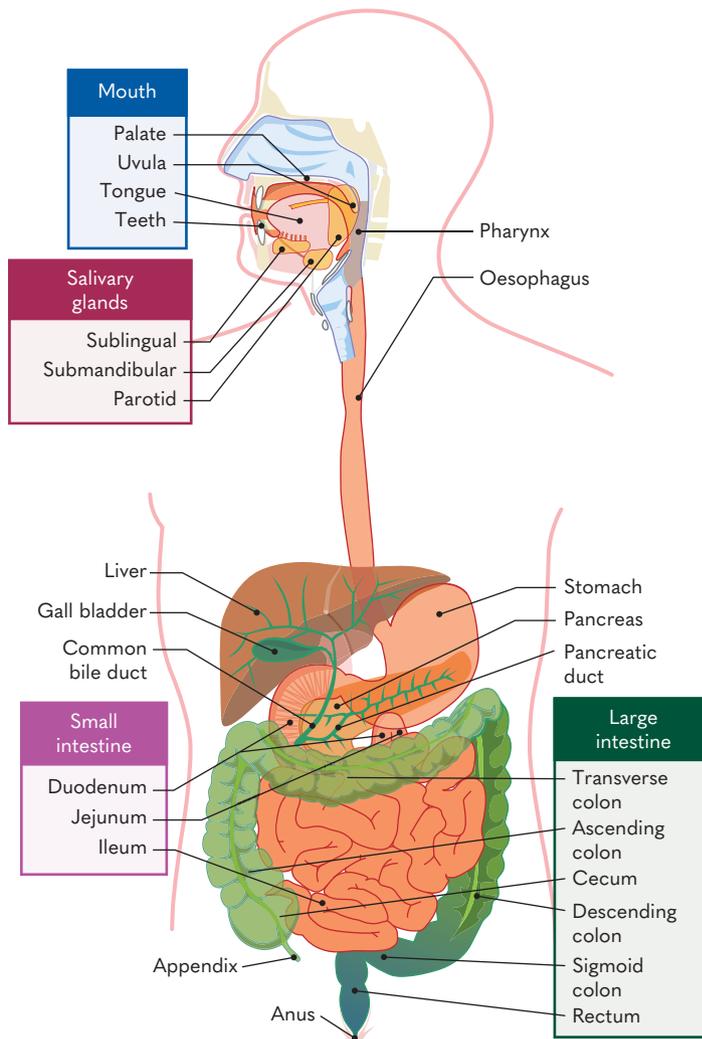
### Let's talk

What do you remember about the macronutrients? What is their role or function in the body? See how many good food sources of each you can list.

Thinking ahead about digestion, can you name the organs involved in this process?



**Figure 1.1:** Macronutrients required in large quantities by the body



**Figure 1.2:** The digestive system, starting from the mouth and finishing at the anus, includes accessory organs: the tongue, salivary glands, pancreas, liver and gall bladder.

## Digestion

**Digestion** is the process of breaking down food into smaller substances. This allows the body to use the nutrients found in the food that we eat. Once these nutrients have been broken down into these smaller substances, they can be absorbed and used by the body for energy, growth, repair and maintenance of bodily needs and functions.

There are a number of organs used in the process of digestion, **absorption** and **utilisation**, including those of the gastrointestinal tract and accessory organs (tongue, salivary glands, pancreas, liver and gall bladder). It is the job of our **gut** to extract the essential nutrients from our food and deliver them to the bloodstream with water and eventually the tissues of the body.

### Activity 1.1 (Practical): Model of the digestive system



- Using play dough or other craft materials, make your own model of the digestive system.
- Annotate your model with the name of each part and the role it plays.



#### Let's talk

When do you think the process of digestion starts? Outline why you think this.

Where does the digestion process end? Outline why you think this.

## Mechanical and chemical digestion

Have you ever smelt a sausage cooking from a distance and then your mouth starts to water? This is the beginning of the digestive process. Digestion starts before the food enters the mouth. The aroma and appearance of food activate salivary glands, ready for the first mouthful. The digestion of food involves both **mechanical digestion** (often referred to as physical digestion) and **chemical digestion**. These processes working together break down

the nutrients into single substances, digesting our food ready for absorption and utilisation of these simple substances.

## Mechanical digestion

Mechanical action begins with the biting and cutting of food by your teeth and then chewing to break it down into smaller pieces. This mechanical work occurring in the mouth increases the surface area of the food and makes it easier to swallow when mixed with saliva. The actions of the tongue and mouth manipulate the food into a **bolus**, which is pushed to the back of the mouth by the tongue, and then swallowing occurs.

The bolus moves through your gastrointestinal tract by the mechanical action of **peristalsis**, which is the muscular contractions that push the food through your system. Peristalsis churns the stomach, to mix the bolus with gastric juices. The bolus now becomes a paste known as **chyme**.

The peristalsis continues pushing the chyme through the small and large intestine. Remaining waste is then gathered in the colon and released through the rectum and anus.

Mechanical digestion can only break the food up into small pieces and then move it through the system. Chemical digestion does the rest of the work.

## Chemical digestion

Chemical digestion ensures that the food that has been mechanically digested is broken down further. The action of **enzymes** chemically digests food into even smaller molecules that can be absorbed and utilised by the body.

**Enzymatic hydrolysis** is the process in which enzymes, with the incorporation of a water molecule, break the chemical bonds that hold macronutrients together. For example:

- Polysaccharides (starch) are broken down into glucose during the process of enzymatic hydrolysis. The enzyme

### digestion

the process of breaking down food into smaller substances

### absorption

how the nutrients are absorbed by the digestive system. Where this occurs is different depending on the macronutrient

### utilisation

how the body uses nutrients

### gut

referring specifically to the gastrointestinal system, which includes the stomach, small intestine and colon

### mechanical digestion

involves physically breaking down food substances into smaller particles to more efficiently undergo chemical digestion

### chemical digestion

the breaking down of food, through the action of enzymes, into small molecules that can be absorbed and utilised by the body

### bolus

a small lump or ball of chewed food mixed with saliva ready for swallowing

is released by the body, and hydrolysis reactions use water molecules to break bonds. This is an important role in the digestion of food. It is this process that breaks down each of the macronutrients into their simple form.

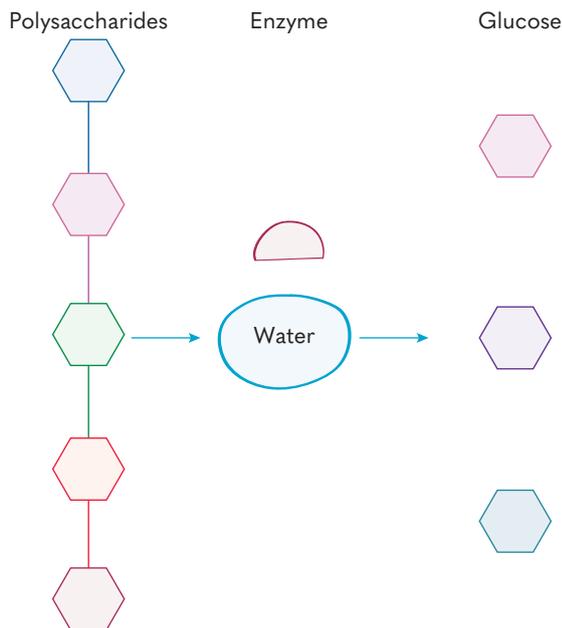
- Salivary amylase begins this process of breaking down starch into simple sugars in the presence of water. This enables the body to absorb and use these smaller molecules. The location of where this occurs and the enzyme involved differ, depending on the macronutrient.

### Activity 1.2 (Inquiry): Digestive enzymes

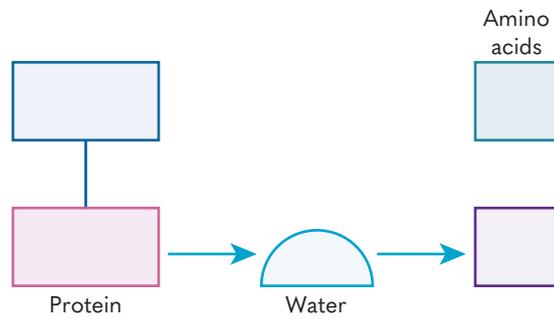


There are many different digestive enzymes. Each targets a specific nutrient, breaking it down so that it can eventually be absorbed by the body. Find out the function of each of these digestive enzymes:

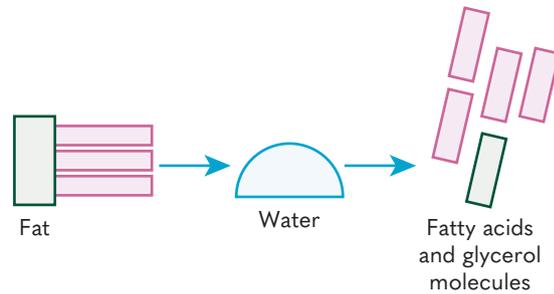
- maltase
- lactase
- lipase
- protease
- sucrase.



**Figure 1.3:** During digestion, complex carbohydrates (polysaccharides) are broken down to monosaccharides such as glucose.



**Figure 1.4:** During digestion, proteins are broken down into amino acids.



**Figure 1.5:** During digestion, fats are broken down into fatty acids and glycerol.

**peristalsis**  
the involuntary constriction and relaxation of the muscles that move food through the digestive tract

**chyme**  
partly digested food and gastric juices, which passes from the stomach to the small intestine

**enzyme**  
naturally produced in the body, enzymes create chemical reactions, including breaking down food particles during digestion

**enzymatic hydrolysis**  
the process in which enzymes break the bonds in molecules with the addition of water. This is an important role in the digestion of food

### Activity 1.3 (Practical): Smoothie bowl



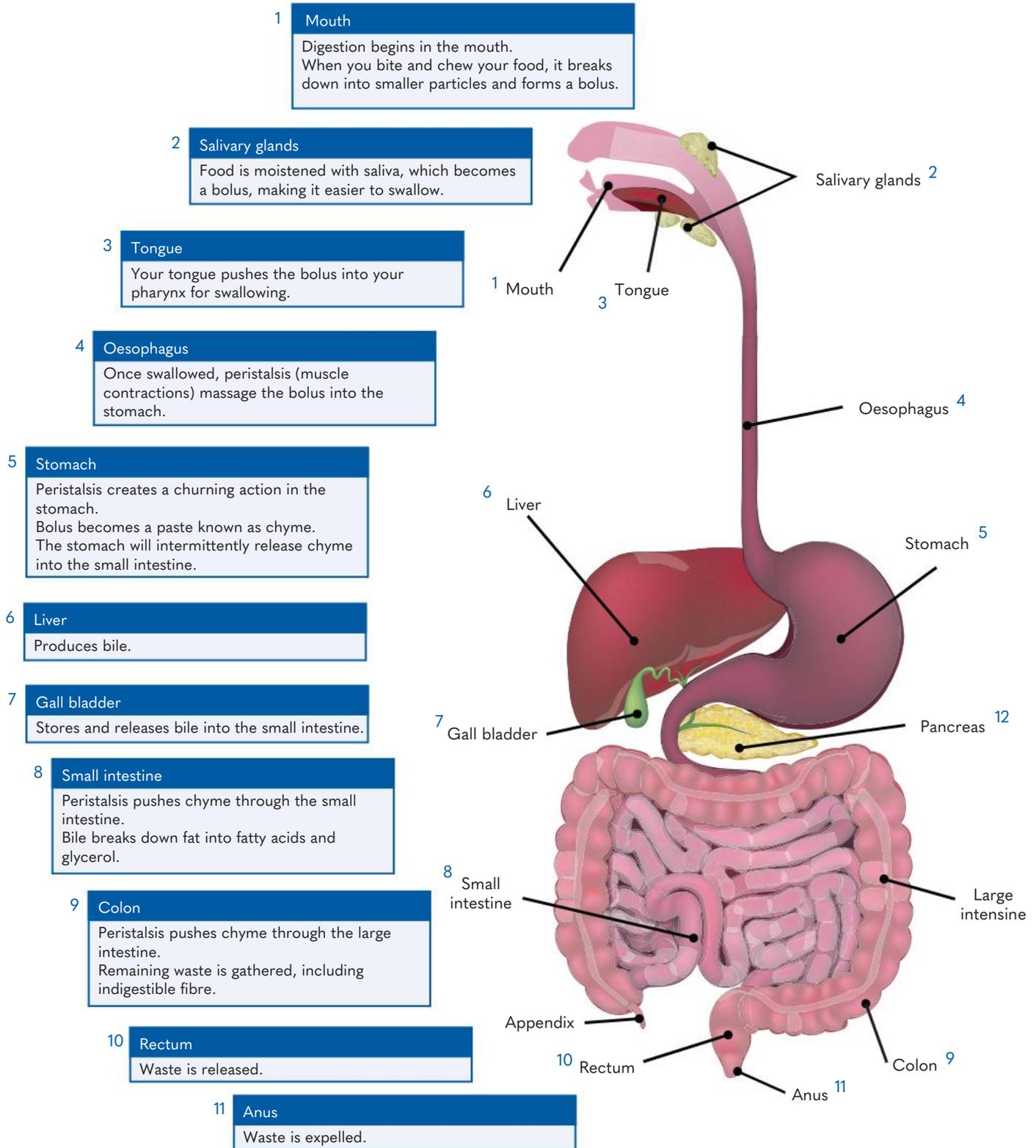
Design a smoothie bowl that incorporates all of the macronutrients (carbohydrate, protein and fat).

Your smoothie bowl must contain fresh, seasonal ingredients and include a topping. Your final product solution should only be enough to serve one person.

Write out your smoothie bowl recipe.

#### Evaluation questions

- Annotate your smoothie bowl recipe, identifying which ingredients are carbohydrate, protein and fat.
- Outline any safety practices you had to follow when using the blender to make your smoothie bowl.
- Complete a sensory analysis of your smoothie bowl.
- Included in the brief was the need for a topping. Explain the process of mechanical digestion from when your topping ingredients enter the mouth.
- Suggest how long it will take your body to digest your smoothie bowl, if eaten for breakfast at the start of the day.



**Figure 1.6:** The digestive system relies on both mechanical and chemical processes.

## 2 Salivary glands

Enzyme = **amylase** and **lingual lipase**

Appearance and aroma of food stimulates saliva.

**Amylase in the saliva breaks down starches (polysaccharides) and disaccharides into dextrins and monosaccharides.**

Lingual lipase is released by saliva to break down triglycerides (fat), but does not begin to work until it reaches the stomach.

- Chemical digestion
- Carbohydrate
- Fat
- Protein

## 5 Stomach

Acid in the gastric juices in the stomach contains the enzymes pepsin, lipase and amylase that digest protein and fat.

**Protein is broken down into smaller chains called amino acids.**

Acid in the stomach activates lingual lipase and is joined by gastric lipase released in the stomach, beginning fat digestion.

The stomach releases hydrochloric acid activating pepsin, which together break down protein into amino acids.

## 6 Liver

Produces bile.

Converts fats into soluble fats.

## 7 Gall bladder

Stores and releases bile into the small intestine.

## 12 Pancreas

Pancreatic lipase is released to the stomach.

Pancreatic juice containing protease enzymes (trypsin and chymotrypsin) is released to stomach.

## 8 Small intestine (duodenum)

Chyme enters from the stomach and mixes with bile. Fat emulsification occurs. Bile with pancreatic lipase further breaks down fat into fatty acids and glycerol. The walls of the small intestine absorb water and the digested nutrients into the bloodstream.

**Pancreatic juices contain amylases that break down into simple sugars (glucose).**

## 10 Small intestine (jejunum)

Fatty acids and glycerol are absorbed into the villi and mix with lymphatic fluid, moving around the body in the lymphatic system and join blood circulation as insoluble fats.

**Villi absorb glucose into the blood capillaries and then into the bloodstream via veins and arteries.**

Absorption of amino acids via villi to the bloodstream to transport as needed.

## Carbohydrate Digestion

- Digestion of carbohydrate starts in the mouth.
- Carbohydrates are broken down into simple sugars by the enzyme salivary amylase.
- Salivary amylase begins to break polysaccharides and disaccharides into their component parts, dextrins and monosaccharides.
- In the small intestine, enzymatic hydrolysis occurs, and carbohydrates are broken down into simple sugars by enzymes such as pancreatic amylase. Enzymatic hydrolysis completes the breakdown of the carbohydrates into simple sugars, glucose, fructose and/or galactose.
- Fibre is indigestible and is used to add bulk to the bowel.

### Absorption

- Absorption of carbohydrate occurs in the first section of the small intestine, in the duodenum.
- Villi and microvilli projections absorb glucose through their outer single cell wall into blood capillaries and then into the bloodstream.
- Cells lining the small intestine absorb glucose into blood capillaries and then into the bloodstream via veins and arteries.

### Utilisation

- The body uses carbohydrates as its primary energy source.
- Any carbohydrate not used in the body can be converted to glycogen and stored in the liver or muscle tissue.

## Activity 1.4 (Inquiry): Fibre



Investigate the three types of fibre – soluble, insoluble and resistant starch. Create a visual presentation showing the following:

- definition of each type of fibre
- good food sources for each type of fibre
- digestion process for each type of fibre
- three tips for how to increase fibre in your daily diet.

## Protein Digestion

- Chemical digestion of protein starts in the stomach.
- The stomach releases gastric acid containing hydrochloric acid.
- The enzyme pepsin is released among the digestive juices and activated by hydrochloric acid, which begins the breakdown of protein into amino acids (enzymatic hydrolysis).
- Pancreatic protease is released from the pancreas into the small intestine, where it breaks down the proteins further (protein unfolds) into amino acids and peptides.

### Absorption

- Absorption of protein occurs in the small intestine, moving the amino acids from the villi to the bloodstream, which then transports the amino acids to the cells in the body as needed.

### Utilisation

- The body uses protein for growth, maintenance and repair of body cells (muscles, blood, connective tissue, bones and hormones).
- Protein assists in energy production.
- Amino acids are also a secondary energy source for growth and activity.

**Activity 1.5 (Inquiry): A day in the life of a macronutrient**

Write a diary entry describing a day in the life of the macronutrient protein found in a handful of peanuts that are just about to be eaten.

Include both the impacts of mechanical and chemical digestion in your story.

**Fat Digestion**

- Lingual lipase is released by saliva but does not begin to work until it reaches the stomach.
- Acid in the stomach activates lingual lipase, joined by gastric lipase released in the stomach, beginning fat digestion.
- The liver produces bile that mixes with chyme in the small intestine.
- Bile is a digestive fluid produced by the liver and stored in the gall bladder. Bile is released into the small intestine

and facilitates digestion by acting as an emulsifier. The digestive fluid breaks down fat globules into smaller droplets, providing a larger surface area for digestion by lipases.

**Absorption**

- Fatty acids and glycerol are absorbed into the villi of the small intestine and mix with lymphatic fluid.
- They move around the body in the lymphatic system and join blood circulation as insoluble fats.
- The liver converts the insoluble fats to soluble fats.

**Utilisation**

- Fat is used for insulation and protection around vital organs.
- Fat helps to transport fat-soluble vitamins.
- Fat is used as a secondary energy source.
- Any fat not utilised by the body is stored as adipose tissue.

**Activity 1.6 (Inquiry): A focus on digestion, absorption and utilisation**

Design a flow chart focused on the digestion, absorption and utilisation of:

- protein
- carbohydrate
- fat.

**Activity 1.7 (Practical): Interactive digestive system experiment**

Search YouTube for 'Lesson idea: digestive system experiment' and watch the video demonstration.

Use this to design your own interactive digestion experiment.

Take pictures of each step and annotate them with what is occurring at this stage for each macronutrient.

# Chilli con carne with guacamole and rice

Serves 2

## Ingredients

### Chilli con carne



1 onion, finely diced



200 g red kidney beans, drained



1 tablespoon olive oil



1/4 bunch coriander



1 clove garlic, minced



400 g tinned chopped tomatoes



1/2 teaspoon chilli powder



1/3 cup white rice



1 carrot, finely diced



200 g beef mince



1/2 teaspoon ground cumin



Salt and pepper



1 stick celery, finely diced



200 mL water



1/2 teaspoon cinnamon



Chilli, optional garnish



1 red capsicum, finely diced

### Guacamole



1/2 ripe avocado



1 tablespoon natural yoghurt



1/8 red onion, finely chopped



1 teaspoon fresh coriander, chopped



1/4 tomato, deseeded and finely chopped



Chopped chilli, optional



1 teaspoon lime juice

## Method

- 1 Prepare the vegetables.
- 2 Separate some coriander leaves as garnish. Finely chop the remaining leaves and stems. Set aside.
- 3 Heat the olive oil in a medium saucepan on a medium heat.

- 4 Sauté the onion, garlic, carrot, celery, capsicum and herbs until softened.
- 5 Add the beef mince. Cook for 2–3 minutes, just to colour. Break up any large chunks of beef.
- 6 Add the drained kidney beans, chopped tomatoes and water.
- 7 Bring to the boil, then reduce the heat to low and simmer with the lid slightly ajar for 20–30 minutes or until the chilli has reduced and thickened. Stir occasionally.
- 8 Cook the rice.
- 9 Prepare the guacamole by mashing the avocado until smooth. Add all the other ingredients and mix well to combine.
- 10 Serve the chilli con carne with rice and guacamole. Garnish with coriander and chilli (optional).



### Evaluation questions

- 1 Outline how this meal provides satiety.
- 2 Identify the type of fat in the avocado.
- 3 Describe how the aromas of the spices when cooking have an effect on the digestive process.
- 4 Describe how the rice would be absorbed by the body during digestion and utilised by the body in the production of energy.
- 5 Complete a sensory analysis of your chilli con carne.
- 6 Suggest how you could modify this recipe with alternative macronutrient food sources.

## Chapter revision

- There are a number of organs and accessory organs used in the process of digestion: mouth, tongue, salivary glands, oesophagus, stomach, liver, gall bladder, pancreas, small intestine (duodenum), large intestine, rectum and anus.
- Digestion is the process where food is broken down into smaller components that can then be absorbed and used by the body.
- Polysaccharides (carbohydrates) are broken down by salivary amylase. Pancreatic amylase breaks them down into disaccharides and then into monosaccharides (glucose). Fibre is not digested like other carbohydrates and is excreted with faeces. Absorption occurs in the small intestine through villi into blood capillaries and then into the bloodstream. Insulin released by the pancreas assists to move glucose from the bloodstream into cells. The body utilises carbohydrate for energy.
- Hydrochloric acid activates pepsin, breaking down protein into amino acids. Pancreatic juices contain protease enzymes that break down the proteins into separate amino acids and peptides. Absorption occurs in the small intestine and is transported through the bloodstream to the liver. The body utilises protein for the growth, maintenance and repair of body cells. Protein assists in energy production and is a secondary energy source.
- Fats are broken down by lingual lipase, pancreatic lipase and bile, breaking them down into fatty acids and glycerol. Absorption occurs in the villi and fats are moved through the lymphatic system. The body utilises fat for insulation, storage of energy and protection around vital organs.

### Apply your knowledge

- 1 Name the macronutrients.
- 2 Identify all the organs used in digestion (including accessory organs).
- 3 Describe the difference between mechanical digestion and chemical digestion.
- 4 Explain the process of enzymatic hydrolysis.
- 5 Identify the enzymes involved in the digestion of carbohydrates.
- 6 Describe how food makes its way to the stomach from the mouth.
- 7 Describe how the body uses fats.
- 8 Outline the role of villi.
- 9 Copy and complete the table.

	Digestion	Absorption	Utilisation
Carbohydrate			
Protein			
Fat			

## Practice exam questions



### Question 1

Describe the chemical digestion and absorption of fats in the small intestine.

**4 marks**

### Question 2

Name two organs involved in the chemical digestion of protein and describe how protein is digested by these organs.

**4 marks**

### Question 3

Explain the physiological process of eating, digesting and absorbing the macronutrients of the chilli con carne with guacamole and rice (see recipe in this chapter).

In your response include:

- sensory appreciation of the chilli con carne, rice and guacamole
- the contribution of this meal to satiety
- the process of eating this meal
- digestion and absorption of the macronutrients in the chilli con carne, rice and guacamole.

**10 marks**

## Chapter 2

*Good food, good mood*

## Key knowledge

- The role of diet in influencing gut microbiota and the relationship between gut microbiota and physical and mental health.

## Key skills

- Explain the role of diet and gut microbiota for health.

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Video 2.1 Chapter Overview

Have you ever heard the sayings 'You are what you eat' and 'Good food, good mood'? How often do you stop and think about what you are eating? Really think? The food you eat plays an important role in the balance of your good and bad gut bacteria. There is strong evidence to show that what we eat not only impacts physical health and dietary-related diseases, but also how food influences our mood, brain and mental health. Building on your knowledge of digestion, in this chapter we will be exploring how the food we eat influences our gut microbiota and how this then connects with physical and mental health. Good food for good health! So, what should we be eating and what are **microbiota**?

**microbiota**

the wide variety of micro-organisms (microbiome), including fungi, yeast and bacteria, that live in the gut

**Get knowledge ready**

- 1 List five examples of foods that you should eat for good health.
- 2 Suggest foods that feed our healthy gut bacteria.
- 3 Suggest how what you eat impacts how you feel.

**Gut microbiota**

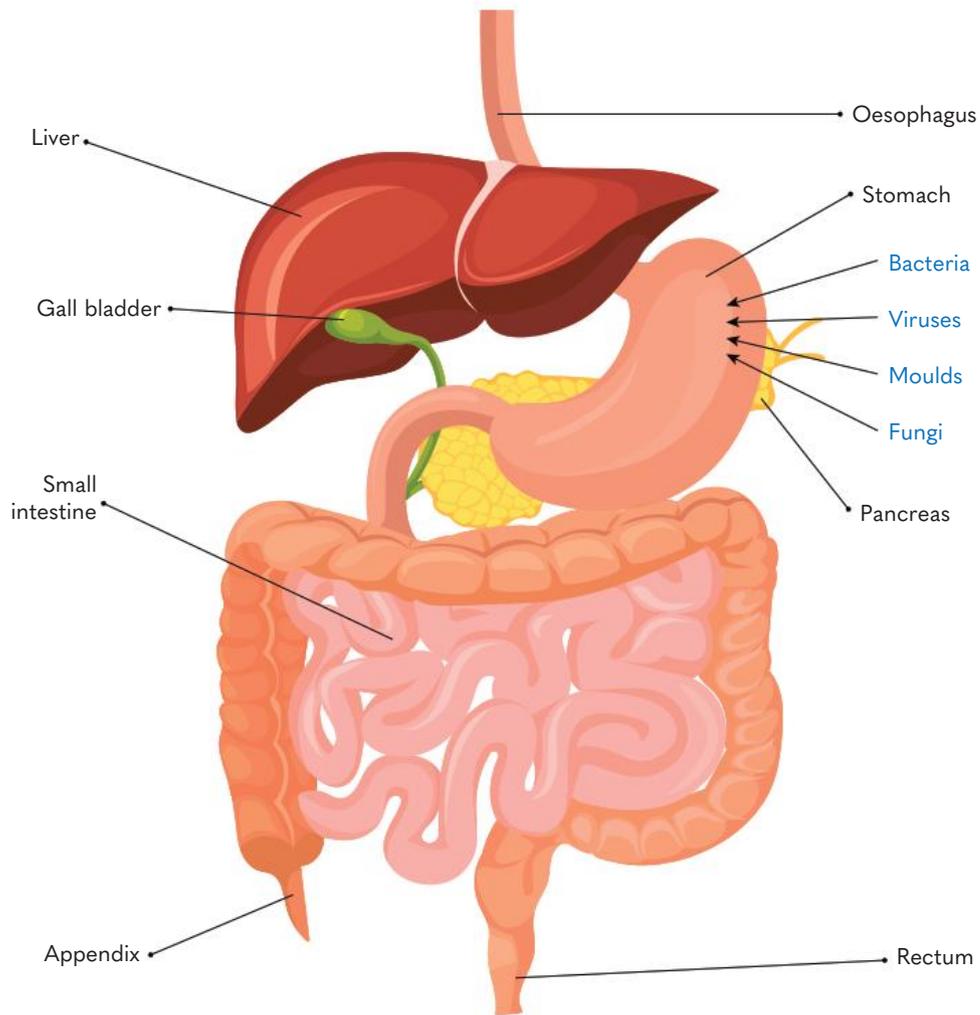
The gut microbiota are made up of a range of microbial life that exists in the human body, including viruses, moulds, fungi and bacteria.

Bacteria in the gut can be both helpful and harmful, with your diet playing an influential role in their make-up. Genetics and the environment around us influence the make-up of our gut bacteria.



### Let's talk

Have you ever heard of the term 'gut microbiota' before? Where have you heard it? Do you think we should be hearing about this term more?



**Gastrointestinal tract**

**Figure 2.1:** When we refer to 'the gut', we are referring specifically to the gastrointestinal system, which includes your mouth, throat, oesophagus, stomach, intestines, rectum and anus.

**microbiome**

collective term that describes the many micro-organisms that live in the human body in different environments. The different environments include the gut, the mouth, skin, lungs and so on. It is the relationship between the microbial cells and the body's genetic material

- Microbiota live with humans from birth
- The human microbiota are made up of trillions of cells, including bacteria, viruses and fungi, collectively known as microbes
- The gut houses the largest population of microbes
- Vital for health is the relationship between microbial cells and their genetic material, the **microbiome**
- The gut microbiota of each individual are unique
- Gut microbiota can heavily contribute to how a person fights disease and digests food, and can even contribute to their physical and mental health

**Figure 2.2:** Fast facts on the gut microbiota

**Role of diet**

**Why is gut health so important?**

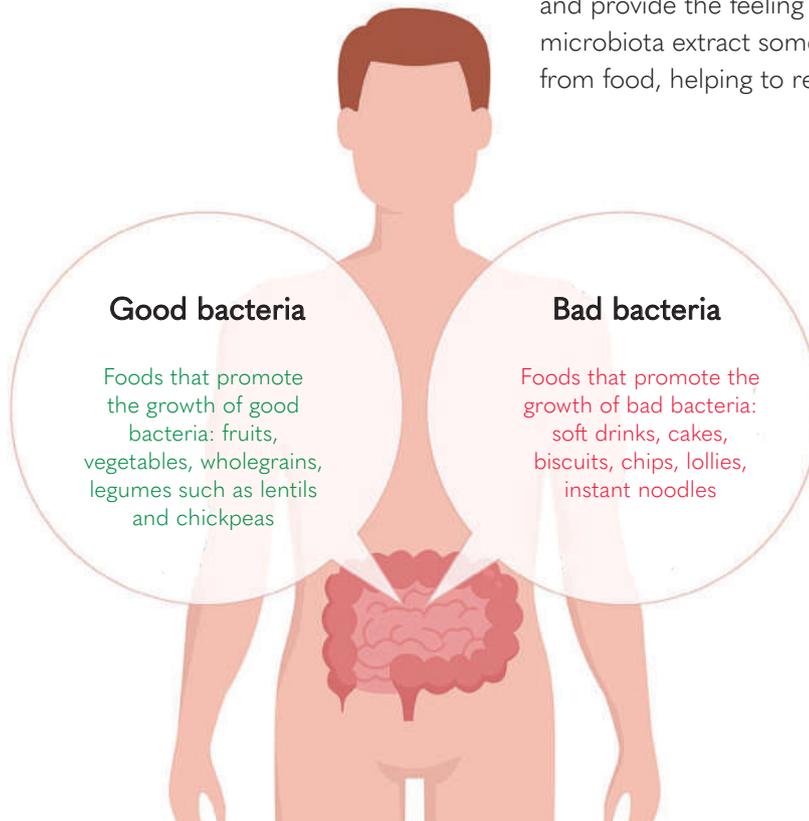
Our gut is responsible for putting and keeping our body into working order. As it breaks down the foods we eat, our gut absorbs nutrients that support our body's functions.

In the gut, these bacteria also help to maintain a level of acidity that prevents the growth of bad bacteria, while allowing good bacteria to thrive. When you have a healthy balance of bacteria in your gut, you're more likely to feel and stay healthy.

**Nutrition**

Gut microbiota help humans to digest energy and nutrients from food. These essential bacteria help to break down foods; without them, nutrients such as fibre would be indigestible.

Gut microbiota can also work to signal food cravings to the brain. They control hunger and provide the feeling of being full. The gut microbiota extract some of the energy we need from food, helping to regulate our body weight.



**Figure 2.3:** Making sure we eat a diet rich in foods that promote the growth of good bacteria and limit foods that contribute to bad bacterial growth will help keep the bad bacteria in check.

To assist in developing healthy gut microbiota, it is important to eat a wide variety of foods in your everyday diet from a young age. A diet high in plant-based foods, including a variety of fruits and vegetables, legumes, nuts,

seeds and wholegrains, will enhance the good bacteria in our gut and keep the bad bacteria in check. One of the main ingredients that our gut loves, that we find in plant-based foods is fibre.



**Figure 2.4:** Sources of fibre in the diet come from a variety of foods.



### Let's talk

Do you eat fibre-rich foods in your daily diet? Can you explain the difference in the types of fibre available in foods?

## Activity 2.1 (Media analysis): Gut microbiota and diet



Read the article 'Gut microbiota and diet: an introduction' by Melissa Lane, a PhD candidate within Deakin University's Food & Mood Centre, and complete the analysis questions that follow.

**Gut microbiota and diet: an introduction**

MELISSA LANE

Over the past decade, interest in the gut microbiome has grown as efforts to measure its composition and function have developed. We now know that we have more bugs within and on us than we do human cells, and some consider us more bacterial than *Homo sapien*.

**What is the gut microbiome and what factors influence it?**

The gut microbiome can be thought of as an ecosystem much like a rainforest, where bacteria, fungi and viruses thrive – some good, some bad. It is recognised that although the gut microbiome alters throughout the lifespan, its major composition typically stabilises in the first few years of life. Many factors affect our gut microbiome,

including (but not limited to) our environment, genetics, and antibiotic interventions. From hereafter, we will consider the gut microbiome in terms of the *bacteria* that live within this gastrointestinal ecosystem – and these bacteria are termed the *gut microbiota*. The above factors influencing our gut microbiota are either difficult to manage or simply cannot be changed. However, the foods we

consume can also significantly impact gut microbiota and are, importantly, modifiable. Our food choices occur regularly – on a day-to-day (sometimes minute-by-minute) basis and this is empowering. Although our gut microbiota are relatively stable, research shows that we can change their composition, for better or worse, within a matter of 24 hours. To change the composition of our gut microbiota refers to either increasing or decreasing the overall amount (i.e., abundance) and/or types (i.e., diversity) of bacteria in our gut.

### **What role do gut microbiota play in diet?**

We know that food choices are modifiable and that food can rapidly change the composition of gut microbiota, but another interesting fact about our microbiota is that they break down certain foodstuffs that would otherwise go unused. That is, there are some foods we are unable to digest and we need our gut microbiota to do the job for us. Simple carbohydrates such as table sugar move through the stomach and into the small intestine where they are easily metabolised, digested and absorbed for energy by our bodies. However, when we eat fibre, it makes its way all the way

through the small intestine and into the large intestine. The large intestine houses most of our gut microbiota and it is here that these microscopic bugs munch and digest the fibre we were unable to access ourselves.

### **What foods best support a healthy gut microbiota composition?**

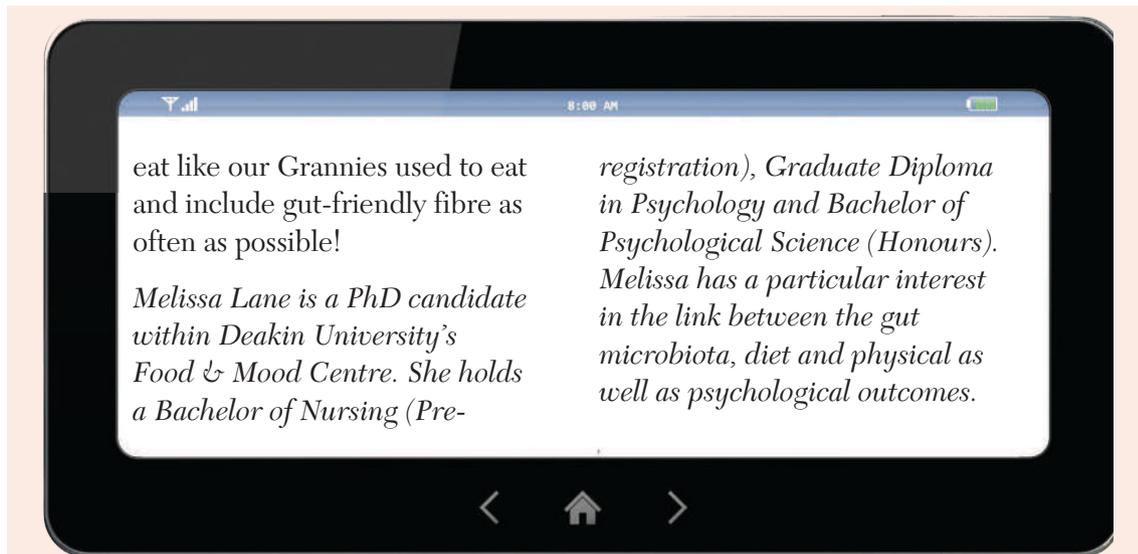
Although we are yet to characterise exactly which bugs are needed for the optimal mix of gut bacteria, we do know that greater gut microbiota diversity is associated with better health outcomes. And what promotes a greater variety of gut bugs? The simple answer is – fibre-rich whole-foods. Examples include plant foods such as vegetables, fruit, whole-grains, legumes, nuts and seeds. We can also promote a healthy gut by consuming bacteria itself in the form of fermented food such as kimchi, kefir, unpasteurised sauerkraut etc. Be mindful, though, that the benefits associated with consuming fibre-rich food or fermented food are transient and will only last for as long as you are consuming them (or shortly thereafter). This means that if we want to reap their health-benefiting rewards, we need to maintain their consumption as often as every day and ideally with every meal. The National Health

and Medical Research Council [NHMRC] recommends that Australians consume between 25 to 30 grams of fibre per day. Most of us are not reaching this target and are instead consuming less than 20 to 25 grams per day. A few simple steps to increase dietary fibre intake may include swapping white bread or white rice for whole-grain bread or brown rice, respectively. Moreover, by adding just two pieces of fruit to our snack pack or 1 cup of mixed vegetables with lunch or dinner may increase our fibre intake by 5 to 9 grams, respectively.

When these foods are consumed regularly, the gut microbiota produce certain fibre-related metabolites referred to as short-chain-fatty-acids or SCFAs. SCFAs are defined as the byproducts of fermentation of food by the gut microbiota. A study by David et al. (2014) showed that consuming a plant-based diet significantly and rapidly (within five days!) increased levels of fibre-related SCFAs associated with anti-inflammatory modulation. The prescribed plant-based diet consisted of oats for breakfast as well as a mix of vegetables, rice and lentils for lunch and dinner. For snacks, fresh and dried fruit were prescribed. Additionally, feeding

our gut microbiota essential complex carbohydrates promotes their ability to regulate our immune system; fight off invading pathogens; produce important nutrients; and, provide us with the extra energy we may need to pick ourselves up in the morning and make that much needed cup of coffee (among other important life things). Alternatively, a day-to-day diet lacking in fibre starves the gut microbiota and can lead to them eating the only food in sight – mucus that lines and protects our gut wall. Evidence suggests that if the gut microbiota creep too close or munch down too deeply on this gut wall, our immune system as well as inflammatory processes may kick in.

In summary, the cards are in our hands in terms of the food choices we make. The great thing about food choices is that we have a number of them to make each day, including breakfast, lunch and dinner as well as desserts and snacks. So even if we forget to include fibre-rich foods in our lunch, we can aim to include them as part of our 3pm 'slump snack'. The very powerful decision to include more fibre-rich foods in our diet can increase gut microbiota diversity and subsequently promote beneficial physiological outcomes. So, let us

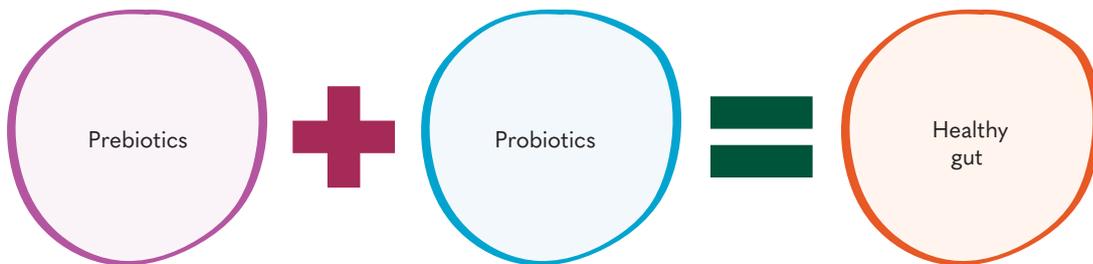


**Figure 2.5:** Article from Deakin University's Food & Mood Centre

Source: Blog article from the Food & Mood Centre at Deakin University.

### Analysis questions

- 1 Create a mind map to summarise the factors that influence the gut microbiome.
- 2 **a** Suggest how quickly we can change the composition of our gut microbiome.  
**b** Why is this important?
- 3 Outline the nutrients needed from foods to best support gut health.
- 4 Discuss the role of diet and gut microbiota for health.



**Figure 2.6:** What we eat impacts gut health. A balance of probiotics and prebiotics in the diet contributes to a healthy gut.

## Prebiotics

**Prebiotics** are important for health. Fibre is the most common type of prebiotic. Prebiotic fibres are not broken down in our gut; they travel through the gut and stimulate the growth and activity of probiotics (the good bacteria).

Prebiotics are substances that come from carbohydrates, mostly fibre, which the body cannot digest in the small intestine. They

provide the food or fuel to keep your gut bacteria alive and healthy. Good bacteria must already be present in the gut to gain the benefits from prebiotics.

The best source of prebiotics is food, not supplements. Many foods contain prebiotics. They are types of fibre (**inulin**) commonly found in legumes, fruits and vegetables. These are the types of fibre that the body cannot digest but your gut's bacterial microbiota can.

---

**prebiotics**  
the fuel for beneficial bacteria in the gut

**inulin**  
a starchy substance found in a wide variety of fruits, vegetables and herbs

---



**Figure 2.7:** These are some examples of good food sources of prebiotics.

**Activity 2.2 (Inquiry): Find the prebiotic**



Remember that prebiotics are found in foods containing fibre. Inulin is often included in many food products. Inulin may be included on food labels under many different names. Complete an investigation on a range of different food labels and discover how inulin is included on food labels. Copy and complete the table.

Food product	Inulin listing on food label

**Activity 2.3 (Practical): Pulse pasta design brief**

Pulse pasta has been developed to provide an excellent source of fibre and higher protein compared to traditional wheat-based pasta. Being gluten-free, it also provides an opportunity for substitution. Pasta is a quick, easy, nutritious, healthy meal solution.

Design a vegetable-based pasta sauce that uses seasonal produce, is high in fibre and can be served with pulse pasta to help support a healthy gut.

## Probiotics



**Figure 2.8:** Key sources of probiotics in food include yoghurt, sauerkraut, kimchi, tempeh, kombucha and kefir.

**Probiotics** are foods that contain live, healthful bacteria. A healthy gut contains many probiotic bacteria. They are 'live microorganisms that, when administered in adequate amounts, confer a health benefit on the host', as defined by the World Health Organization (WHO). We can find probiotics in foods that help us to maintain a healthy balance of bacteria in the intestine. Examples of probiotics include lactobacillus, acidophilus and bifidobacteria. Probiotics present in our gut make it a less inviting place for bad bacteria to survive. When we are stressed, ill, take antibiotics or consume a poorly balanced diet, our gut microbiota will be affected and out of balance. We can help our gut out by consuming probiotics to enhance the good bacteria present in our bodies.

### Using bacteria

Our ancestors have used the process of **fermentation** for thousands of years. They preserved foods using bacteria that causes

fermentation. Fermentation not only preserved the food but also enhanced its health benefits. In fact, it is one of the oldest and healthiest ways to preserve and consume food. Fermenting uses a chemical process by which microbes break down the macronutrients. It is the resultant acid or alcohol content that acts as a natural preservative, and as the acidity increases, the bacteria are destroyed. Fermented foods can be used in the preparation of a range of dishes.

**probiotics**  
foods that contain live, healthful bacteria. They are foods that maintain a healthy balance of bacteria in the intestine

**fermentation**  
a natural process that converts micro-organisms such as yeast and bacteria, and carbohydrates such as starch and sugar into acids or alcohol

**Activity 2.4 (Practical): Sauerkraut versus kimchi**

In pairs, make one quantity of the sauerkraut recipe and one quantity of the kimchi recipe.

Note: sauerkraut needs to be made 2–3 days minimum in advance.



# Sauerkraut

## Ingredients



400 g green or white cabbage, cored and finely shredded



1 cabbage leaf



1 teaspoon fine salt



¼ teaspoon caraway seeds or peppercorns



1 clean and sterilised 500 g air-tight jar

## Method

- 1 Sterilise a jar for the prepared sauerkraut.
- 2 Combine the cabbage and salt in a large bowl.
- 3 Massage the salt into the cabbage for 5 minutes. Wait 5 minutes and then repeat. The cabbage should wilt, so cell walls will start to break down and release juices.
- 4 Mix in the caraway seeds or peppercorns.
- 5 Grab handfuls of your cabbage. Squeeze out the juice and firmly pack the cabbage into the clean and sterilised jar.
- 6 Press down to push out any air.
- 7 Cover the cabbage with cabbage juices.
- 8 Place the cabbage leaf on top to weigh down the shredded cabbage. It is important that all the cabbage is submerged in the liquid.\*
- 9 Check on your sauerkraut daily. It will be ready to eat after 3 days.

Tip: You can also add carrot to your cabbage for colour, texture and flavour.

\*If you need more liquid, you can add more salted water (1 teaspoon of salt for every 250 mL water).



# Kimchi Ingredients



200 g wombok,  
roughly cut



1/4 cup water



15 g rock salt



1/2 clove garlic



Ginger, 1 large  
slice



1/4 teaspoon rice  
wine vinegar



1/8 teaspoon  
chilli flakes

## Method

- 1 Sterilise a jar for the prepared kimchi.
- 2 Rinse and prepare the wombok.
- 3 Combine the salt and water in a large bowl.
- 4 Stir in the wombok, cover and leave to sit for 4 hours.
- 5 Drain the wombok, keeping the liquid from the bowl.
- 6 Place the mixture into a sterilised jar, covering with the reserved liquid. Keep at room temperature.
- 7 Put aside for 2–3 days to develop the flavours of the kimchi.
- 8 Drain the liquid before using.



### Evaluation questions

- 1 Conduct a sensory analysis comparing these two popular fermented products. Copy and complete the table.

	Appearance	Aroma	Taste	Mouthfeel
Kimchi				
Sauerkraut				

- 2 Investigate the role of kimchi in the Korean diet.
- 3 Investigate the role of sauerkraut in the European diet.
- 4 Explain the changes to pH during the fermentation process.
- 5 Describe the benefits of sauerkraut and kimchi for gut health.
- 6 Suggest other ways sauerkraut and kimchi could be incorporated into your diet.

## What's the difference?



**Prebiotics:**  
fibre found in leafy greens, are the **fuel** for the beneficial bacteria in your gut



**Probiotics:**  
live beneficial bacteria, act like **factories** to ferment fibre and prebiotics to make metabolites

**Figure 2.9:** What is the difference between prebiotics and probiotics?

**general level health claim**  
 'A general level health claim is a claim that describes a relationship between the consumption of a food, or a component in the food, and particular benefits in relation to health (a health effect). A general level health claim does not refer to a serious disease or a biomarker of a serious disease' (FSANZ)

 **Let's talk**  
 Explain the difference between probiotics and prebiotics.

 **Let's talk**  
 Why is it important to aim to get probiotics and prebiotics from a range of food sources?

**Activity 2.5 (Practical): Probiotics – Vaalia versus Yakult**

**Sensory and nutritional analysis**  
 Vaalia and Yakult are yoghurt products that have scientific evidence to prove their claim to contain probiotics good for our health. The theory is that eating food products such as these with live bacteria will have a greater effect on our gut. These brands make a **general level health claim** due to the level of living micro-organisms in these products and the relationship between the food and health, promoting health and wellbeing.

- 1 Taste test the products, listing descriptive words for each product's taste, texture, appearance and aroma.
- 2 Using information on the product's nutrition information panel (NIP), list the probiotics and amounts if this information is available. Copy and complete the table.

	Taste	Texture	Appearance	Aroma	Probiotic bacteria
Vaalia Natural Yoghurt					
Yakult					
Plain Natural Yoghurt					

- 3 Using the labels, describe the nutritional differences between the Vaalia Natural Yoghurt and the Plain Natural Yoghurt.
- 4 Should people be consuming these products in their diet? Justify your response.
- 5 Explain how people incorporate products such as these into their daily diet.
- 6 Explain the role that probiotics play in supporting gut microbiota.
- 7 Justify which yoghurt product you would choose for a teenager aged 14–18. In your response, explain how your choice helps to meet the recommended servings of milk, yoghurt, cheese and alternatives, mostly reduced fat.

## PREBIOTICS VS PROBIOTICS



# Prebiotic and probiotic salad bowl

Serves 2

## Ingredients

### For the salad



1/4 beetroot, diced



1/2 carrot, sliced



2 florets cauliflower, chopped



1/4 zucchini, sliced



1/4 red onion, sliced



4 cherry tomatoes



1/4 can chickpeas, drained



1 tablespoon olive oil



1 tablespoon flaked almonds (optional)



1 pinch spices to taste: chilli powder, turmeric, garam masala, cumin, sea salt, pepper



1/4 cup quinoa



1/2 cup water



1 teaspoon salt



1 clove garlic, crushed



1 sprig thyme

### Yoghurt dressing



1/4 cup natural yoghurt



1 pinch sea salt



1/4 lemon, juiced



1 pinch chilli powder (optional)

### To serve



1/4 avocado (optional)



1/4 cucumber, diced



1 tablespoon sunflower seeds

## Method

- 1 Preheat the oven to 200°C.
- 2 Add the cut vegetables into a greased baking dish.
- 3 Scatter the chickpeas and tomatoes on top of the vegetables.
- 4 Drizzle with the olive oil and chosen spices. If using, sprinkle the almonds on top.

- 5 Place the baking dish in the preheated oven and roast until cooked.
- 6 To prepare the quinoa: rinse the quinoa really well and add to a saucepan with water, salt, garlic and thyme.
- 7 Bring the saucepan to a simmer, lower the heat and cook, covered, for approximately 10–15 minutes or until the water has been absorbed.
- 8 Take the quinoa off the heat and leave aside, covered, for 5 minutes. Fluff with a fork.
- 9 Prepare the yoghurt dressing by mixing all the ingredients together in a small bowl. Set aside.
- 10 Prepare the cucumber and avocado (if using).
- 11 In your serving bowl, creatively place the quinoa, roasted vegetables, cucumber and avocado (if using). Drizzle the yoghurt dressing over the salad and top with the sunflower seeds.

### Evaluation questions

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- 1 Annotate the prebiotic and probiotic salad bowl recipe, identifying key macronutrients.
- 2 Highlight foods that contain fibre.
- 3 Highlight examples of prebiotic or probiotic foods on your annotation.
- 4 Suggest how you might modify the recipe with alternative macronutrient food sources.

## Relationship between gut and physical and mental health



### Let's talk

Our gut has been referred to as our second brain. Why?

### obesity

a condition in which a person's weight is 20 per cent or more above 'normal' weight, or they have a body mass index (BMI) of 30 or more

### physical health

relates to the functioning of the body and its systems. It includes the physical capacity to perform daily activities or tasks

### type 2 diabetes

a condition in which the body becomes resistant to the normal effects of insulin and/or gradually loses the capacity to produce enough insulin in the pancreas, thus putting healthy blood glucose levels at risk

### autoimmune disease

a disease in which the body's immune system attacks healthy cells

Food sometimes harms our body, and what we eat affects the gut microbiota. We have a range of good and bad bacteria in the body, and what we eat helps us balance this. Foods can have both a negative and a positive influence on this delicate balance.

### Positive influence:



Eating a diet rich in fibre from a diverse range of foods such as fruits, vegetables, wholegrains and legumes will increase the amount of good bacteria in our gut by providing a healthy dose of prebiotic foods.

Consuming probiotic foods such as fermented products like kimchi, sauerkraut and kombucha will also lead to an increase in the good bacteria in our microbiome. It has an anti-inflammatory effect on the gut, keeping the balance of good bacteria high.

### Negative influence:



A diet high in sugar and fat can feed the wrong bacteria in our gut. This type of diet can enable the bad bacteria to grow faster and cause inflammation of the gut. The preventative bacteria is not able to kick in and create a mutually beneficial relationship within the gut microbiome, and the gut suffers. These harmful bacteria have been linked with **obesity** and depression.

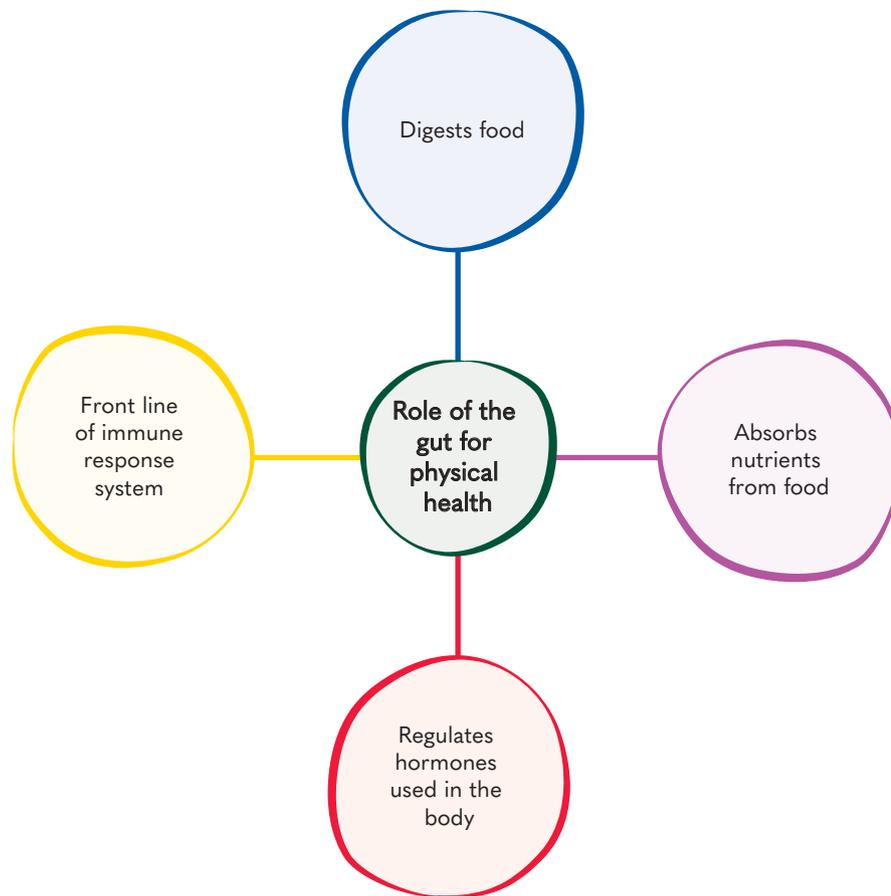
### Physical health

Looking after your physical health includes regular physical movement and a diet high

in fibre. Our **physical health** can be strongly affected by our gut microbiota. When our balance of bacteria in the gut is healthy and the good bacteria are in the gut, the body's immunity is more likely to be stronger, providing protection from illness. Physical health is also supported by factors such as regular physical activity, consuming a balanced diet, having appropriate rest/sleep, maintaining an ideal body weight, and the absence of illness, disease or injury. When gut health isn't optimal, hormones become imbalanced. Research has discovered that imbalances in the gut have been linked to a range of conditions, including obesity, **type 2 diabetes** and **autoimmune disease**. Fibre is the key nutrient protecting physical health. Not only is it a prebiotic, it provides bulk and aids in satiety, feeding the good bacteria in your microbiome. We can increase fibre in our diet by eating a variety of fresh fruits and vegetables, wholegrain foods and adding plant-based foods such as legumes and chickpeas to the diet.

### Immunity

From birth, a baby starts to build their microbiome. A healthy gut microbiome contributes to a healthy immune system. The body's immune system is rapidly developing and is a vital defence mechanism that adapts and responds to microbes. A strong immune system allows for an effective and quick response to disease-causing organisms. When the bacteria in our gut is not balanced, and bad bacteria is in control, inflammation can be hard to fight off and can impact on our physical and mental health. Diet can be a main contributor to bad bacteria in our gut, especially a diet high in soft drinks and foods high in sugar, salt and saturated and trans fats. Taking antibiotics is also a contributor to the increases in bad bacteria in our gut. If our gut has an imbalance of good and bad bacteria, this can impact on our immune system and make an individual more susceptible to illness. We can keep the good bacteria count high in our gut by changing our diet.



**Figure 2.10:** Gut microbiota play an influential role in an individual's physical health.

### Activity 2.6 (Analyse): School canteen menu analysis



- 1 Review your school's canteen menu.
- 2 Make recommendations regarding food products that could be changed or modified to ensure that your school's canteen is providing access to foods that have a positive influence on gut microbiota and physical health.

### Mental health

A mentally healthy brain enables an individual to positively form opinions, make decisions and use logic. **Mental health** is associated with low levels of stress and anxiety, positive self-esteem, as well as a sense of confidence and optimism.

Studies have shown that diet and mental disorders are leading causes of **morbidity** and **mortality** in the world. Research is showing us that there is a link between poor gut health and depression. Lifestyle factors, such as modifications to diet, can improve the mental state of an individual as they impact on the good bacteria present in the gut. Consistently, we are finding that research is concluding that the better one's diet is, the better one's mental health is. Good food = good mood! Modifications to diet can have a positive influence on mood. When modifying food intake, it should include plenty of vegetables, legumes, fruits and good sources of plant and animal protein while limiting processed food products and refined grains. Reducing those foods with high amounts of added sugar, salt and saturated fats is important too.

### mental health

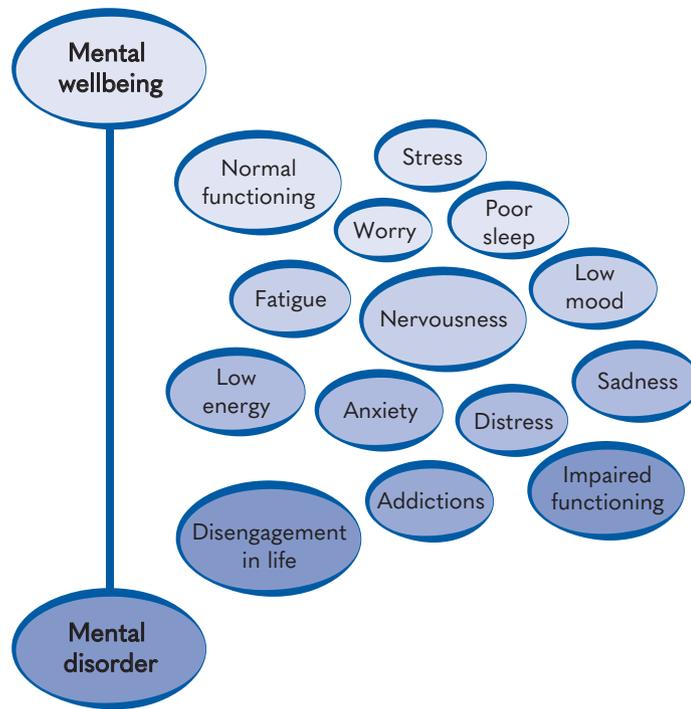
the current state of wellbeing relating to the mind or brain and to the ability to think and process information. A mentally healthy brain enables an individual to positively form opinions, make decisions and use logic. Mental health is about the wellness of the mind rather than illness, and is associated with low levels of stress and anxiety, positive self-esteem, and a sense of confidence and optimism

### morbidity

'ill health in an individual and levels of ill health within a population' (AIHW)

### mortality

the numbers of deaths in a population in a given period

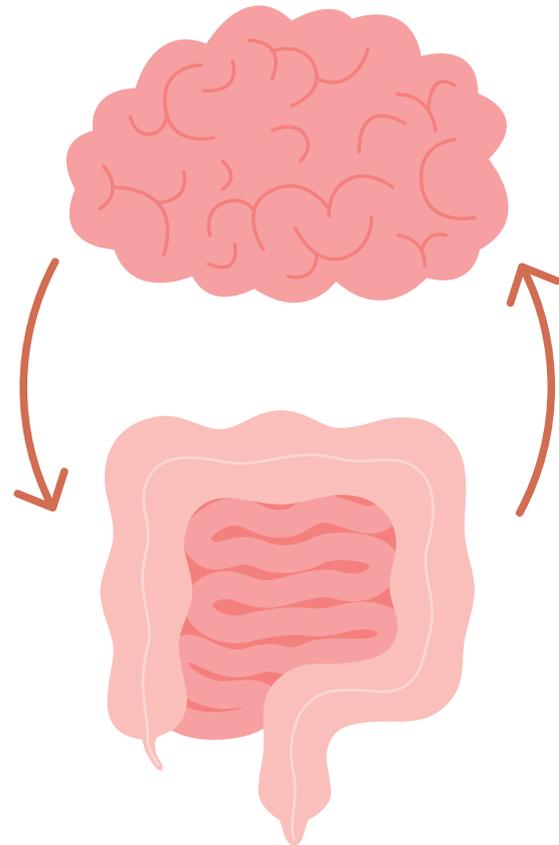


**Figure 2.11:** The relationship between mental wellbeing and mental disorder changes as we journey through life. Many factors play a part in where we fit on the continuum on any given day.

Scientists are researching the link between the brain and gut, with studies continually finding new evidence. Science has discovered that the hippocampus, the brain’s memory and learning centre, shrinks when we have insufficient fruit and vegetables in our diet.

Diet also causes an effect on mood. The better the diet, the better the mental health outcomes. The relationship here is very much cause and effect; that is, diet causes an effect on mood.

Fibre is good for mood. It is seen as the natural ingredient in food that can improve our mental wellbeing. Fibre lowers blood sugar levels, keeps us fuller for longer and keeps our digestive system regular. Fibre plays a role in developing a healthy gut microbiome, and studies are discovering exactly what that relationship between the healthy gut microbiome and the brain is that makes it a feel-good food. We can increase fibre in our diet by including a wide variety of plant-based foods such as fruits, vegetables, nuts, seeds and wholegrains.



**Figure 2.12:** The gut and the brain have a distinct connection.



### Let's talk

How many plant-based foods did you eat last week? What changes do you think you need to make to include 30 different plant-based foods each week?



### Let's talk

Suggest why having a coffee or chocolate bar might make you feel good in the moment but can change your mood shortly after consumption. Discuss ways in which you can change short-term gratification into long-term health benefits.

## Activity 2.7 (Inquiry): Plant-based foods in the Australian Guide to Healthy Eating



Cutting-edge science is discovering the role of diet and its impact on our mood and our brain health. Diet plays a crucial role in reducing symptoms for those with mental health issues and helps to reduce stress, anxiety and depression. Focusing on diet is seen as a first-line therapy to treat mood, with a particular focus on increasing plant-based foods.

- 1 Using the Australian Guide to Healthy Eating, highlight all the plant-based foods on the food model.
- 2 How many of these foods do you eat daily?
- 3 How many of these foods do you eat weekly?
- 4 Dietitians and nutritionists will tell you that you can always make a meal healthier. Explain how you could add more plant-based foods to your diet each day.
- 5 Including more plant-based foods in the diet boosts fibre intake. Outline the role of fibre in the diet.
- 6 By increasing the diversity of vegetables and plant-based foods in our diet, we increase the diversity of bacteria in our gut. Describe the impacts this would have on our gut's microbiome.

There are a number of simple steps that we can take to look after and improve our mental health by simply changing our diet.

- Go for diversity with your foods! The Australian Guide to Healthy Eating helps with this by choosing a variety of plant-based foods from each food group.
- Practise mindful eating. Be present when you eat, savour, enjoy and try not to eat in

front of a television or your phone. Every food has its place, so when you are eating don't forget to really be present with this action and enjoy it.

- Plan your meals and surround yourself with healthy snacks that help you to increase plant-based foods. You will choose healthier options when you are surrounded by them.

## Chapter revision

- The gut microbiome plays an important role in the body, including digesting food, absorbing nutrients and regulating hormones used in the body. The gut is the front line of our immune response system.
- A balance of probiotics and prebiotics in the diet contributes to a healthy gut.
- Eating a wide variety of plant-based foods in the diet helps to maintain a healthy gut microbiome.
- Including probiotics in the diet, such as fermented foods like sauerkraut, and prebiotic foods high in fibre, such as fruits, vegetables, nuts, seeds, legumes and wholegrains, helps to maintain a healthy gut.
- Imbalances in our gut microbiota can affect our physical health and have been linked to a range of conditions, including obesity and a compromised immune system. Consuming a diet high in fibre is important as fibre is the key nutrient protecting physical health.
- A healthy diet, high in fibre, is associated with better mental health outcomes. This relationship is very much cause and effect; that is, diet causes an effect on mood.

### Apply your knowledge

- 1 Why do you think poor diet and mental health are such prominent issues in Australia?
- 2 Describe ways we can improve our mood through food.
- 3 Explain the role of diet and gut microbiota for health.
- 4 'Our physical needs for food sometimes nourish and sometimes harm our bodies.' Explain this statement.
- 5 Discuss the difference between probiotics and prebiotics. Give an example of good food sources for each.
- 6 Suggest why everybody should increase fibre in their diet.

## Practice exam questions



### Question 1 Multiple choice

The nutrient that has a positive influence on the gut microbiome is:

- A Fibre
- B Glucose
- C Saturated fats
- D Polyunsaturated fats

**1 mark**

### Question 2

Explain how diet influences gut microbiota.

**4 marks**

### Question 3

‘Diet is now a recognised modifiable factor in mental health.’

Discuss the role of diet and microbiota for mental health.

**6 marks**

# Chapter 3

## *Understanding the Australian Dietary Guidelines*

### Key knowledge

- The principles of research in the development of the Australian Dietary Guidelines and Australian Guide to Healthy Eating, including recognition of credible sources, evidence-based information and accurate analysis of data.
- The nutritional rationale of the Australian Guide to Healthy Eating, with particular focus on the ways in which food selection can assist in the prevention of obesity and related lifestyle diseases.

### Key skills

- Justify the science behind why the Australian Dietary Guidelines and the Australian Guide to Healthy Eating are credible sources of dietary information.
- Discuss the nutritional rationale of the Australian Guide to Healthy Eating.

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Video 3.1 Chapter Overview

In order to make healthy food choices, we need dietary advice based on the best available scientific evidence on food and health. The Australian Dietary Guidelines (the Guidelines) and the Australian Guide to Healthy Eating have been developed through rigorous research methodology to provide credible, **evidence-based** dietary information. These guidelines provide realistic and practical recommendations to support Australians in making food choices that improve health and wellbeing and can assist in the prevention of lifestyle diseases.



### Get knowledge ready

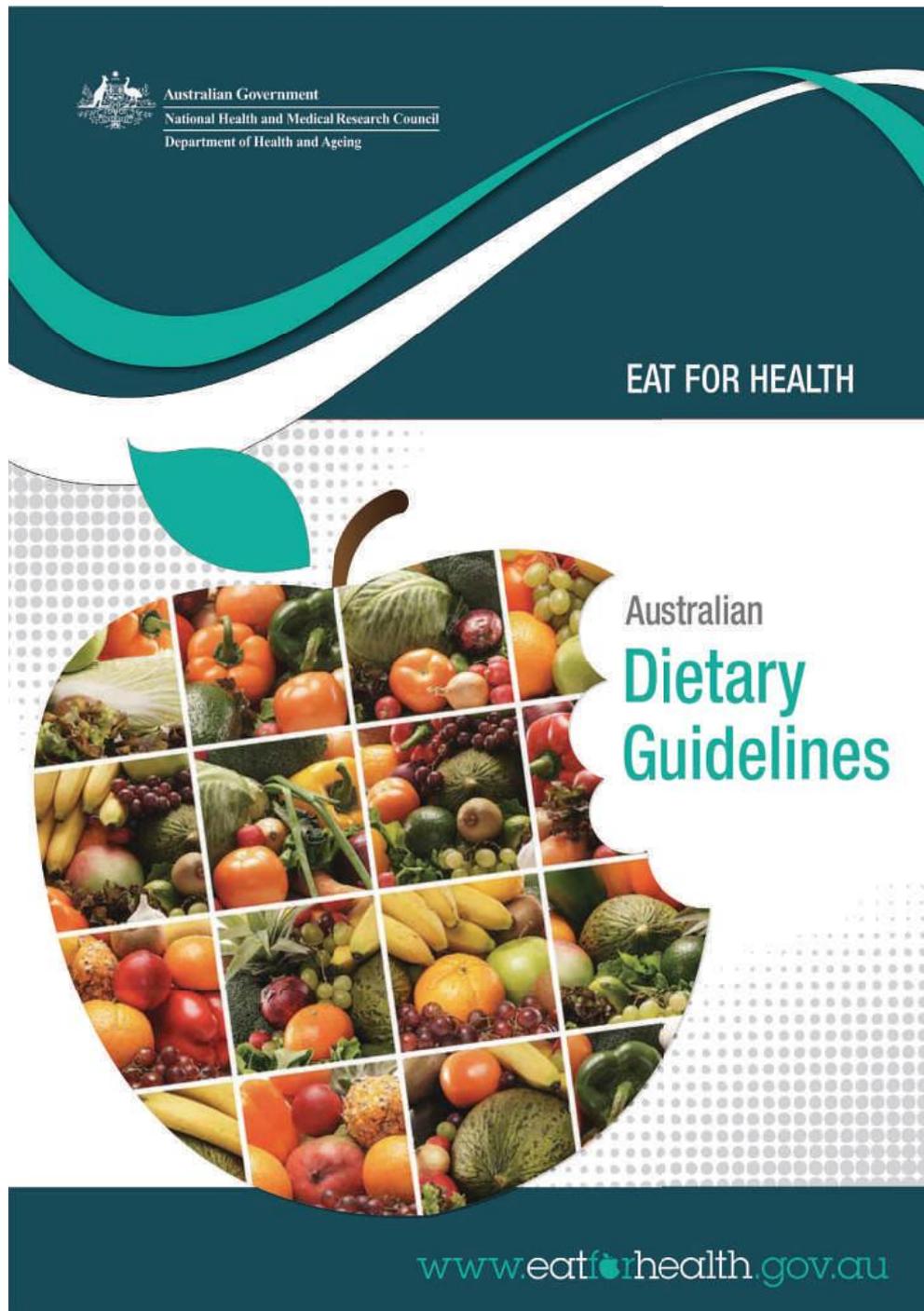
- 1 Explain how you can determine if a source is credible or not.
- 2 List the five food groups and state two key nutrients obtained from each group.
- 3 Discuss the types of foods that are often associated with obesity and related lifestyle diseases.

**evidence-based** the information is supported by the best available current research and data that has been sourced using sound methodology

## The development of the Australian Dietary Guidelines

The Australian Dietary Guidelines are a framework for healthy eating that provide information on the types and amounts of

foods, food groups and dietary patterns to protect against diet-related conditions, chronic disease and promote community health and wellbeing. The Guidelines are based on scientific evidence and expert opinion and are intended to promote healthy eating patterns among all Australians.



**Figure 3.1:** The Australian Dietary Guidelines  
Source: National Health and Medical Research Council

The Australian Dietary Guidelines currently in use were published in 2013 by the National Health and Medical Research Council (NHMRC) with funding from the Australian Government Department of Health and Ageing. The principles of research used in the development of the Guidelines ensure that the information provided is accurate, methodically researched and evidence-based.

**methodologist**  
oversees research to ensure that the collection and analysis of data is conducted in an appropriate, transparent, unbiased and accurate manner

**Nutrient Reference Values (NRV)**

recommendations of the amounts of nutrients required on an average daily basis for adequate physiological function and the prevention of disease

**systematic literature review**

a comprehensive and objective study that uses explicit repeatable methodology in order to identify, assess and synthesise existing relevant literature on a specific topic in order to answer a clearly formulated question

In 2008, the NHMRC commissioned an extensive review of the 2003 Guidelines, establishing the Dietary Guidelines Working Committee. Committee members were multidisciplinary, coming from a diverse range of fields relevant to food and health. These included government agencies, the public health sector, peak professional bodies, advocacy groups and educational institutions. The committee was assisted by an expert **methodologist** to ensure that the review was undertaken in a transparent, accurate and unbiased manner. The Working Committee considered the following when translating the evidence that went into the formation of the Guidelines:

- the 2003 Guidelines and their supporting documentation
- the Evidence Report
- the **Nutrient Reference Values (NRV)** Document
- the Food Modelling System
- key authoritative government reports and additional literature.



**Let's talk**

The Working Committee consisted of 13 members from a range of fields and was assisted by an expert methodologist. Discuss the benefits of having a multidisciplinary committee.

**The Evidence Report**

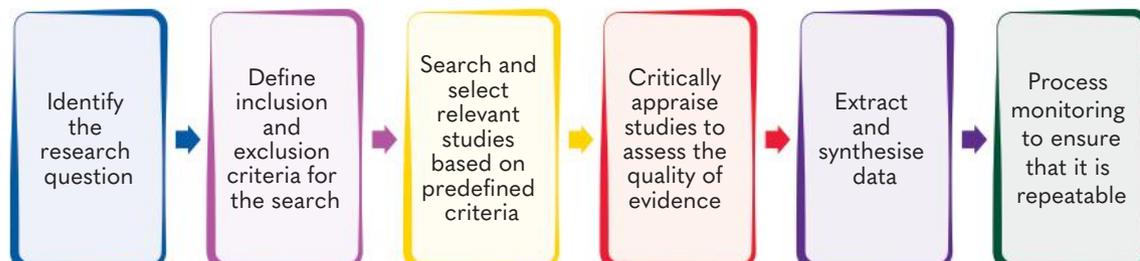
The Working Committee agreed that the revised guidelines should build upon the evidence base from previous versions. It commissioned the Dietitians Association of Australia (DAA) to undertake a series of **systematic literature reviews** to answer targeted questions on food, diet and disease/health relationships.

The reviews considered only evidence that was published from peer-reviewed literature spanning from 2002 to 2009. This was to develop an understanding of updated research that had occurred since the publication of the 2003 Guidelines.



**Let's talk**

Why is it so important to review and understand updated research? Why do you think research changes over time?



**Figure 3.2:** Steps undertaken in a systematic literature review

It was important for the Working Committee to understand whether associations between food, dietary patterns and health outcomes had strengthened, weakened or remained unchanged.

The previous Guidelines provided recommendations based on nutrients and health outcomes. The Working Committee determined that the literature review it was to undertake should focus on food, most especially **whole foods**, rather than isolated nutrients.

Additional information was also sought on physical activity, weight gain and energy balance; infant, child and adolescent growth rates; economic, physical and psychosocial

barriers and enablers; food safety, preparation and storage; environmental sustainability; and past food selection guides.

The evidence from the reviews was assessed according to NHMRC levels and grades. The levels focused on the type of research that was conducted. This ranged from a systematic review of randomised controlled trials (Level I) down to case studies (Level IV).

Data was graded based on its evidence base, consistency, clinical impact, generalisability and applicability. Grading ranged from A, indicating that the body of evidence can be trusted to guide practice, to D, indicating that the body of evidence is weak and recommendations must be applied with caution.

**whole foods**  
this refers to foods themselves (e.g. fruit, vegetables, bread, meat and milk) and not the food components they contain, such as fibre, protein, iron and calcium

2.1 VEGETABLES and CORONARY HEART DISEASE		
<i>Does a particular intake of vegetables affect the risk of coronary heart disease?</i>		
<b>Evidence Statement</b>	Consumption of each additional daily serve of vegetables is associated with a reduced risk of coronary heart disease.	
<b>Grade</b>	B	
<b>Component</b>	<b>Rating</b>	<b>Notes</b>
Evidence base	Good	Level III evidence from two meta-analyses, each with nine cohort studies (with most studies in common and medium risk bias) and two cohort (low risk bias) and one case control and one RCT (medium risk bias).
Consistency	Good	Meta-analyses and case control and RCT protective (and in each study) but cohort studies show no effect.
Clinical impact	Good	15 to 25% reduction with additional serve.
Generalisability	Good	US, Europe.
Applicability	Excellent	Australian adults of both sexes.

**Figure 3.3:** Vegetable evidence statement. The rigorous and methodical analysis of data conducted in the systematic literature reviews ensures that the evidence statements that inform the Guidelines, such as the one above, are based on the best available scientific evidence.

Over 55 000 scientific journal articles were retrieved and examined during this process.



### Let's talk

Longitudinal randomised controlled trials (RCT) provide the highest level of evidence regarding the effects of dietary intake on health.

Long-term observational studies are primarily used to determine the effects of dietary intake on health.

Discuss why RCT are rarely implemented when researching how dietary intake may influence disease. Discuss why the preference would be to use long-term observational studies.

Rigorous and methodical analysis of data, overseen by a team of nutrition and medical experts, ensures that the dietary advice provided in the Guidelines is based on the best available scientific evidence, from credible sources, which reflects best practice standards.

### Food Modelling System

The Food Modelling System was developed in order to translate the NRV into dietary models.

The models aim to provide realistic and practical diets by considering issues such as cultural diversity, socio-economic status, environmental sustainability and food availability within Australia.



**Figure 3.4:** The Food Modelling System converted the nutrient requirements for groups of people based on their age, gender, lifestyle, body size and activity levels into the amounts of foods that should be consumed to promote health and wellbeing and prevent diet-related chronic disease.

Foundation Diets and Total Diets were then constructed. These were used to inform the Australian Dietary Guidelines and the Australian Guide to Healthy Eating.

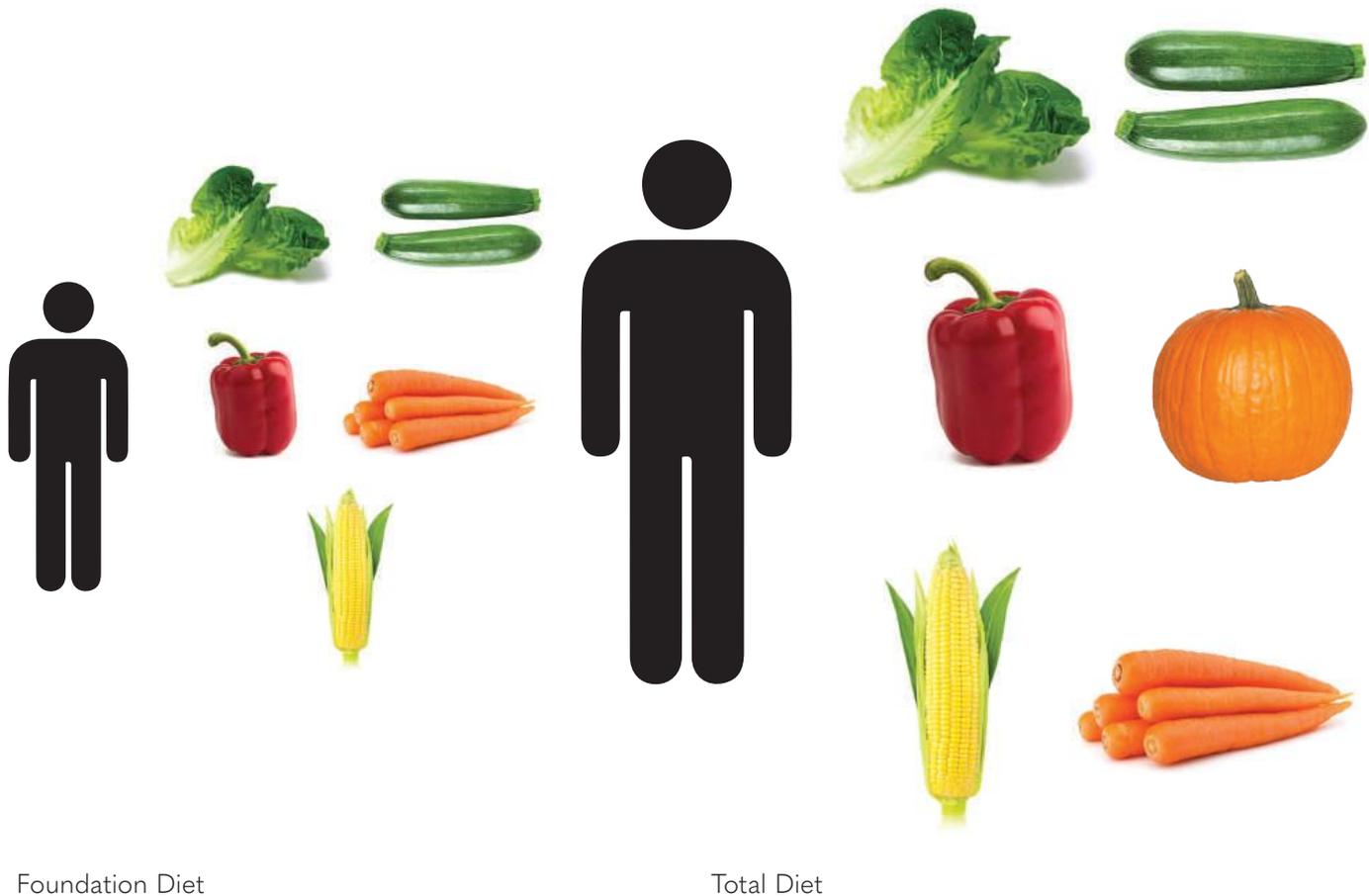
- The Foundation Diet details the serve sizes and number of serves of different types of foods required for the smallest and least active people within each age and sex group.
- The Total Diets are variations of the Foundation Diets for people who have greater energy needs due to their physical activity and/or height within each age and sex group.

The diets were constructed by specialist consultants and informed by the Evidence Report. Expertise was drawn from the clinical and public health sector, the dietetics profession, food industry, legislative sector and consumer groups.

Public consultation was sought to review the dietary models and recommendations within the Guidelines. Submissions were made from individuals, government departments, industry groups and other organisations such as Food Standards Australia New Zealand (FSANZ), the Heart Foundation and Diabetes Australia. Relevant adjustments were made before the NHMRC project team finalised the Guidelines.

### Principles of research

The extensive review process and the subsequent development of the 2013 Australian Dietary Guidelines ensured that they provided the best available evidence-based information at the time of publication. Their development was overseen by trustworthy, non-biased independent sources who were experts in their field.



**Figure 3.5:** Foundation Diet and Total Diet

Data that informed the Guidelines was rigorously and methodically analysed through large-scale systematic literature reviews using high-quality methodology to ensure that the information was evidence-based, up to date,

reliable and accurate. An overview of the credible sources, evidence-based information and accurate analysis of data can be seen in Table 3.1.

**Table 3.1:** Credible sources, evidence-based information and accurate analysis of data

Credible sources	Evidence-based information	Accurate analysis of data
<ul style="list-style-type: none"> <li>National Health and Medical Research Council</li> <li>The Dietary Guidelines Working Committee comprised of experts in the field of health, nutrition and food</li> <li>Dietitians Association of Australia</li> <li>Consultation with food and industry experts</li> </ul>	<ul style="list-style-type: none"> <li>Evidence Report containing over 55 000 peer-reviewed journal articles</li> <li>2003 Guidelines and their support documentation</li> <li>NRV Document</li> <li>Food Modelling System</li> <li>Key authoritative government reports</li> </ul>	<ul style="list-style-type: none"> <li>Rigorous research methodology used in the systematic literature reviews</li> <li>Evidence graded using NHMRC protocols</li> <li>Assistance of expert methodologist to oversee the Evidence Report processes</li> </ul>

## The Australian Dietary Guidelines (2013)

The Australian Dietary Guidelines provide realistic and practical recommendations to offer guidance on foods, food groups and dietary patterns in order to reduce the risk of diet-related conditions and chronic disease.

A healthy diet works to prevent and manage health risk factors such as these and therefore plays a vital role in reducing the total **burden of disease** within Australia.

Ischaemic heart disease has been the leading cause of death within Australia since 2006 (ABS, *Causes of Death, Australia*, 2020), while **cardiovascular disease** is leading the total burden of disease within the country (AIHW, *Australia's Health 2018*, 2018).

Rates of overweight and obesity continue to rise, with 67 per cent of Australian adults and 24.9 per cent of children aged 5–17 being overweight or obese (ABS, *National Health Survey*, 2018).

The Australian Dietary Guidelines recognise that nutrition contributes significantly to quality

of life, protection against disease and reducing premature death, and is essential for the normal growth and development of children.

Promoting health and wellbeing and reducing the risk of diet-related conditions and chronic disease such as obesity, cardiovascular disease, type 2 diabetes, **hypertension** and some types of **cancer** is the primary aim of the Australian Dietary Guidelines.

The Guidelines provide population-level health advice that applies to all healthy Australians, including those with common health conditions such as being overweight.

The Guidelines are not intended for people who require specialised dietary advice for a medical condition or vulnerable groups, such as the frail elderly, who may be at risk of malnutrition.

People who require specialised diets should seek guidance from an accredited practising dietitian who has specific clinical training to prescribe an individual tailored diet.

The information and recommendations in the Australian Dietary Guidelines (Table 3.2)

### burden of disease

a measure of the impact of disease and injuries by calculating the years of healthy life lost due to premature death or living with a disability due to illness or injury

### cardiovascular disease

includes all diseases and conditions of the heart and blood vessels (including heart, stroke and vascular diseases) caused mainly by blood supply to the heart, brain and legs

### hypertension

persistently elevated or high blood pressure

### cancer

a range of diseases categorised by uncontrolled and abnormal cell growth

are designed to help health professionals, policymakers, educators and the Australian public make informed decisions regarding their food choices.

There are five guidelines or principal recommendations included in the Australian Dietary Guidelines.

**Table 3.2:** The Australian Dietary Guidelines

<b>Guideline 1</b>	<p>To achieve and maintain a healthy weight, be physically active and choose amounts of nutritious food and drinks to meet your energy needs.</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• Older people should eat nutritious foods and keep physically active to help maintain muscle strength and a healthy weight.</li> </ul>
<b>Guideline 2</b>	<p>Enjoy a wide variety of nutritious foods from these five groups every day:</p> <ul style="list-style-type: none"> <li>• Plenty of vegetables, including different types and colours, and legumes/beans</li> <li>• Fruit</li> <li>• Grain (cereal) foods, mostly wholegrain and/or high cereal fibre varieties, such as breads, cereals, rice, pasta, noodles, polenta, couscous, oats, quinoa and barley</li> <li>• Lean meats and poultry, fish, eggs, tofu, nuts and seeds, and legumes/beans</li> <li>• Milk, yoghurt, cheese and/or their alternatives, mostly reduced fat (reduced fat milks are not suitable for children under the age of 2 years)</li> </ul> <p>And drink plenty of water.</p>
<b>Guideline 3</b>	<p>Limit intake of foods containing saturated fat, added salt, added sugars and alcohol.</p> <p><b>a</b> 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.</p> <ul style="list-style-type: none"> <li>• Replace high fat foods which contain predominantly saturated fats such as butter, cream, cooking margarine, coconut and palm oil with foods which contain predominantly polyunsaturated and monounsaturated fats such as oils, spreads, nut butters/pastes and avocado.</li> <li>• Low fat diets are not suitable for children under the age of 2 years.</li> </ul> <p><b>b</b> Limit intake of foods and drinks containing added salt.</p> <ul style="list-style-type: none"> <li>• Read labels to choose lower sodium options among similar foods.</li> <li>• Do not add salt to foods in cooking or at the table.</li> </ul> <p><b>c</b> Limit intake of foods and drinks containing added sugars such as confectionery, sugar-sweetened soft drinks and cordials, fruit drinks, vitamin waters, energy and sports drinks.</p> <p><b>d</b> 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.</p>
<b>Guideline 4</b>	Encourage, support and promote breastfeeding.
<b>Guideline 5</b>	Care for your food; prepare and store it safely.

Source: National Health and Medical Research Council

**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**

A healthy weight is associated with normal growth and development in children and a reduced risk of lifestyle diseases among people of all ages. Food intake and physical activity are key behavioural influences related to weight.

Healthy weight varies from person to person and is dependent on factors such as their lifespan stage. The common approach to

measuring a healthy weight in adults is to use the **body mass index (BMI)**. BMI is determined through the following equation:

$$\text{BMI} = \text{weight (kg)} / \text{height}^2 \text{ (m)}$$

A person with a BMI:

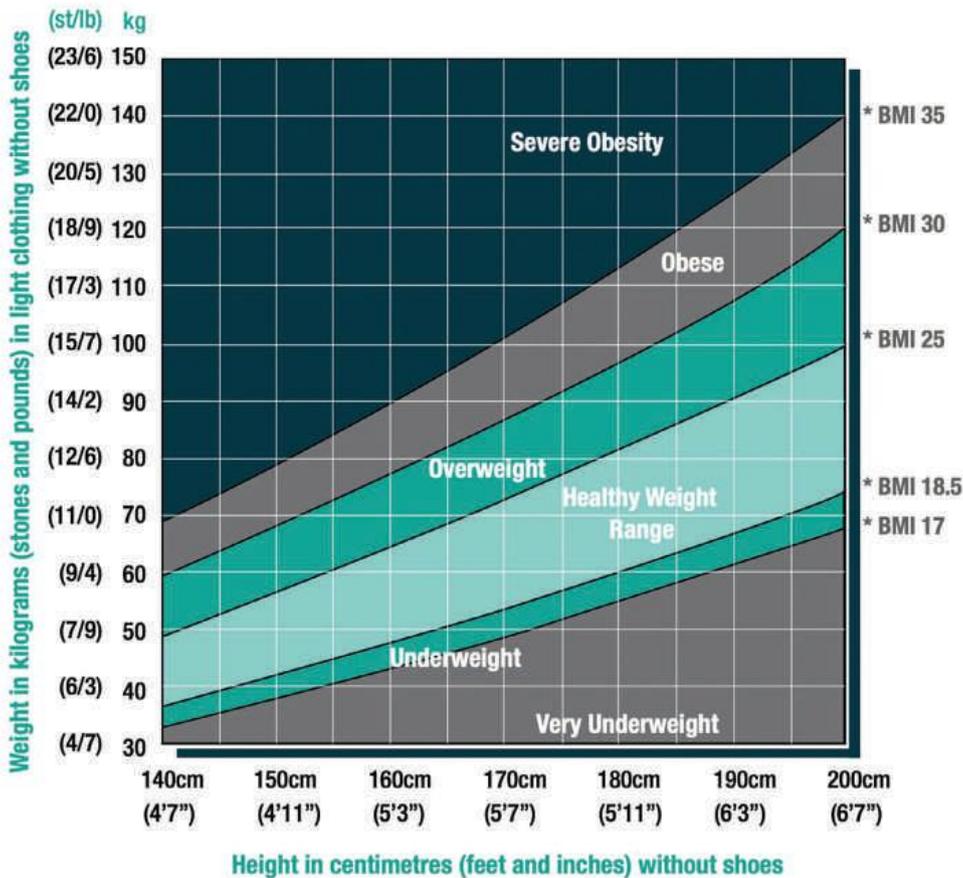
- between 25 to less than 30 is considered overweight
- 30 or more is considered obese.

Over time, increased energy intake without an increase in physical activity creates an energy imbalance resulting in weight gain. People aged 5–17 years should be accumulating

**body mass index (BMI)**

BMI = weight (kg) / height<sup>2</sup> (m); a statistical measure of body mass calculated by dividing weight (in kilograms) by height (in metres) squared. A score of 18.5–24.9 is considered a healthy weight

**AIM FOR A HEALTHY WEIGHT: BMI CHART FOR ADULTS**



**Figure 3.6:** BMI chart for adults  
Source: National Health and Medical Research Council

Another way for adults to measure their weight-related health risk is with a tape measure. Measure halfway between your lowest rib and the top of your hip bone, roughly in line with your belly button.

Your waist measurement	Your weight-related health risk
Men less than 94cm Women less than 80cm	Your weight-related health risk is low.
Men between 94–102cm Women between 80–88cm	Your weight-related health risk is increased, especially if your BMI is more than 25 too.
Men more than 102cm Women more than 88cm	Your weight-related health risk is high.



**Figure 3.7:** Waist circumference is used in conjunction with BMI to monitor weight in adults. For people under the age of 18, monitoring growth and healthy weight is assessed by the use of standard growth charts and a BMI-for-age chart.

Source: National Health and Medical Research Council

60 minutes or more of moderate to vigorous physical activity each day, while the recommendation for adults is to accumulate 150–300 minutes (2.5–5 hours) of moderate activity or 75–150 minutes (1.25–2.5 hours) of vigorous-intensity activity each week. This should be combined with a dietary pattern that meets one’s nutrient requirements and does not exceed total energy expenditure.

The consumption of specific foods and food groups is associated with the risk of excess weight gain, while other food types reduce this risk. Foundation Diets developed by the Food Modelling System provide nutrient requirements with minimum energy intake for the smallest, least active person in each

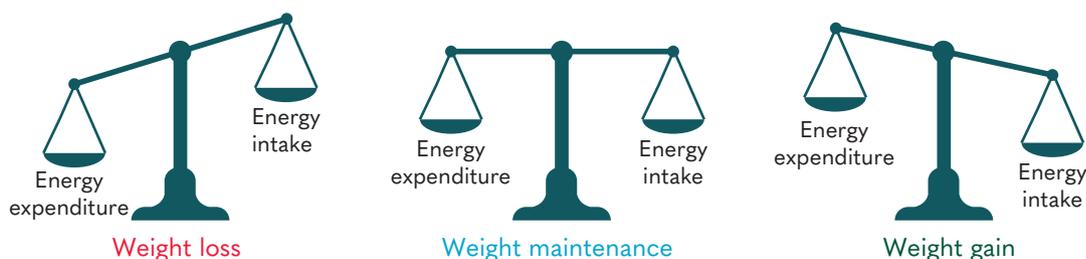
age and sex group. In order to achieve and maintain a healthy weight, the quantities of foods outlined in these diets should not be exceeded and consumption of nutrient-poor **discretionary foods** and drinks should be limited.

Portion size is also a major contributor to increased energy consumption. The consumption of fruit, vegetables and wholegrain foods is associated with a reduced risk of weight gain. These high-fibre foods have an increased satiety value, which helps manage appetite and hunger. Nutritious foods of lower energy density should be selected in order to optimise growth and development and maintain a healthy weight.

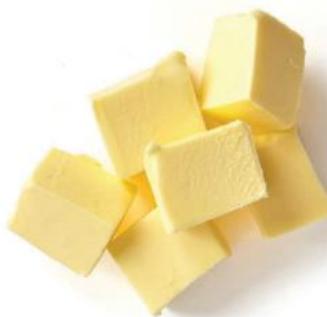
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**discretionary foods**  
foods and drinks not necessary to provide the nutrients the body needs. These foods are high in saturated fats, sugars, salt and/or alcohol, and are therefore described as energy-dense

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**Figure 3.8:** Energy balance and weight gain



**Figure 3.9:** Foods contributing to an increased energy intake include those high in saturated fat and sugar-sweetened drinks. Examples are processed meats, butter, pies, energy drinks, cordials and soft drinks.

### Guideline 2: Enjoy a wide variety of nutritious foods from these five food groups every day

Eating a variety of food from the five food groups, in the proportions recommended, is essential for health and wellbeing, development and assisting in the prevention of lifestyle diseases. The Australian Dietary Guidelines group foods primarily based on their type and nutrient contribution, while the serve size for each individual food within a group is determined by its energy and nutrient density.



#### Let's talk

The proportion of daily energy intake from discretionary foods is 41 per cent for people aged 14–18 and 36 per cent for people over 18 years (approximately 6–8 and 5–7 serves per day, respectively).

Are you selecting discretionary foods over nutrient-dense foods?

Think, pair, share some short-term and long-term consequences that may result from this nutritional imbalance.

**Table 1** Nutritional characteristics of the Five Food Groups

Food Group name	Grain (cereal) foods, mostly wholegrain and/or high cereal fibre varieties	Vegetables and legumes/beans	Fruit	Milk, yoghurt, cheese and/or alternatives, mostly reduced fat	Lean meat and poultry, fish, eggs, tofu, nuts and seeds, legumes/beans
<b>Main distinguishing nutrients</b>	carbohydrate protein iron dietary fibre thiamin folate iodine	beta-carotene and other carotenoids vitamin C folate dietary fibre	vitamin C dietary fibre	calcium protein riboflavin vitamin B <sub>12</sub>	protein iron zinc vitamin B <sub>12</sub> (animal foods only) long chain omega 3 fatty acids
<b>Other significant nutrients*</b>	energy magnesium zinc riboflavin niacin vitamin E	Carbohydrate (potato, sweet potato, sweet corn, legumes) magnesium iron potassium	carbohydrate folate beta-carotene potassium	energy fat carbohydrate magnesium zinc potassium	dietary fibre (plant foods only) energy essential fatty acids niacin vitamin E (seeds, nuts)

\* Some foods from the Five Food Groups (such as some bread, breakfast cereal and most cheese) can also contribute significant amounts of sodium

**Figure 3.10:** A dietary pattern should include a variety of foods within each food group, particularly within the plant-based groups (vegetables, fruits and grains), to ensure that all nutrient requirements are met. A dietary pattern consisting of variety is associated with a reduced risk of lifestyle diseases and improved health outcomes.

Source: National Health and Medical Research Council

## The Australian Guide to Healthy Eating

The **Australian Guide to Healthy Eating** represents the proportion of the five food groups recommended for consumption each day. The model shows a circle segmented into five, with each segment representing one of the five food groups. The size of the segment indicates the recommended proportion that the particular food group should contribute to the daily diet.

The model includes unsaturated spreads and oils that should only be used in small amounts, as well as discretionary choices that should only be consumed sometimes and in

small amounts. The model also encourages people to drink plenty of water.

The range of foods illustrated in the Australian Guide to Healthy Eating were selected based on foods commonly consumed in Australia, affordability, accessibility, cultural diversity, biological variety and nutritional density. Obtaining sufficient quantities of all nutrients requires eating a variety of foods within each food group every day and across the week. The proportions do not equate to the recommended serves of foods as these differ depending on age, sex and energy requirements. This is explored in Chapter 4.

## Australian Guide to Healthy Eating

a food selection guide that visually represents the proportion of the five food groups recommended for consumption each day



Australian Government  
National Health and Medical Research Council  
Department of Health and Ageing

www.eatforhealth.gov.au

# Australian Guide to Healthy Eating

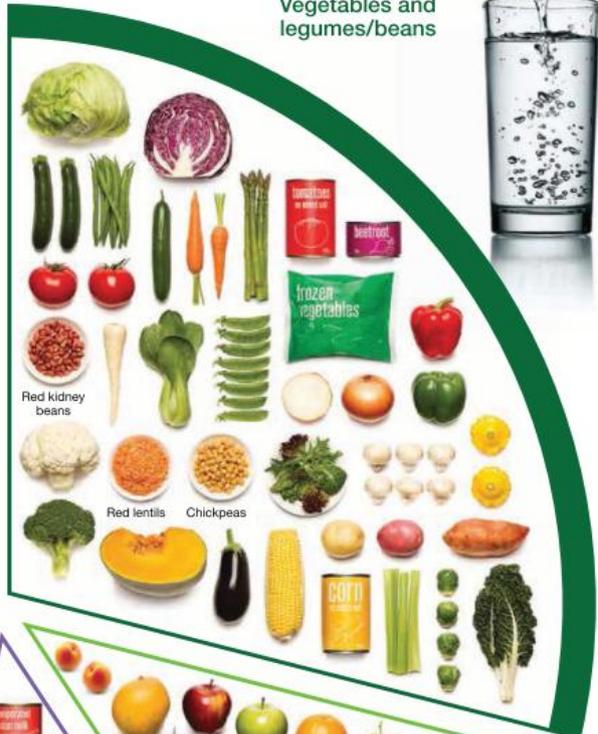
Enjoy a wide variety of nutritious foods from these five food groups every day.

Drink plenty of water.

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



Vegetables and legumes/beans



Lean meats and poultry, fish, eggs, tofu, nuts and seeds and legumes/beans



Milk, yoghurt, cheese and/or alternatives, mostly reduced fat



Fruit



Use small amounts



Only sometimes and in small amounts





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# Aboriginal and Torres Strait Islander Guide to **Healthy Eating**

Eat different types of foods from the five food groups every day.



Drink plenty of water.



**Figure 3.11:** The Australian Guide to Healthy Eating and the Aboriginal and Torres Strait Islander Guide to Healthy Eating  
Source: National Health and Medical Research Council



### Let's talk

The Australian Dietary Guidelines produced the Aboriginal and Torres Strait Islander Guide to Healthy Eating. What similarities and differences can you see between the two food selection models?

**phytochemicals** compounds found in plant material that can provide health benefits and act as antioxidants

### Vegetables, including different types and colours, and legumes/beans

Consuming different types and colours of vegetables and legumes/beans can provide

a range of nutrients and **phytochemicals** that help prevent weight gain and a range of lifestyle diseases. Vegetables come from different parts of plants, including plant leaves, roots, tubers, flowers, stems, seeds (legumes) and shoots. Different colours, such as red capsicums, orange pumpkins, brown mushrooms and green broccoli, provide a variety of nutrients and phytochemicals. Fried vegetables, such as potato chips and crisps, are not included in this food group as they are considered a discretionary choice due to their high energy density, salt and fat content.

## What is a serve of vegetables?

A standard serve is about 75g (100–350kJ) or:

- ½ cup cooked green or orange vegetables (for example, broccoli, spinach, carrots or pumpkin)
- ½ cup cooked dried or canned beans, peas or lentils (preferably with no added salt)
- 1 cup green leafy or raw salad vegetables
- ½ cup sweet corn
- ½ medium potato or other starchy vegetables (sweet potato, taro or cassava)
- 1 medium tomato



**Figure 3.12:** What is a serve of vegetables?  
Source: National Health and Medical Research Council

### Fruit

The consumption of fruit may help reduce the risk of cardiovascular disease, some cancers and assist in maintaining a healthy weight due to its high fibre, vitamin and phytochemical profile. Eating whole fresh fruit is the preferred option as most of the dietary fibre found in fruit is lost during juicing.

- Frequent consumption of fruit juice can increase the risk of dental decay as the acidity erodes tooth enamel.
- Dried fruit is higher in kilojoules due to the loss of water content and can increase the risk of dental decay due to sticking to teeth.
- If selecting canned fruits, it is best to choose varieties canned in natural juice or water instead of syrup.

## 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)



**Figure 3.13:** What is a serve of fruit?

Source: National Health and Medical Research Council



**Figure 3.14:** Eating a wide variety of different colours and types of fruits and vegetables provides the body with essential nutrients and phytochemicals to help prevent lifestyle diseases.

- Choosing different coloured fruits will increase the variety of nutrients within the diet.

**The importance of fruits and vegetables**

Fruits and vegetables are nutrient-dense and high in fibre. They contribute to satiety, which can assist in appetite and hunger management. Feeling full reduces the likelihood of greater quantities of food being consumed, or the inclusion of discretionary foods, therefore limiting weight gain. As there is a strong association between body weight and type 2 diabetes, the consumption of fruits and vegetables may reduce the risk of this disease. The high fibre content decreases the risk of colorectal cancer as it reduces build-up

of harmful toxins in the bowel and assists in regular healthy bowel movements.

Phytochemicals found in fruits and vegetables offer protective factors against some types of cancer as they reduce the build-up of potentially harmful free radicals (molecules that cause damage to body cells). Some phytochemicals and vitamins such as C and E can act as antioxidants, which prevent or slow damage to cells caused by free radicals by neutralising them. Free radicals encourage **low-density lipoprotein (LDL)** cholesterol to stick to arterial walls. Therefore, the reduction in free radicals reduces the risk of plaque build-up in arteries, helping prevent cardiovascular disease.

**low-density lipoprotein (LDL)** known as 'bad' cholesterol as it tends to accumulate in the vessel walls, forming plaque and hardening the arteries

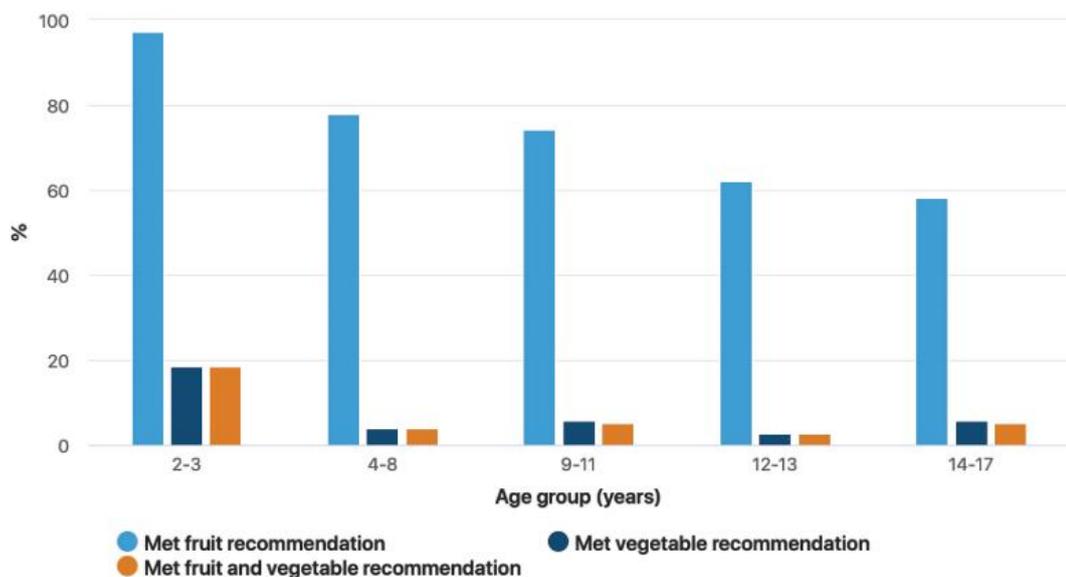
**Activity 3.1 (Data analysis): Children's fruit and vegetable intake**



Eating a wide variety of nutritious foods is needed to ensure optimum nutrition to support the healthy growth and development of children. As Figure 3.15 shows, many Australians are not meeting the Australian Dietary Guidelines daily serves recommendations.

- 1 Using the data in Figure 3.15, describe how the consumption of fruit changes with age.
- 2 Suggest a possible reason for the change described in question 1.
- 3 Explain how the consumption of fruits and vegetables can assist in the prevention of lifestyle diseases and aid in childhood development.

**Children aged 2-17 years - proportion meeting fruit and vegetable intake recommendations, 2017-18**



**Figure 3.15:** Children's risk factors 2017-18 financial year

Source: <https://www.abs.gov.au/statistics/health/health-conditions-and-risks/childrens-risk-factors/latest-release>



Wholegrain options provide key nutrients such as:

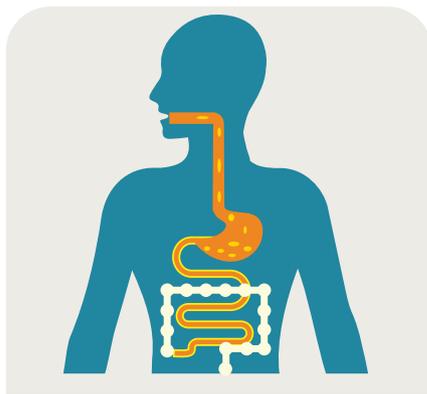
- starch (complex carbohydrate)
- dietary fibre
- protein
- B group vitamins
- vitamin E
- iron
- magnesium
- phosphorus
- zinc.

There is evidence of a probable association between the consumption of wholegrain/high-fibre foods and the reduced risk of weight gain, cardiovascular disease, type 2 diabetes and some types of cancers.

Soluble fibre found in barley and oats:

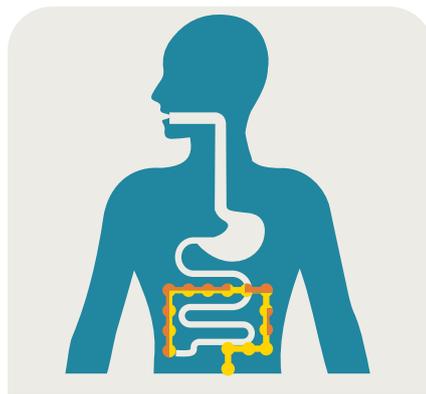
- reduces the risk of weight gain, cardiovascular disease and type 2 diabetes as it has favourable effects on satiety, blood cholesterol and glucose levels
- dissolves in water to form a thick gel-like substance that slows down digestion, helping people feel fuller for longer
- increases the absorption of LDL cholesterol, therefore helping to lower blood cholesterol levels.

The consumption of oats slows the rate of glucose absorption, therefore reducing the requirement of insulin. Soluble fibre and resistant starch have prebiotic effects, feeding the healthy bacteria in the large intestine to reduce harmful toxins and protect against colorectal cancer.



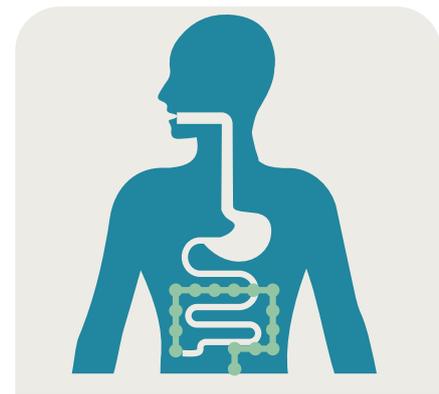
### Soluble fibre

- Gel-like
- Slows down digestion
- Lowers blood glucose levels
- Lowers LDL cholesterol
- Foods: wholegrains (especially oats, barley and rye), legumes, some fruits, vegetables, nuts and seeds



### Insoluble fibre

- Bulking fibre
- Promotes regular bowel movements
- Foods: wholegrains (brown rice, rye, barley) and bran-based cereals, couscous, legumes, nuts and the skins of vegetables and fruits



### Resistant starch

- Prebiotic
- Feeds probiotics (healthy bacteria) in the large intestine
- Foods: legumes, firm bananas, cold cooked potatoes, wholegrains (brown rice, breads, wholegrain pasta)

**Figure 3.17:** Dietary fibre and resistant starch

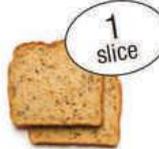
Insoluble fibre absorbs water and adds bulk to faeces. This promotes regular bowel movements, reducing problems such as constipation and haemorrhoids. It is

associated with the reduced risk of colorectal cancer as it aids in the removal of harmful toxins found within the large intestine.

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

A standard serve is (500kJ) or:

1 slice (40g)	bread
$\frac{1}{2}$ medium (40g)	roll or flat bread
$\frac{1}{2}$ cup (75-120g)	cooked rice, pasta, noodles, barley, buckwheat, semolina, polenta, bulgur or quinoa
$\frac{1}{2}$ cup (120g)	cooked porridge
$\frac{2}{3}$ cup (30g)	wheat cereal flakes
$\frac{1}{4}$ cup (30g)	muesli
3 (35g)	crispbreads
1 (60g)	crumpet
1 small (35g)	English muffin or scone



1 slice



$\frac{1}{2}$  cup cooked



$\frac{2}{3}$  cup





$\frac{1}{2}$  cup cooked

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

**Figure 3.18:** What is a serve of grain (cereal) food?

Source: National Health and Medical Research Council

### ***Lean meat and poultry, fish, eggs, nuts and seeds, and legumes/beans***

Lean meats, poultry, fish, eggs, nuts and seeds, and legumes/beans are protein-rich foods that are an important component of the Australian diet. Besides protein, these foods provide a wide variety of nutrients, such as iron, zinc and other minerals, vitamin B<sub>12</sub> and essential fatty acids, including omega 3.

Processed and cured meats such as ham, bacon and salami are not included in this food group and are considered discretionary choices due to their high amounts of added salt and saturated fat. When selecting meat and poultry options, skin and excess visible fat should be removed prior to cooking in order to reduce the amount of saturated fat consumed.



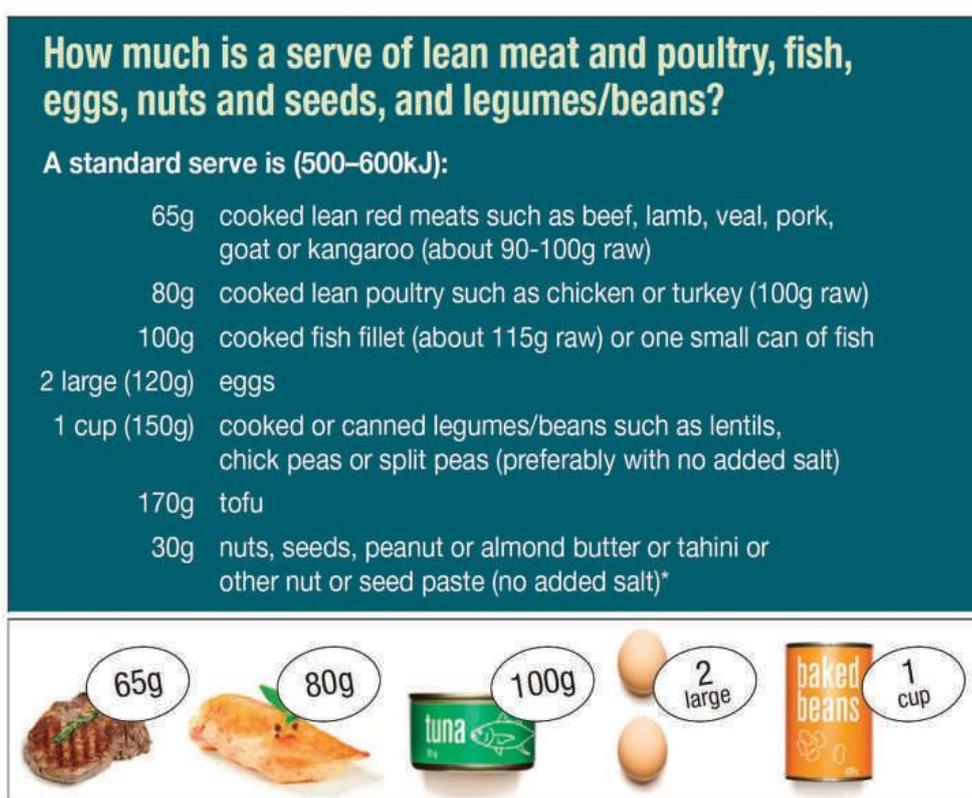
**Figure 3.19:** Eating fish reduces the risk of cardiovascular disease due to the protective effects of omega-3 fatty acids. These fatty acids reduce blood clots and inflammation while increasing **high-density lipoproteins (HDL)**, or good cholesterol, in the body.

**high-density lipoprotein (HDL)** known as 'good' cholesterol, HDLs recover cholesterol from cells, vessel walls and other lipoproteins to take back to the liver for disposal. HDLs tend to prevent or reverse the build-up of plaque in the arteries



People who follow a vegan diet should consume a diverse range of nuts, seeds and legumes/beans as they provide a variety of nutrients without coming from animal sources. Vitamin B<sub>12</sub> is not reliably supplied by plant-based sources; therefore, foods fortified with B<sub>12</sub> or B<sub>12</sub> supplements may be needed by people who follow vegan dietary patterns.

**Figure 3.20:** The consumption of lean red meats should not exceed 100/120 g per day as this amount is associated with an increased risk of colorectal cancer.



\*Only to be used occasionally as a substitute for other foods in the group

**Figure 3.21:** How much is a serve of lean meat and poultry, fish, eggs, nuts and seeds, and legumes/beans?  
Source: National Health and Medical Research Council

### ***Milk, yoghurt, cheese and/or their alternatives***

Milk, yoghurt, cheese and fortified plant-based alternatives are high in calcium, protein, iodine, vitamins A, B<sub>2</sub> and B<sub>12</sub>, and zinc. It is recommended that people over the age of two consume reduced fat varieties to reduce energy and saturated fat intake. Calcium-enriched milk products such as soy, oat, almond and rice milk provide alternatives

for people who do not drink milks from animal sources. Butter, cream and ice cream are considered discretionary choices and are not included in this group due to their high amounts of added sugar and saturated fat.

The consumption of reduced fat dairy foods reduces the risk of cardiovascular disease, type 2 diabetes, hypertension and some types of cancer.



**Figure 3.22:** Nutrients found in dairy foods such as milk and yoghurt have been shown to improve blood lipid profiles, increase insulin sensitivity, assist in blood pressure management and provide anti-inflammatory effects. The consumption of calcium-rich foods is also associated with improved bone mineral density.

### *Drink plenty of water*

Water is essential for life and is required by the body to aid in chemical reactions; digestion, absorption and transportation of nutrients; elimination of waste products; and the regulation of body temperature. Fluoridation of tap water assists in the prevention of tooth decay as fluoride helps to strengthen the tooth's mineral structure. Choosing water as the preferred drink throughout the day will assist in hydration.

### Activity 3.3 (Practical): Recipe modification



Tuna mornay is a popular meal choice for many Australian households. Take a look at the simple changes you can make to the tuna mornay recipe on page 71 to increase the serves of vegetables, reduce the amount of fat and increase the fibre content.

Prepare both recipes in class, then answer the questions on page 72.

### 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



**Figure 3.23:** What is a serve of milk, yoghurt, cheese and/or alternatives?

Source: National Health and Medical Research Council

# Tuna mornay

Serves 2

## Ingredients



250 g dried spiral pasta



80 g butter



¼ cup plain flour



1½ cups pure cream



1 cup full cream milk



1 cup grated cheese



1 brown onion, finely diced



425 g can tuna in oil, drained and flaked



1 cup fresh breadcrumbs



½ cup parmesan cheese

## Method

- Preheat the oven to 180°C fan bake. Grease a 2 L capacity ovenproof dish. Cook the pasta in a saucepan of salted boiling water until al dente. Drain.
- Melt 30 g of butter in a saucepan over a medium heat. Add the flour and cook, stirring, for 1 minute. Remove from the heat. Gradually stir in the combined cream and milk. Return to the heat. Cook, stirring constantly, for 3 minutes or until the sauce boils and thickens. Stir in the grated cheese and season with salt and pepper.
- Meanwhile, melt 20 g of butter in a small frying pan over a medium heat. Add the onion. Cook until translucent, then transfer to a bowl. Add the tuna, pasta and cheese sauce. Mix well. Spoon the mixture into a prepared dish.
- Combine the breadcrumbs and parmesan cheese in a bowl. Sprinkle over the tuna mixture. Dot with butter, then bake for 30 minutes or until the cheese is golden brown.



# Modified tuna mornay

Serves 2

## Ingredients



150 g dried wholemeal spiral pasta



30 g unsaturated fat margarine



2 teaspoons sunflower oil



1/4 cup wholemeal plain flour



2 cups reduced fat milk



1/2 cup reduced fat grated cheese



1 teaspoon mustard powder



1 brown onion, finely diced



2 celery stalks, thinly sliced



1 carrot, grated



1 cup frozen peas and corn



425 g can tuna in springwater, drained and flaked



1 cup wholemeal fresh breadcrumbs



1 tablespoon pumpkin seeds



1/4 cup parmesan cheese



1 cup fresh spinach

## Method

- 1 Preheat the oven to 180°C fan bake. Grease a 2 L capacity ovenproof dish. Cook the pasta in a saucepan of salted boiling water until al dente. Drain.
- 2 Melt 30 g of margarine ~~butter~~ in a saucepan over a medium heat. Add the flour and cook, stirring, for 1 minute. Remove from the heat. Gradually stir in ~~combined cream~~ and the milk. Return to the heat. Cook, stirring constantly, for 3 minutes or until the sauce boils and thickens. Stir in the grated cheese, ~~mustard powder~~ and season with salt and pepper.

- 3 Meanwhile, melt 20 g butter heat the oil in a small frying pan over a medium heat. Add the onion and celery. Cook until translucent, then transfer to a bowl. Add the tuna, pasta, cheese sauce and the remaining vegetables. Mix well. Spoon the mixture into a prepared dish.
- 4 Combine the breadcrumbs, pumpkin seeds and parmesan cheese in a bowl. Sprinkle over the tuna mixture. Dot with butter then Bake for 30 minutes or until the cheese is golden brown.

### Evaluation questions

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- 1 Identify the ingredients that were modified or added to increase the fibre content of the recipe.
- 2 The recipe contains both soluble and insoluble fibre. Outline the differences between these two types of fibre and how they assist in the prevention of relevant lifestyle diseases.
- 3 Assess the modified recipe against the Australian Guide to Healthy Eating.

### Only sometimes and in small amounts



**Figure 3.24:** Examples of discretionary food choices

### Guideline 3: Limit intake of foods containing saturated fat, added salt, added sugars and alcohol

Food and drinks containing saturated fat, added salt, added sugars and alcohol are considered discretionary choices and appear in the bottom right-hand corner of the Australian Guide to Healthy Eating. These foods include processed meats, cakes, lollies, fried food, potato crisps, pizza, butter, cream, ice cream, soft drink and salty crackers.

Discretionary choices can contribute high amounts of kilojoules to the daily diet and displace more nutritious foods. These choices should be limited to only sometimes and in small amounts as evidence attributes these foods to an increased risk of obesity and related lifestyle diseases. When consumed in occasional small amounts, these foods and drinks can add variety and enjoyment to the diet and are often used in many social and cultural celebrations and activities.

### Saturated fats

Fats are an essential part of the diet; however, the overconsumption of saturated fat has adverse health effects. Consuming foods high in fat is a risk factor for obesity as these are energy-dense and can lead to excessive energy intake. If these kilojoules are not utilised by the body, they will be stored as body fat, leading to weight gain and potential obesity.



**Figure 3.25:** Foods containing high amounts of saturated fat, such as butter, cream, cakes and processed meats, should be limited.



**Figure 3.26:** Replacing foods high in saturated fat with monounsaturated and polyunsaturated fats food sources is associated with improved blood lipid profiles and the reduced risk of cardiovascular disease. These fats are found in foods such as avocados, fish, nuts, seeds and olives.

Saturated and trans fats increase the risk of cardiovascular disease by raising low-density lipoproteins (LDL) cholesterol, while trans fats also lower high-density lipoproteins (HDL) cholesterol. Diets high in saturated fat increase **insulin resistance**, a precursor for type 2 diabetes. Colorectal cancer has also been linked to diets high in saturated fat.

### Salt

In the Australian Dietary Guidelines, 'salt' refers to sodium chloride. Salt is used heavily during food processing as it enhances flavours and preserves foods. Sodium is utilised in the body to regulate blood pressure, blood volume and maintain body water distribution. Only a small amount of sodium is required by the body for optimal functioning; however, it is often overconsumed.

High levels of sodium in the diet increase blood volume and pressure. Decreasing

sodium intake has been shown to reduce blood pressure and therefore the risks of hypertension and cardiovascular disease. Selecting minimally processed foods with no added salt and lower sodium sauce options, as well as using alternative means to flavour food, such as herbs and spices, are practical ways to lower sodium dietary intake.



**Figure 3.27:** Salt added at the table is only one source of salt in the diet.

### insulin resistance

an impaired response of the body to insulin, resulting in elevated levels of glucose in the blood

## Sugar

High intakes of added sugar, often in the form of sucrose, contribute to adverse health effects. Sucrose is used during food processing as it acts as a flavour enhancer and preservative. Foods containing high amounts of these simple sugars include confectionery and sugar-sweetened drinks such as sports and soft drinks.

Studies have shown a probable association between sugar-sweetened drinks and weight gain. Excess fat around the cells and insulin receptor sites may lead to insulin resistance, which is a precursor of type 2 diabetes. Water and plain milk should be selected over sugar-sweetened drinks.



**Figure 3.28:** Sugar is hiding in many foods, not only sweet treats!

**FOR EXAMPLE A SERVE OF THESE DISCRETIONARY FOODS THAT PROVIDES ABOUT 600 KJ IS:**

- 2 scoops (75 g) regular ice cream
- ¼ cup condensed milk
- 50-60 g (about two slices) processed meats, salami, mettwurst
- 1 ½ thick or 2 thinner higher fat/salt sausages
- 30 g salty crackers (a small individual serve packet)
- 2-3 sweet biscuits
- 1 (40 g) doughnut
- 1 slice (40 g) plain cake or small cake-type muffin
- 40 g sugar confectionary (about 5-6 small lollies)
- 60 g jam/honey (about 1 tablespoon)
- 1/2 small bar (25 g) chocolate
- 2 tablespoons (40 g) cream
- 1 tablespoon (20 g) butter or hard margarine
- 200 mL wine (2 standard drinks (note this is often 1 glass for many Australian wines))
- 60 mL spirits (2 standard drinks)
- 600 mL light beer (1½ standard drinks)
- 400 mL regular beer (1½ standard drinks)
- 1 can (375 mL) soft drink
- 1/3 (60 g) commercial meat pie or pastie
- 12 (60 g) fried hot chips

**WHAT ARE DISCRETIONARY FOOD CHOICES?****Figure 3.29:** What is a serve of discretionary food choices?

Source: National Health and Medical Research Council

**Activity 3.4 (Case study): Daily food intake analysis**

Read the following case study and complete the activities that follow.

Bowen is a 23-year-old male who has recently become interested in health and wellbeing. He has started to track his food intake to identify how he can better improve his diet. Table 3.3 shows Bowen's typical food intake for one day.

**Table 3.3:** Bowen’s typical food intake for one day

Breakfast	Lunch	Dinner	Snacks
1 coffee ¼ cup milk	<u>Bacon and egg sandwich</u> 2 slices white bread 1 tablespoon butter 2 rashers of bacon 1 fried egg 1 tablespoon tomato sauce <u>Crumpets</u> 2 crumpets with 2 tablespoons strawberry jam 1 cup orange juice	<u>Chicken Kiev and vegetables</u> 160 g chicken breast stuffed with 1 tablespoon garlic butter. Crumbed and fried 3 potatoes mashed with 1 tablespoon butter and ¼ cup milk 1 cup boiled broccoli 1 cup orange juice	100 g yoghurt 30 g dried mixed fruit

**Questions**

1 Using the ‘what is a serve’ information found within the chapter, copy and complete the table.

	Vegetables & legumes/ beans	Fruit	Grain (cereal) foods, mostly wholegrain	Lean meat and poultry, fish, eggs, nuts and seeds, and legumes/ beans	Milk, yoghurt, cheese and/or alternatives (mostly reduced fat)	Discretionary choices
Recommended intake (serves)	6	2	6	3	2.5	0–3
Bowen’s intake (serves)						

- Evaluate Bowen’s food intake according to the information in the Australian Dietary Guidelines, considering the food groups that are underconsumed and overconsumed.
- Suggest ways in which Bowen can modify his daily food consumption to better align with the recommendations regarding his fruit and vegetable intake.
- Bowen’s discretionary food intake was largely due to spreads and sauces. Suggest alternatives to these high saturated fat and sugar options.
- If Bowen was to continue these dietary trends, identify lifestyle diseases he may be at risk of based on his food intake.

**Guideline 4: Encourage, support and promote breastfeeding**

Breast milk contains all the nutrients required to support growth and development of infants to around six months of age. Breastfeeding provides short-term and long-term health benefits for both infant and mother.

There is credible evidence that infants who were breastfed exclusively in the first few months have lower risk of blood pressure, LDL cholesterol levels and obesity in adult life. Benefits for mothers can include a reduced risk of ovarian and pre-menopausal breast cancer, accelerated postpartum weight loss and a reduced risk of haemorrhaging.



**Figure 3.30:** Breast milk helps reduce the risk of infection, allergies, asthma and eczema, and improves cognitive development.

**Guideline 5: Care for your food; prepare and store it safely**

In order to reduce cases of foodborne illness, it is essential that food is prepared and stored safely. People who are at an increased risk of foodborne illness include pregnant women, infants, older adults, and people with certain medical conditions who have compromised immune systems due to health and development factors.

Food poisoning generally occurs when pathogenic bacteria multiply to harmful levels as a result of incorrect handling and temperature control of food. Practical guidelines regarding the correct handling and storage of food are covered at the beginning of this book.

# Vegetable tajine

Preparation time: 15 minutes

Cooking time: 40 minutes

Serves 4

## Ingredients



¼ teaspoon saffron threads



1 tablespoon olive oil



1 large onion, thinly sliced



3 garlic cloves, crushed



3 cm piece fresh ginger, minced



1 teaspoon turmeric



1 teaspoon cumin



1 tablespoon harissa paste



1 cinnamon stick



500 g sweet potato, cut into 2 cm pieces



2 carrots, peeled and chopped



1 zucchini, cut into 2 cm pieces



1 400 g tin chopped tomatoes



1 400 g can chickpeas, drained



10 dried apricots, roughly sliced



1 cup couscous



20 g flaked almonds



15 g coriander



15 g flat leaf parsley



½ lemon

## Method

- 1 Put the saffron into a jug, cover with 500 mL of boiling water and leave to infuse.
- 2 Heat the oil in a tajine or a heavy-based saucepan over a medium heat. Sauté the onions until soft and translucent. Stir in the garlic, ginger, harissa paste and spices. Cook for another minute or until aromatic.

- 3 Pour over the saffron water and add the chopped vegetables, tomatoes and drained chickpeas.
- 4 Bring to the boil, cover, reduce the heat to low, and simmer for 40 minutes, or until tender, stirring occasionally.
- 5 When the vegetables are almost tender, prepare the couscous. Place the dry couscous in a bowl and add 250 mL of boiling water. Cover and leave to stand for 10 minutes before fluffing with a fork.
- 6 Toss the herbs, dried apricots and flaked almonds through the tajine. Serve on top of the couscous. Squeeze over lemon and garnish with extra herbs.



### Evaluation questions

- 1 Use the nutritional rationale of the Australian Guide to Healthy Eating to justify why this recipe supports vegans in meeting their daily nutrient requirements.
- 2 Outline the nutritional benefits of leaving the peel on the vegetables.
- 3 Discuss the health benefits of using spices rather than salt to flavour a dish.
- 4 According to the Australian Dietary Guidelines, one serve of fruit equates to 150 g of fresh apricots or 30 g of dried apricots. Explain why there is a significant difference in weight when comparing fresh fruit to its dried counterpart.

## Chapter revision

- The development of the Australian Dietary Guidelines was overseen by a Working Committee consisting of multidisciplinary health, nutrition and food experts. The large-scale systematic literature reviews accurately analysed relevant data in a methodical and transparent manner. This rigorous process ensured that the Guidelines contain the best available evidence-based information.
- The Australian Dietary Guidelines provide practical recommendations about the types and amounts of foods and food groups that should be consumed in order to promote health and wellbeing and reduce the risk of lifestyle disease.
- The five guidelines are:
  - 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 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.
- The Australian Guide to Healthy Eating represents the proportions of the five food groups that should be consumed each day. In addition to the five food groups, it includes spreads and oils that should be used in small amounts, discretionary choices that should be limited to only sometimes and in small amounts, and recommends that people should drink plenty of water.
- Food selection can assist in the prevention of lifestyle diseases such as obesity, cardiovascular disease, hypertension, type 2 diabetes and some types of cancers. Compounds found in foods that relate to these lifestyle diseases include:
  - fibre
  - fats
  - sodium
  - sucrose
  - phytochemicals and antioxidants.
- The nutritional rationale underpinning the Australian Dietary Guidelines groups foods primarily on the basis of their type and nutrient contribution. The amounts recommended for consumption are based on the nutrient requirements for each age and sex group.

### Apply your knowledge

- 1 Outline why the Australian Dietary Guidelines were developed.
- 2 Explain why a systematic literature review was undertaken in the revision of the Australian Dietary Guidelines.
- 3 Describe the relationship between the Australian Guide to Healthy Eating and the Australian Dietary Guidelines.
- 4 Explain why consuming vegetables of different types and colours may improve health outcomes.
- 5 Describe the difference between the Foundation Diet and the Total Diet.
- 6 Explain how the consumption of the five food groups can assist in the prevention of obesity and related lifestyle diseases.

## Practice exam questions



## Question 1

	Muesli bar number 1 Steve's Fruit-free Muesli Bars	Muesli bar number 2 Paula's Nut Bar: Peanut Butter
	Nutrition information panel	Nutrition information panel
	Quantity per 100 g	Quantity per 100 g
Energy	1776 kJ	2250 kJ
Protein	9.9 g	13.3 g
Fat	16.5 g	33.1 g
Saturated	2.3 g	12.3 g
Carbohydrates	55.2 g	44.4 g
Sugars	13.6 g	29.4 g
Sodium	11 mg	313 mg

Using the nutrition information panels provided, evaluate which muesli bar is the better choice for reducing the risk of diet-related conditions.

**6 marks**

## Question 2

With reference to the Australian Dietary Guidelines, explain why muesli bars are often considered a discretionary food.

**3 marks**

## Question 3

Explain the nutritional rationale underpinning the Australian Guide to Healthy Eating.

**3 marks**

## Chapter 4

# Dietary requirements

### Key knowledge

- Reasons for differences in dietary requirements, considering factors including age, sex, pregnancy and lactation and activity levels.
- The physiology of food allergies and intolerances, including how allergy and intolerance differ and their respective symptoms, causes and management with a focus on allergies identified by Food Standards Australia New Zealand and lactose, gluten and fermentable oligosaccharides, disaccharides, monosaccharides and polyols (FODMAP) intolerances.

### Key skills

- Apply the healthy eating recommendations of the Australian Dietary Guidelines and Australian Guide to Healthy Eating to the planning of daily food intake and, through practical activities, create nutritious meals to cater for a diverse range of needs.
- Justify the substitution of ingredients in the management of food allergies and intolerances.

VCE Food Studies Study Design extracts © VCAA; reproduced by permission

Food is needed to nourish us; however, sometimes overconsuming or underconsuming foods can have consequences for your body. The principles of research used in the Australian Dietary Guidelines and the Australian Guide to Healthy Eating provide us with accurate and scientifically based advice to plan our daily food intake in order to achieve a nutritious, balanced diet. Differences in dietary requirements are factored into the guide, including age, sex, activity levels, pregnancy and **lactation**.

Adverse reactions can sometimes occur in individuals when a certain food is consumed. Do you know friends who have to avoid certain foods? Perhaps you know someone who carries an EpiPen? Food allergies and food intolerances are physiological conditions that dictate which foods should be excluded from someone's diet in order to stay healthy.

### Get knowledge ready

- 1 Can you name the nutrients that are used as energy sources in your body?
- 2 When planning daily food intake, outline why we need to consider an individual's age, sex, activity levels, pregnancy and lactation.
- 3 Discuss what can happen to an individual who has an adverse reaction to something they eat.



**Video 4.1** Chapter Overview

**lactation**  
the secretion of milk by the mammary glands



## Biological reasons for differences in dietary requirements

Everybody, no matter what age, needs to ensure that they are eating a nutritious and balanced diet. Dietary requirements differ between individuals and population

groups, depending on a number of biological factors, including age, sex, pregnancy and lactation, and activity levels. When planning and preparing food, these are important considerations to provide the most appropriate and enjoyable meal for all while meeting nutritional needs.



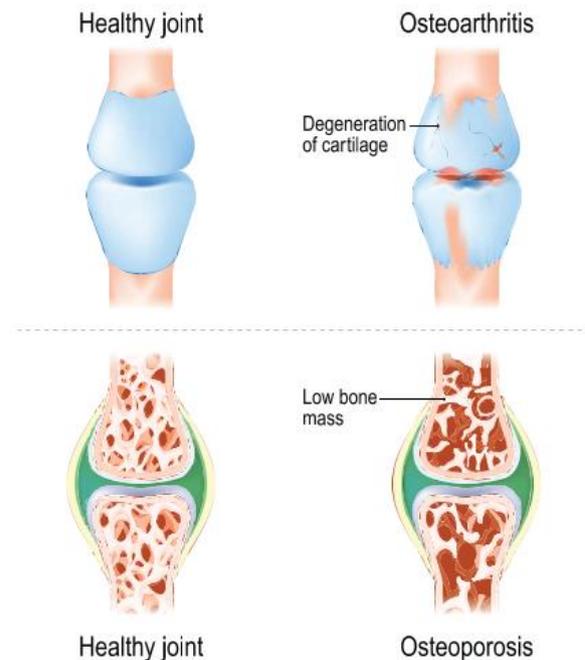
**Figure 4.1:** Dietary requirements differ because people are all different!

### Age

As humans naturally age, the nutrients needed by our body will vary due to the physical changes that take place. Some nutrients are required in greater quantities for specific purposes, such as the increased calcium needs of adolescents because of the formation of bones in this growth phase.

Osteoporosis is the condition where bone deteriorates, becoming fragile and brittle, leading to a high risk of fracture and breakages. Osteoarthritis is the deterioration of cartilage in the joint over time. It is common for people in late adulthood to develop osteoporosis and osteoarthritis in joints such as the knee, hip and fingers. The symptoms of these conditions present later in life but it is the consumption of the recommended dietary intake of calcium throughout life that can help in the prevention.

### Osteoporosis vs Osteoarthritis



**Figure 4.2:** Calcium is important for building strong bones.

**Table 4.1:** Nutrients across the lifespan

Lifespan stage	Important nutrients and reason required	Considerations for meal planning
<p><b>Prenatal</b></p> 	<ul style="list-style-type: none"> <li>• B group vitamins – release of energy</li> <li>• Calcium – developing foetal skeletal system</li> <li>• Carbohydrate – energy source</li> <li>• Folate – reducing the risk of neural tube defect</li> <li>• Iron – increased blood volume and red blood cell production</li> <li>• Protein – new foetal tissue growth and placenta</li> <li>• Vitamin C – connective tissue development and iron absorption</li> </ul>	<p>Pregnant mother to eat a balanced diet including:</p> <ul style="list-style-type: none"> <li>• wholegrain cereals</li> <li>• fresh fruits and vegetables</li> <li>• low-fat protein sources such as lean meat, fish and chicken</li> </ul>
<p><b>Infancy</b></p> 	<ul style="list-style-type: none"> <li>• Calcium – needed for bone growth and development</li> <li>• Carbohydrate – energy source</li> <li>• Fat – energy source</li> <li>• Protein – rapid growth and development</li> </ul>	<p>Infant to consume:</p> <ul style="list-style-type: none"> <li>• breast milk is recommended for the first six months</li> <li>• cereals</li> <li>• fruits</li> <li>• vegetables</li> <li>• legumes</li> <li>• dairy foods (not low fat)</li> <li>• meat</li> <li>• fish</li> </ul>
<p><b>Childhood</b></p> 	<ul style="list-style-type: none"> <li>• Calcium – needed for bone growth and development</li> <li>• Carbohydrate – energy source</li> <li>• Protein – for continued growth</li> <li>• Iron – red blood cell production</li> <li>• B group vitamins – release of energy</li> <li>• Zinc – assists muscle growth and the development of the immune system</li> </ul>	<p>Eat a balanced diet including:</p> <ul style="list-style-type: none"> <li>• wholegrain cereals and legumes</li> <li>• fresh fruits and vegetables</li> <li>• low-fat protein sources such as lean meat, fish and chicken</li> <li>• nuts</li> </ul>

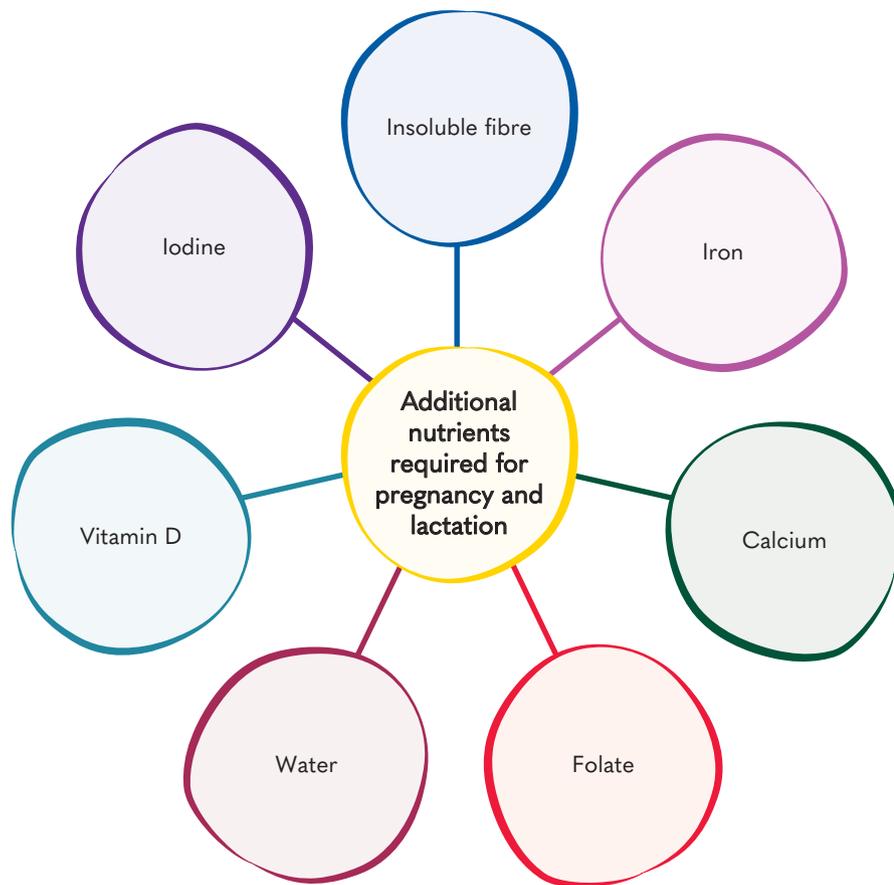
Lifespan stage	Important nutrients and reason required	Considerations for meal planning
<p><b>Youth</b></p> 	<ul style="list-style-type: none"> <li>• Carbohydrate – energy source</li> <li>• Calcium – forming peak bone mass</li> <li>• Protein – for continued growth</li> <li>• Iron – red blood cell production</li> <li>• Vitamin C – antioxidant, detoxifier and helps iron absorption</li> <li>• B group vitamins – release of energy</li> </ul>	<p>Eat a balanced diet including:</p> <ul style="list-style-type: none"> <li>• dairy foods – milk, cheese and yoghurt</li> <li>• wholegrain cereals</li> <li>• fresh fruits and vegetables</li> <li>• low-fat protein sources such as lean meat, fish and chicken</li> </ul>
<p><b>Adulthood</b></p> 	<ul style="list-style-type: none"> <li>• Protein – repair of body tissue and cells</li> <li>• Calcium – maintain bone density</li> <li>• Iron – red blood cell production</li> </ul>	<p>Eat a balanced diet including:</p> <ul style="list-style-type: none"> <li>• low-fat protein sources such as lean meat and chicken, fish and liver</li> <li>• low-fat dairy foods – milk, cheese and yoghurt</li> <li>• leafy green vegetables</li> </ul>
<p><b>Late adulthood</b></p> 	<ul style="list-style-type: none"> <li>• Calcium – especially important for women because calcium loss can increase during menopause</li> <li>• Fibre – to prevent constipation</li> <li>• Protein – repair of body tissue and cells</li> </ul>	<p>Eat a balanced diet including:</p> <ul style="list-style-type: none"> <li>• low-fat dairy foods – milk, cheese and yoghurt</li> <li>• wholegrain cereals</li> <li>• fruit</li> <li>• vegetables</li> <li>• lean meat, chicken and fish</li> </ul>



**Let's talk**

Are you making appropriate food choices for your lifespan stage? List the nutrients that you may need to include more of in your daily food consumption. Discuss ways you could incorporate these nutrients into your everyday diet.

## Pregnancy and lactation



**Figure 4.3:** Additional nutrients required for pregnancy and lactation

During pregnancy and lactation, a woman needs to consider a diet rich in nutrient-dense foods. It is not about eating for two when you are pregnant, rather ‘eating for you’. The pregnant mother needs to ensure that specific nutrients are consumed for a healthy pregnancy. Increased iron in the diet is needed for the formation of increased blood cells being developed for the growing **foetus**.

Increased fibre will aid in helping to avoid constipation when pregnant. Consumption of foods high in insoluble fibre is important to help keep bowel movements regular. Fluids, in particular water, should also be kept high to assist with the digestion of the nutrients and helping to avoid constipation. This is because as the foetus grows, the mother’s digestive system becomes crowded.




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**foetus**  
the unborn offspring of a person

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**Figure 4.4:** Iron can be consumed in the diet in foods such as silverbeet and spinach leaves, lentils, chickpeas and lean red meats.



**Figure 4.5:** Insoluble fibre can be consumed in foods such as wholegrain breads and cereals, legumes such as lentils, and dried fruit, especially prunes.

**folate (or folic acid)**

a B-group vitamin that is essential for the development of the foetus in pregnancy. Adequate folate in the diet of women who are of childbearing age can reduce the risk of neural tube defects in babies

**neural tube defects**

birth defects of the brain, spine or spinal cord, including spina bifida and anencephaly

**fortified**

a food that has added nutrients not normally found in the food product

**osteoporosis**

a medical condition where bones become brittle and fragile. It is usually seen in older people as a result of hormonal changes and/or a deficiency in calcium and/or vitamin D

**Folate** aids in the formation of the brain and spinal cord of the foetus. It is important that folate levels are maintained for the optimal development of these organs during pregnancy. Insufficient folate during pregnancy can be a risk factor for **neural tube defects**

such as spina bifida and anencephaly. A number of foods such as bread are **fortified** with folate, but one can also consume folate from legumes such as chickpeas and lentils, and leafy green vegetables are another good source.



**Figure 4.6:** Bread, lentils and chickpeas are good sources of folate in the diet.

The intake of additional calcium is needed during pregnancy to provide the maximum bone growth of the foetus. Calcium is also required for the formation of tooth buds. If a pregnant woman does not increase calcium consumption during pregnancy, her body

will use the calcium stored in her bones for the growth of the foetus. This can be a risk factor for the mother and contribute to **osteoporosis** later in life. Consumption of additional calcium during pregnancy can be a protective factor for this disease.



**Figure 4.7:** Dairy foods are a rich source of calcium in the diet. If you don't consume animal products, you can obtain calcium from soy and leafy green vegetables such as spinach.

Guideline 4 in the Australian Dietary Guidelines is 'Encourage, support and promote breastfeeding'. Breastfeeding is a time when a mother will need to consume additional nutrients for the production of breast milk. The mother will require more energy in her diet to ensure that the physiological process that the body uses to make the breast milk can occur effectively. She will also need to keep fluid levels up

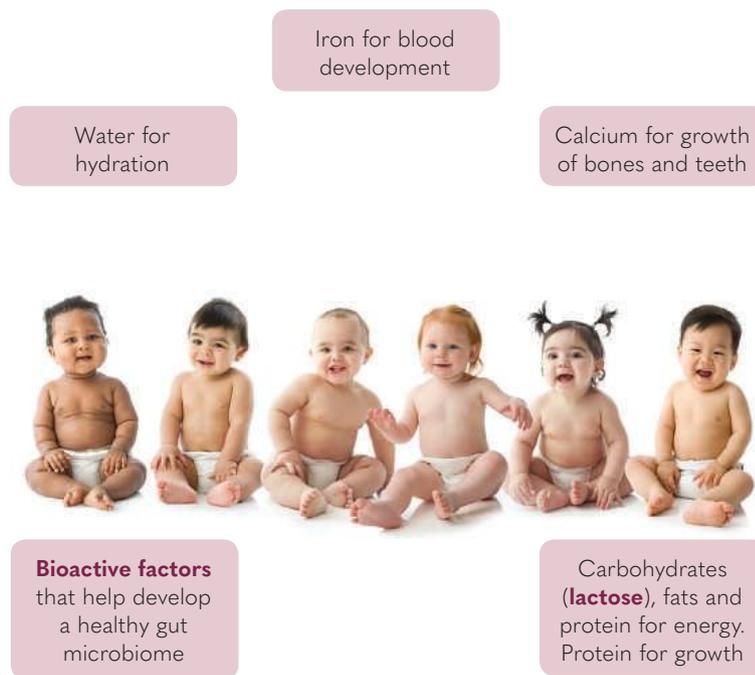
by consuming adequate water, as a major component of breast milk is water.

**Sex**

The male and female bodies have a different structure and grow and develop differently. Nutrient intakes vary according to energy needs and the growth, maintenance and repair of the body cells at different stages of the lifespan.

**bioactive factors** found in breast milk, these are elements that have an effect on biological processes and thus impact our health. Examples found in breast milk include living cells, antibodies and hormones

**lactose** the sugar found in milk and milk products

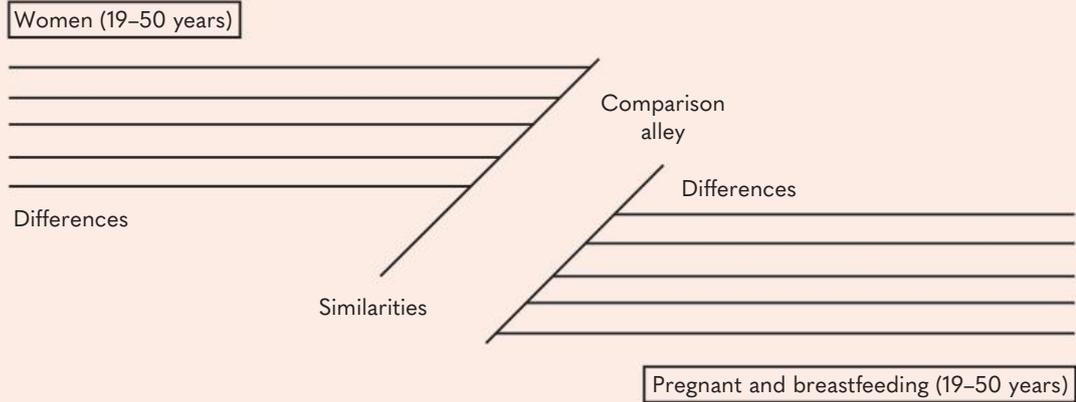


**Figure 4.8:** Consuming a variety of nutritious foods is important for women who breastfeed, as breast milk is a rich source of nutrients needed for growth and development for the baby.

**Activity 4.1 (Inquiry): Eating for two – really?**



- 1 Access the Australian Dietary Guidelines and analyse the recommended number of serves of food groups for women (19–50 years), pregnant women (19–50 years) and breastfeeding women (19–50 years).
- 2 Copy and complete the comparison alley, noting the similarities and differences in the number of recommended serves of food groups.



- 3 Use the data in your comparison alley to analyse where there are differences, what nutrients the food group is providing and why there would be a difference in the recommendation.
- 4 In conclusion to your analysis, suggest ways to apply the principles of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating to the planning of daily food intake for a pregnant or lactating woman. Demonstrate a range of practical ways to create healthy meals or snack options to meet dietary needs.

Puberty, a time of rapid change in adolescence, is when we can really start to see differences in the nutrient requirements for males and females. The Eat for Health Program, which includes the Australian Dietary Guidelines and the Australian Guide to Healthy Eating, includes recommendations that reflect the different nutrient needs for males and females.



**Let's talk**

The Australian Dietary Guidelines recommend serving sizes for each food group. Explain the concept of a serving size. Where can we find out the information on recommended serving sizes? Is this information accessible to all?



- Males generally have greater muscle mass
- Males generally weigh more than females
- Males generally are taller than females



- Female bodies experience menstruation and menopause
- Female bodies can support pregnancy and lactation

**Figure 4.9:** The differences in male and female body structure explains the different requirements for energy across the lifespan.

### Activity 4.2 (Data analysis): Daily recommendations for age and sex from the Australian Dietary Guidelines



The data in Table 4.2 has been sourced from the Australian Dietary Guidelines recommendations for enjoying a variety of nutritious foods. Consider the data and respond to the analysis questions.

**Table 4.2:** Recommended number of serves of the five food groups for males and females of different ages according to data from the Australian Dietary Guidelines

	Age (years)	Recommended number of serves per day				
		Vegetables and legumes/beans	Fruit	Grain (cereal) 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
Boys	2–3	2½	1	4	1	1½
Boys	12–13	5½	2	6	2½	3½
Boys	14–18	5½	2	7	2½	3½
Men	19–50	6	2	6	3	2½
Men	70+	5	2	4½	2½	3½
Girls	2–3	2½	1	4	1	1½
Girls	12–13	5	2	5	2½	3½
Girls	14–18	5	2	7	2½	3½
Women	19–50	5	2	6	2½	2½
Women	70+	5	2	3	2	4

Source: National Health and Medical Research Council, Australian Dietary Guidelines, NHMRC, 2013

- 1 Draw a Venn diagram for each life stage to compare the similarities and differences in the number of serves of nutritious foods for males and females across the lifespan.
- 2 Discuss why there are differences in the recommended number of serves as identified in question 1.
- 3 Consider the nutrients that the food groups provide and the body's needs for males and females at that age. In your response, include a discussion of: puberty, activity level, body composition, age, weight, height and state of health.
- 4 Explain how you could incorporate the recommended number of serves of each food group into your day. Discuss how you could make any improvements.
- 5 Consider the recommended number of serves per day for men aged 70+ and women aged 70+. Where there are differences in the recommendations, apply the principles of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating to suggest how this could occur when meal planning.

## Activity levels

When we eat, energy from nutrients is released from food to fuel our body and is measured in kilojoules (kJ). The nutrients carbohydrate, fat and protein all provide the body with energy and are found in a variety of foods. Energy requirements vary with age, sex, body size and activity levels.

you are. In general, infants, children and adolescents have specific food needs because they are in a period of rapid growth and development requiring additional energy for play and physical activity. Older Australians may be less active and not require extra energy above their needs.

Activity levels vary across the lifespan depending on how **sedentary** or active

### sedentary

describes a lifestyle that involves little or no physical activity. It is usually characterised by minimal energy expenditure, such as sitting



**Figure 4.10:** Eating foods that contain protein, carbohydrate and fats provides the body with energy. When we exercise, we burn energy, and our body uses kilojoules provided by these foods.

**Activity 4.3 (Case study): Have you moved enough today?**

Visit the Australian Government Department of Health website <https://www.health.gov.au/> and search for the report titled 'Australian 24-hour movement guidelines for children (5 to 12 years) and young people (13 to 17 years): an integration of physical activity, sedentary behaviour, and sleep'.

This report has also been compiled into a brochure, a fact sheet, and a poster titled '24-hour movement guidelines – children and young people (5 to 17 years)'. Download and read through these documents, then answer the questions below.

**Questions**

- 1 Suggest why the Australian Government needed to develop these guidelines.
- 2 Copy the table and complete a SWOT analysis (strengths, weaknesses, opportunities and threats) of the '24-hour movement guidelines – children and young people (5 to 17 years)'

<b>Strengths</b>	<b>Weaknesses</b>
<b>Opportunities</b>	<b>Threats</b>

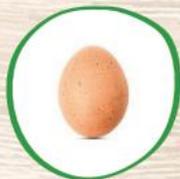
- 3 Outline your opinion of these guidelines. Do you think they are realistic for 5–17-year-olds to achieve in a 24-hour period? Justify your response.
- 4 Suggest how the '24-hour movement guidelines – children and young people (5 to 17 years)' align with the Australian Dietary Guidelines.

# Caesar salad

Serves 1

## Ingredients

### Salad



1 egg



½ baby cos lettuce, leaves separated, washed, dried, coarsely torn



2 teaspoons parsley, finely chopped



1 streaky bacon rasher, rind and excess fat trimmed, thinly sliced



2 anchovy fillets in oil, drained, thinly sliced



20 g parmesan cheese, shaved



1 slice sourdough bread, crust removed, cut into 1 cm cubes

### Dressing



1 egg yolk



1 pinch sea salt flakes



1 teaspoon white wine vinegar



⅓ cup olive oil



1 teaspoon fresh lemon juice



1 teaspoon Dijon mustard



Freshly ground black pepper

## Method

### Dressing

- 1 To make the dressing, place the egg yolk, vinegar, mustard and sea salt flakes in a bowl.
- 2 Use a wire balloon whisk to whisk until smooth.
- 3 Add a few drops of oil to the egg-yolk mixture and whisk until well combined. Continue adding oil in a thin, steady stream down the side of the bowl, whisking constantly, until well combined and thick.
- 4 Taste and season with lemon juice and pepper. Set aside.

### Boiled egg

- 1 Bring a saucepan of water to the boil over a medium-high heat.
- 2 Add the egg and cook for 6–7 minutes. Drain. Cool under cold running water.
- 3 Peel the egg. Cut in half and set aside.

## Preparing the salad ingredients

- 1 Heat a frying pan over a high heat. Add the bacon and cook, stirring, for 1 minute or until crisp.
- 2 Transfer to a plate lined with paper towel.
- 3 Reheat the pan. Add the bread and cook, stirring, for 3 minutes or until brown.
- 4 Transfer to a plate lined with paper towel.

## To make the salad

- 1 Combine the bacon, croutons, lettuce, anchovy and parsley in a bowl.
- 2 Add the dressing and gently toss until combined.
- 3 Place the salad into a serving bowl. Top with egg and sprinkle with parmesan cheese. Serve immediately.



### Activity 4.4 (Practical): Recipe design task



- 1 Your task is to modify the caesar salad recipe so that it meets the nutritional requirements for one of the lifespan stages. Follow the steps in the design process to create your modified version of this classic salad. Develop your criteria for success.
- 2 Create a mind map to generate ideas for your possible solution to the task.
- 3 Choose your final product solution and create the recipe for your production lesson.
- 4 Produce a food order for your production.
- 5 Produce your solution to the task and photograph your final presentation. Annotate your final production photos, evaluating the nutritional quality of your meal and referring to the Australian Dietary Guidelines in your response.
- 6 Evaluate your performance against the set of criteria for success questions written at the beginning of the design process.

## Food allergies

A **food allergy** is the body's **immune system** reacting to a foreign substance. An **allergic reaction** to food can be triggered by even very small amounts and the reaction can be mild to severe. A severe reaction is known

as **anaphylaxis** and can have life-threatening effects on the body. There are a number of foods that can be the cause of a food allergy, resulting in an adverse reaction for the person with the allergy. Food allergies can be fatal, so it is important that these foods are avoided.

### food allergy

an abnormal immunological reaction to food caused by a foreign substance, usually protein. Some severe food allergies can cause an anaphylactic reaction and as a result are life-threatening (for example, peanut allergy)

### immune system

the body's defence against infection. It is made up of cells and proteins that create a complex network that recognises a germ in the body and creates microbes to destroy the germ

### allergic reaction

when the body overreacts to an allergen and triggers a series of symptoms that vary for each individual and depend on the severity of the reaction. A reaction can be mild (sneezing) or life-threatening (anaphylaxis). An allergic reaction relates to the immune system

### anaphylaxis

extreme sensitivity to a food product; can be life-threatening



**Figure 4.11:** Common food allergens, usually a protein, include eggs, milk, shellfish, sesame, soy, peanuts and tree nuts (for example, almonds and cashews).



**Figure 4.12:** Allergen labelling in Australia is a compulsory component on a food label. The Food Standards Code requires the ten depicted allergens to be on a food label.

Source: Food Standards Australia & New Zealand

Consuming the **allergen** causes the body's immune system to produce **antibodies** to fight against the substance. Reactions are quick and can be severe, requiring urgent medical attention. An example of the body's immune response is impaired airways or swelling of the tongue. It is very important for people who suffer severe allergies to be aware of what they are consuming, including reading ingredient lists and checking menus to ensure that they are not consuming the allergen they will react to.

In some cultures and religions, highly allergic foods are fed to babies. The thought here is that the body develops the ability to process these foods without creating an allergic reaction. Hare Krishnas feed their babies nut paste to prevent an infant developing a reaction to nuts.

### allergen

a substance that can cause an allergic reaction. There are many different allergens. When in the body, an allergen binds with a protein and triggers the allergic reaction

### antibodies

a protein produced by the body's immune system when the body detects a harmful substance. The harmful substance is referred to as an antigen. The body creates a unique antibody to defend against a specific type of antigen



### Let's talk

Food allergy occurs in around 10 per cent of infants, 4–8 per cent of children aged up to five years and 2–3 per cent of adults. Discuss reasons why there is a drop in the number of cases as people age.

In 2021, the Australia New Zealand Food Standards Code (the Code) introduced new requirements for the labelling of allergens in food in Australia. The allergens peanuts, tree nuts, milk, eggs, sesame seeds, fish and shellfish, soy, lupin and wheat must be declared on the food label, however small the amount. The reason for the change was to make allergen information on food labels clearer and more consistent for food-allergic consumers.

### Nut allergy

Allergies to nuts, especially peanuts, are the most common allergy in Australia. Anaphylaxis is a severe allergic reaction, often life-threatening, requiring urgent medical attention. For some people with a nut allergy, even the smallest traces of nuts can cause a reaction, and this can be simply touching a product containing nuts or using equipment that has had nuts in it and has not been washed correctly. Those who are highly allergic don't have to eat the products containing nuts to have a reaction.



**Figure 4.13:** Peanuts, pine nuts, cashews, almonds and walnuts are common nuts that can cause food allergies, including anaphylaxis.



**Let's talk**

A peanut allergy is the most common allergy in children and adolescents. As a result, many schools, especially primary schools, have become 'nut-free zones'. Is your school nut-free?

Talk with your partner about why you think many schools, especially primary schools, have made the choice to ban nuts. Develop a list of other possible solutions to ensure that students who have nut allergies, or any allergy, can be safe at school.



**Figure 4.14:** An EpiPen

**Anaphylaxis**

Nuts are not the only triggers of an anaphylactic reaction. Other allergens include peanuts, tree nuts, milk, eggs, sesame seeds, fish and shellfish, soy, lupin and wheat.

**Symptoms**

**Table 4.3:** Symptoms of a mild allergic reaction

Symptoms of a mild allergic reaction	Symptoms of a severe allergic reaction – anaphylaxis
<ul style="list-style-type: none"> <li>• Swelling of the mouth, face, lips and eyes</li> <li>• Tingling sensation of the mouth</li> <li>• Redness or hives</li> <li>• Abdominal pain or vomiting</li> </ul>	<ul style="list-style-type: none"> <li>• Swelling of the tongue</li> <li>• Swelling/ tightness of the throat</li> <li>• Difficulty breathing</li> <li>• Noisy breathing, wheezing or persistent cough</li> <li>• Pale complexion</li> <li>• Loss of consciousness</li> </ul>

**Management**

- An EpiPen or Anapen delivers an injection of adrenalin.
- An **anaphylactic** should carry an EpiPen or Anapen so that treatment, if needed, can be received straight away.

**Activity 4.5 (Inquiry): ASCIA Action Plan and First Aid Plan**



The Australasian Society of Clinical Immunology and Allergy (ASCIA) Action Plans and First Aid Plans for Allergy and Anaphylaxis are medical documents that have been developed as easy-to-follow, single-page documents to assist in emergency treatment of severe allergy and anaphylaxis. Plans for allergic reactions are in green and plans for anaphylaxis are in red. Visit the ASCIA website and find the Action Plans for Allergic Reactions and Anaphylaxis.

- 1 Outline where you would find such posters.
- 2 State who these posters could be useful for.
- 3 Explain how the posters would assist in the management of an allergy.
- 4 Do all individuals who have a food allergy need adrenalin? Explain your answer.

**anaphylactic**  
an individual who suffers from anaphylaxis

- A delay in receiving treatment can be fatal.
- It is important to know the symptoms of anaphylaxis and ensure a quick response and treatment – injecting with the EpiPen and calling an ambulance.
- Allergic reactions are avoided by making careful and appropriate food choices.

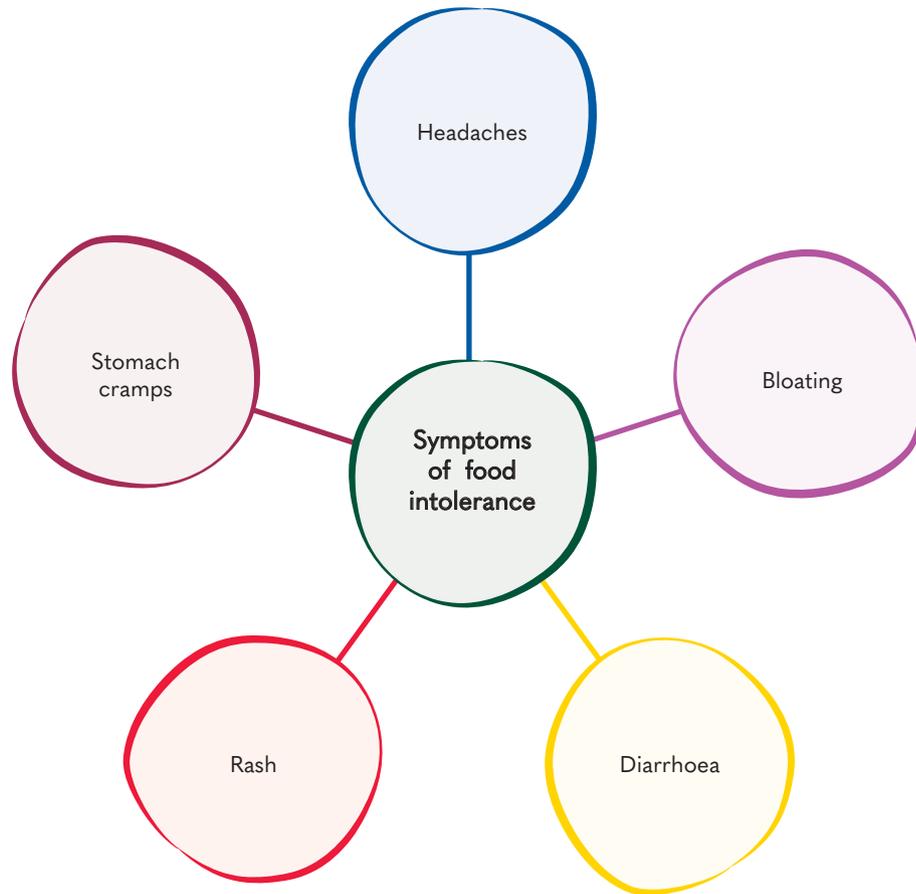
## Food intolerances

A **food intolerance** is a chemical reaction that occurs in the body when a particular food or drink is consumed. Different from a food allergy, a food intolerance is not an immune response and will not lead

to anaphylaxis. A person who suffers an intolerance will find they can tolerate a certain amount of the trigger food, but when they have had too much, they become unwell with symptoms that vary for each person.

### food intolerance

a chemical reaction in the body to particular foods. It is much more common than food allergy (for example, gluten intolerance)



**Figure 4.15:** Symptoms of food intolerance

### coeliac disease

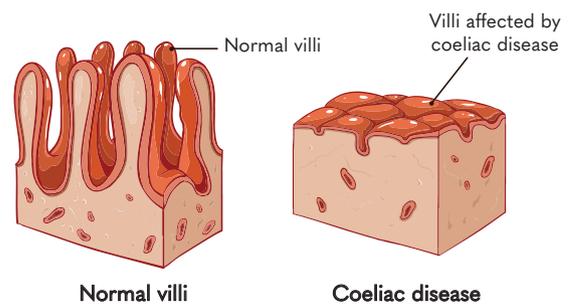
a disease of the small intestine that results in permanent intolerance to gluten

### gluten

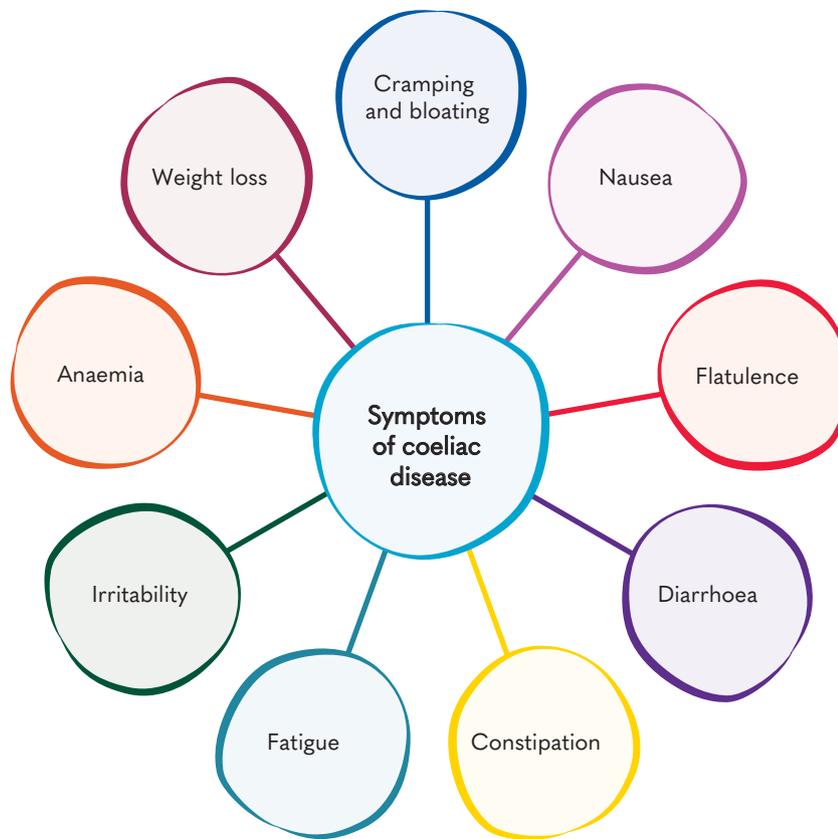
a protein substance found in many cereal products, including wheat, rye, barley and oats, which gives dough its elastic texture

## Coeliac disease (gluten intolerance)

**Coeliac disease** is a disease of the small intestine that results in a permanent intolerance to **gluten**, the protein found in wheat, oats, barley and rye cereals. Consuming gluten damages the villi or surface area of the small intestine, preventing the absorption of nutrients.



**Figure 4.16:** The image on the left shows the villi of a healthy small intestine. The image on the right shows the villi of a person who is gluten-intolerant. Note the inflamed and flattened villi, damaged by gluten.



**Figure 4.17:** Symptoms of coeliac disease

The treatment for coeliac disease is a permanent gluten-free diet. Unfortunately, even the slightest consumption of gluten can cause a reaction. The long-term effects of consuming gluten if a person is gluten-intolerant include:

- osteoporosis, due to calcium being unable to be absorbed
- bowel damage and malnutrition, due to the prevention of nutrient absorption.

**Table 4.4:** Foods to be avoided and gluten-free food choices

Foods to be avoided ❌	Gluten-free food choices ✅
Products containing wheat, oats, barley and rye, such as: <ul style="list-style-type: none"> <li>• Bread products</li> <li>• Pastry goods</li> <li>• Pasta products</li> <li>• Breakfast cereals</li> <li>• Flour products</li> <li>• Many snack foods containing gluten</li> <li>• Biscuits</li> <li>• Condiments containing gluten</li> <li>• Processed meat containing gluten, such as salami, ham and sausages</li> </ul>	<ul style="list-style-type: none"> <li>• Gluten-free products such as gluten-free flour, gluten-free pasta and gluten-free bread</li> <li>• Rice</li> <li>• Corn-derived products such as cornflour, corn tortillas and corn chips</li> <li>• Meat, poultry and fish</li> <li>• Fruit and vegetables</li> <li>• Most dairy products</li> </ul>



**Let's talk**

Are you surprised that processed meats contain gluten? Discuss why you think gluten is a common ingredient in processed meats.

**Lactose intolerance**

**Lactose intolerance** is a condition where the body is unable to digest lactose, the sugar found in milk and milk products. The body does not have sufficient amounts of the enzyme lactase to break the lactose down into simple sugars for digestion.

Lactose intolerance affects people in different ways. Some people are able to tolerate small amounts of lactose with minimal symptoms and really only have to avoid drinking milk, whereas others are more sensitive and have to avoid lactose altogether.

**lactose intolerance**  
a condition where the body is unable to digest lactose

**Activity 4.6 (Practical): Comparative analysis**



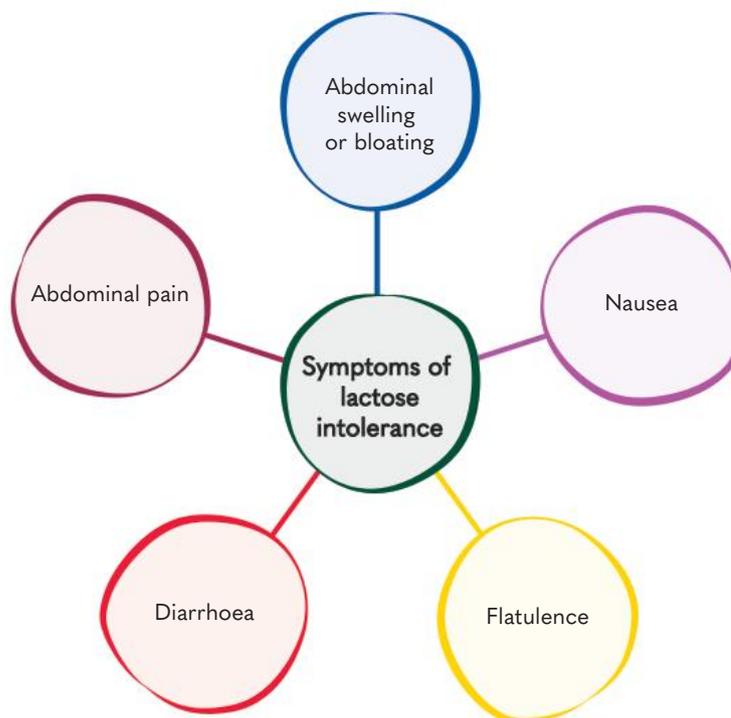
**Avoiding gluten**

- 1 Research a recipe familiar to you that contains gluten.
- 2 Annotate the original recipe to show how you could modify the gluten ingredients with gluten-free alternatives.
- 3 Prepare both recipes in class, creating the original recipe and the modified gluten-free recipe.
- 4 Write an evaluation on the role of gluten in the product made and the similarities and differences in the final products when substituting with gluten-free ingredients. Include a comparative analysis of the physical and sensory properties of the final outcomes in your evaluation.

**Table 4.5:** Foods to be avoided and lactose-free food choices

Foods to be avoided ❌	Lactose-free food choices ✅
<ul style="list-style-type: none"> <li>• Milk</li> <li>• Chocolate</li> <li>• Cream</li> <li>• Ice cream</li> <li>• Custard</li> <li>• Some cheeses</li> <li>• Many desserts, cakes and biscuits</li> </ul>	<ul style="list-style-type: none"> <li>• Lactose-free milk</li> <li>• Soy milk</li> <li>• Lactose-free ice cream</li> <li>• Lactose-free chocolate</li> <li>• Plant-based milks</li> </ul>

**Figure 4.18:** Symptoms of lactose intolerance





### Let's talk

Scrambled eggs, pancakes, muesli bars and even some canned soup tins have been identified as foods to avoid if lactose-intolerant. Discuss why this is the case. List the ingredients you would be looking for on the food labels of these products.



Milk



Chocolate



Cream



Ice cream



Custard



Some cheeses



Many desserts, cakes and biscuits

**Figure 4.19:** A variety of foods contain lactose.



Some cheeses can contain virtually no lactose, so can be tolerated by many people with a sensitivity to lactose.

Yoghurt is generally digested well by the body due to its natural bacteria cultures.



Lactose free products such as plant-based milks

**Figure 4.20:** Lactose-free food choices

### Activity 4.7 (Practical): Yoghurt taste test



#### Living lactose-free

For this activity, you need to sample a serve of yoghurt and a serve of lactose-free yoghurt. Copy and complete the table, then answer the questions.

	Appearance	Aroma	Taste	Texture	Ingredients list
Yoghurt					
Lactose-free yoghurt					

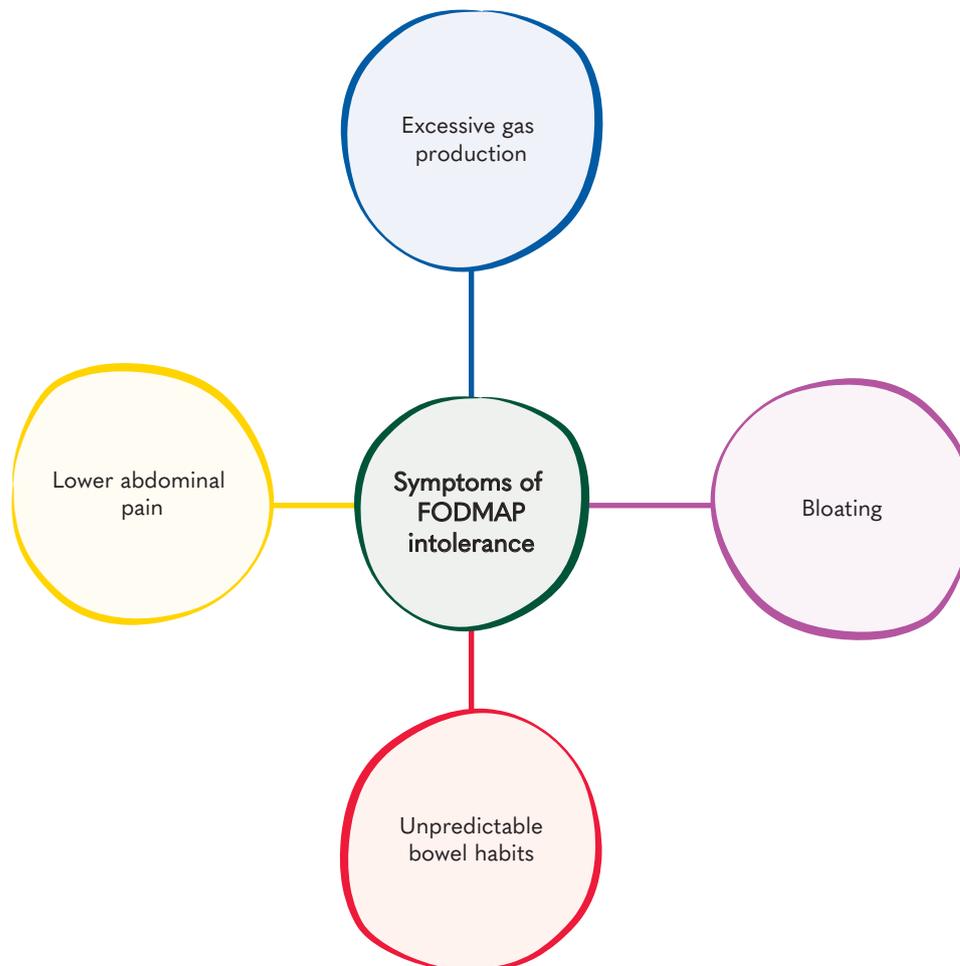
- 1 Describe the similarities in the sensory properties between the two samples.
- 2 Describe the differences in the sensory properties between the two samples.
- 3 Name the yoghurt that you preferred. Explain why.
- 4 Refer to the nutrition information panels of each yoghurt. Do they differ? If so, detail how they differ.
- 5 There are other lactose-free food products available on the market. List three other products and justify if you think substituting lactose-free products will still allow an individual to meet their dietary needs in accordance with the Australian Guide to Healthy Eating.

## Fermentable oligosaccharides, disaccharides, monosaccharides and polyols (FODMAP) intolerance

FODMAP is the acronym used to describe the group of fermentable, short-chain carbohydrates (sugars):

- oligosaccharides
- disaccharides
- monosaccharides
- polyols.

If someone is intolerant to FODMAPs, when consumed, they are not absorbed properly in the gut, and can cause symptoms in people with irritable bowel syndrome (IBS). FODMAPs are found naturally in many foods and food additives, including fruit, honey, vegetables, legumes and cereals. People with a FODMAP intolerance suffer from symptoms, including those shown in Figure 4.21.



**Figure 4.21:** Symptoms of FODMAP intolerance. To relieve symptoms, individuals are advised to reduce the quantity and/or reduce the frequency of consumption of foods high in FODMAPs.

**Table 4.6:** The Monash University FODMAPs team has created a detailed list of FODMAP-friendly foods and foods to be avoided. Individuals' reactions to certain foods will vary.

Food group	High FODMAP foods	Low FODMAP alternatives
Vegetables	Artichoke, asparagus, cauliflower, garlic, green peas, mushrooms, onion, sugar snap peas	Aubergine/eggplant, beans (green), bok choy, capsicum (bell pepper), carrot, cucumber, lettuce, potato, tomato, zucchini
Fruits	Apples, apple juice, cherries, dried fruit, mango, nectarines, peaches, pears, plums, watermelon	Cantaloupe, grapes, kiwi fruit (green), mandarin, orange, pineapple, strawberries
Dairy & alternatives	Cow's milk, custard, evaporated milk, ice cream, soy milk (made from whole soybeans), sweetened condensed milk, yoghurt	Almond milk, brie/camembert cheese, feta cheese, hard cheeses, lactose-free milk, soy milk (made from soy protein)
Protein sources	Most legumes/pulses, some marinated meats/poultry/seafood, some processed meats	Eggs, firm tofu, plain cooked meats/poultry/seafood, tempeh
Breads & cereals	Wheat/rye/barley based breads, breakfast cereals, biscuits and snack products	Corn flakes, oats, quinoa flakes, quinoa/rice/corn pasta, rice cakes (plain), sourdough spelt bread, wheat/rye/barley free breads
Sugars, sweeteners & confectionery	High fructose corn syrup, honey, sugar free confectionery	Dark chocolate, maple syrup, rice malt syrup, table sugar
Nuts & seeds	Cashews, pistachios	Macadamias, peanuts, pumpkin seeds/pepitas, walnuts

Source: Department of Gastroenterology, Monash University. Table reproduced with permission from Monash University ([monashfodmap.com](http://monashfodmap.com)). Download the Monash University FODMAP Diet App for a comprehensive food guide containing the FODMAP ratings and serving sizes for hundreds of different foods and beverages. Available on iOS and Android.

### Activity 4.8 (Summarise): Being mindful to modify



Using a graphic design tool (for example, Comic Life, Canva or Piktochart), create a summary of the difference between a food allergy and a food intolerance. Include at least five examples of modifications or food swaps that individuals can make if they suffer from an allergy or an intolerance.

## Managing food allergies and intolerances in the kitchen

To manage a food allergy or intolerance when preparing food, you must know how to read food labels. The label will contain an ingredients list, mandatory listings of common allergens and sometimes voluntary statements.

**The ingredients list** will show the consumer exactly what is contained in the product. (You can read more about food labels and the purpose of the ingredients list in Chapter 10.)

### Mandatory listing of common allergens –

governed by requirements in the Australia New Zealand Food Standards Code. The code specifies allergens that are mandated to be declared on a food label. These allergens include:

- gluten
- milk
- eggs
- peanuts
- tree nuts
- sesame
- soy
- fish
- shellfish
- wheat
- lupin.



**Voluntary statements** – these are statements that a manufacturer has the option of including on their label, such as:

- ‘may contain traces of ...’
- ‘made in a facility that also produces ...’

They can indicate to the consumer the possibility of cross-contamination with an allergen during the production process. The manufacturer may test or measure the allergen levels in the food, but it is not mandatory for them to do so.

**Figure 4.22:** A food label showing the ingredients list, a common allergen declaration and a voluntary statement



### Let's talk

Explain why you think a manufacturer would choose to include a voluntary statement on a food package. Discuss the consequences of choosing not to include a voluntary statement on a food package. Consider ethics and economics in your discussion.

### Substituting ingredients

Learning to manage a food allergy or intolerance is all about learning what ingredients are a suitable substitute when cooking. Recipes should be carefully considered and adapted to remove ingredients that cause the allergy or intolerance. For example:

- Use a gluten-free bread when making a sandwich for someone with a gluten intolerance.

- If cooking for an individual with a lactose intolerance, substitute milk with a lactose-free milk or milk variety such as almond milk, soy milk or coconut milk.
- Substitute soft cheese on a cheese platter for an individual with a lactose intolerance with a tahini spread, pesto or a cashew cheese.

### Activity 4.9 (Inquiry): Supermarket sleuth



Visit your local supermarket or check out your school kitchen pantry and complete an audit of allergens. Copy the table and list all the products you find that contain the allergens in the table. Next, find a suitable replacement for each ingredient that you could substitute.

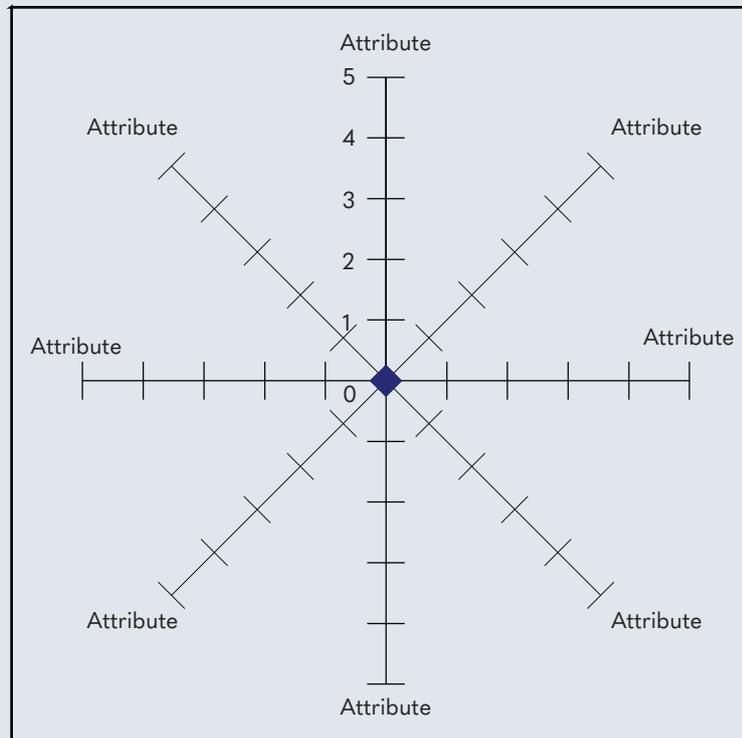
Allergen	Products that contain the allergen – mandatory or voluntary labelling	Suitable substitutes
Gluten	<i>Wholemeal bread</i>	<i>Gluten-free wholemeal bread</i>
Cow's milk		
Eggs		
Peanuts		
Tree nuts		
Sesame		
Soy		
Crustaceans (shellfish)/fish		

- 1 Reflect on your results. List two positives, two negatives and two interesting points you found in your investigation.
- 2 How easy is it to access a balanced diet on a daily basis for someone with an allergy and/or intolerance? Consider availability, cost and variety in your response.
- 3 For a person who has an allergy and/or intolerance, discuss how they are still able to access and use the Australian Dietary Guidelines.
- 4 Research and experiment in the kitchen with one of your suitable substitutes. After your experiment, discuss if this product is going to produce the same sensory properties as the food in cooking as it would if you were to use the original product. Detail the modifications that may need to be made.

### Activity 4.10 (Practical): Sensory analysis of vegetable lasagne



- 1 Modify the vegetable lasagne recipe on pages 110–112 for the following allergies and intolerances. Consider the quantity of the ingredient you would need and how the substituted ingredient will contribute to the final product's sensory properties.
  - a Gluten intolerance
  - b Lactose intolerance
  - c Egg allergy
- 2 Create the vegetable lasagne recipe to cater for the range of allergies and intolerances listed.
- 3 Choose a range of attributes that you think best describe the sensory properties of a lasagne. Copy the star diagram and list each attribute you have chosen around the star.



- 4 Taste test the different variations of lasagne and give a score from 0 to 5 of the intensity of each attribute. Map your results on the star diagram. Use a different colour for each variation of lasagne that you taste test.
- 5 Complete a sensory evaluation of the final products by comparing your data on a star diagram and discuss which lasagne you prefer and why. Consider the differences in each lasagne by analysing your results on each specific attribute. Describe the similarities. Is there an opportunity for a new product to be developed after considering your results and evaluation?
- 6 'You don't have to completely ban a food allergen from the home, but rather be stringent in your home about preventing cross-contamination.' Outline two food safety and two food hygiene practices to provide a safe environment for preventing an allergic reaction.

# Vegetable lasagne

Serves 1-2

## Ingredients

### Pasta



1 cup plain flour



¼ teaspoon salt



1 egg, beaten lightly

### Béchamel sauce



1 tablespoon butter



1½ tablespoons plain flour



1 cup milk

### Lasagne



1 red capsicum, roasted



½ onion, diced



¼ teaspoon mixed herbs



½ eggplant, thinly sliced



1 clove garlic



2 tablespoons tomato paste



200 g sweet potato or pumpkin, thinly sliced



1 tin (410 g) diced tomatoes



60 g mozzarella, grated



2 teaspoons oil

## Method

### Pasta

- 1 Sift the flour and salt together on a clean surface.
- 2 Using your hands, bring the flour into a round mound.
- 3 Make a well in the centre of the flour.
- 4 Pour egg into the centre of the well and, working with the fingertips of one hand, gradually bring in the flour until it forms a dough.
- 5 Firmly knead the dough, using the heel of your hand, for about 5 minutes.

- 6 Cover in plastic and rest in the fridge for 10 minutes.
- 7 Dust the pasta dough and pasta machine rollers with flour.
- 8 Roll the pasta through the pasta machine, going through each setting 2–3 times, then increasing by an increment.
- 9 When you have reached the desired thickness, cut the pasta to fit your dish.

### Béchamel sauce

- 1 Melt the butter in a small saucepan with the flour to form a roux. Do not let it burn.
- 2 Gradually add the milk and stir until smooth.
- 3 Allow to thicken. Remove from the heat.

### Lasagne

- 1 Roast the capsicum and remove the skin by placing hot in a plastic bag.
- 2 Chargrill the eggplant and sweet potato.
- 3 Heat the oil in a frying pan and sauté the garlic and onion until soft.
- 4 Add the diced tomatoes and mixed herbs. Simmer for 5 minutes.
- 5 Spread half the tomato mixture over the bottom of the lasagne dish.
- 6 Top with the sweet potato and then a layer of pasta.
- 7 Spread 1 tablespoon of tomato paste over the pasta sheet, then layer on the eggplant.
- 8 Pour over the remaining tomato mixture, one-third of the cheese and another layer of pasta.
- 9 Spread the remaining tomato paste over the pasta.
- 10 Cover with the roast capsicum.
- 11 Place another layer of pasta, pour over the béchamel sauce and cover with the mozzarella.
- 12 Bake in a preheated oven at 180°C for 20 minutes or until golden brown.



### Evaluation questions

- 1 Consider the ingredients in the lasagne recipe. Discuss how the recipe could meet the dietary requirements for each biological factor listed in the table. Copy and complete the table.

Age	Sex	Pregnancy and lactation	Activity levels

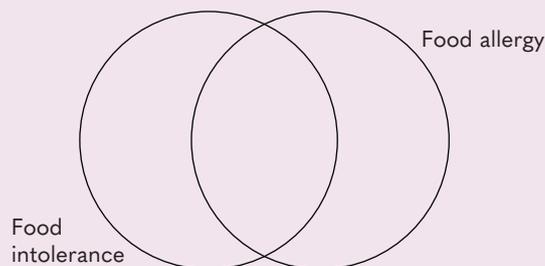
- 2 Discuss three modifications you could make to the recipe to better meet the biological differences in dietary requirements, as listed in the table.
- 3 When cooking this recipe, what allergies and intolerances would you need to be aware of? Explain how you could modify the recipe to cater for the needs of someone with an allergy or intolerance.

## Chapter revision

- Dietary requirements are varied according to biological reasons, including age, sex, activity level, pregnancy and lactation. These factors influence the amount of the nutrient needing to be consumed.
- The Australian Dietary Guidelines and the Australian Guide to Healthy Eating state the dietary requirements we need to maintain a healthy diet for biological reasons, including age, sex and activity level, and for particular lifespan stages such as pregnancy and lactation.
- A food allergy is an abnormal immunological reaction to food caused by a foreign substance, whereas a food intolerance is a chemical reaction that occurs in the body when a particular food or drink is consumed.
- The symptoms for mild to moderate food allergy or intolerance may sometimes be similar, but food intolerance does not involve the immune system and does not cause severe allergic reactions (anaphylaxis).
- To correctly manage a food allergy or intolerance, make careful and appropriate food choices and learn to read food labels. This is the best way to avoid foods that cause allergic reactions.

### Apply your knowledge

- 1 List the biological reasons for differences in dietary requirements.
- 2 Explain why pregnant and breastfeeding women have increased nutritional needs.
- 3 Discuss why the evidence-based principles of the Australian Dietary Guidelines are the most suitable resource to assist with planning daily food intake for age and sex.
- 4 Outline the biological reasons why activity levels of an individual alter the dietary requirements they need for optimal daily food intake. Use an example in your response for a mainly sedentary adolescent compared to an adolescent in elite athletic training.
- 5 **a** Use a Venn diagram to describe the similarities and differences between food allergies and food intolerances.



- b** Provide an example of a food allergy and list two products to be avoided.
  - c** Provide an example of a food intolerance and list two products to be avoided.
- 6 Suggest three ways to manage a food allergy or intolerance.
  - 7 Describe how you would know if someone was having an anaphylactic reaction.
  - 8 Describe coeliac disease and outline the long-term impacts on the body this can cause if an individual is not diagnosed with this condition.
  - 9 Suggest three modifications that a person with a lactose intolerance could make to ensure that they have an adequate diet that is meeting their needs.
  - 10 Outline the information that is mandated on food labels in regard to food allergies and intolerances.

## Practice exam questions



### Question 1 Multiple choice

Which of the following is an allergen identified by Food Standards Australia New Zealand (FSANZ)?

- A Apple
- B Carrot
- C Sesame
- D Sunflower seed

**1 mark**

### Question 2

When lactating/breastfeeding, women must understand the reason for the difference in dietary requirements. The Australian Dietary Guidelines recommend the following minimum serves of the food group listed in the table for women and breastfeeding women aged 19–50 years.

Food group	Serves for women aged 19–50 years	Serves for breastfeeding women aged 19–50 years
Lean meats and poultry, fish, eggs, tofu, nuts and seeds, and legumes/beans	2	2½

For the food group listed in the table, explain why an increased intake is required during lactation.

**2 marks**

### Question 3

A home-made fried rice typically contains many of the following ingredients: white rice, onion, bacon, corn, capsicum, peas, soy sauce, egg, onion, garlic and spring onion.

- a Identify the ingredients that would need to be substituted for a person with a FODMAP intolerance. Justify your response.
- b Outline the symptoms someone with a FODMAP intolerance would experience if these substitutions were not made.

**3 marks**

**2 marks**

# Area of Study 1:

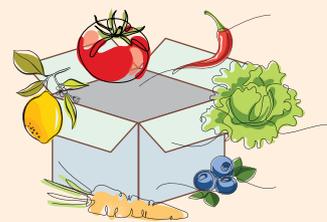
## Extended response question

### Question 1

The Eat for Health Program was developed to promote health and wellbeing and to reduce the risk of diet-related diseases in healthy populations. Justify the science behind why the Australian Dietary Guidelines and the Australian Guide to Healthy Eating are credible sources of dietary information.

**10 marks**

## Let's unpack it



Refer to 'How to unpack exam questions' on pages xv–xvi as a guide to the following question breakdown.

### Question 1

The Eat for Health Program was developed to promote health and wellbeing and to reduce the risk of diet-related diseases in healthy populations. Justify the science behind why the Australian Dietary Guidelines and the Australian Guide to Healthy Eating are credible sources of dietary information.

**10 marks**

**A Annotate the command word:** Justify means to show, prove or defend, with reasoning and evidence, an argument, decision or point of view using given data and/or other information.

**B Parts of question**

**C Count the marks** – holistically marked

**D Determine key words to use**

Credible sources  
 Scientific evidence-based information  
 Peer-reviewed  
 Literature review  
 Australian Dietary Guidelines  
 Australian Guide to Healthy Eating  
 Food Modelling System  
 Research methodology  
 Accurate analysis of data

**E Evidence**

Use your knowledge to provide evidence to support your statements made.





A close-up, slightly blurred photograph of hands preparing food. One hand is holding a green pepper, and another is holding a knife. The background shows various vegetables like tomatoes and yellow peppers. The overall tone is warm and focused on the act of cooking.

## Unit 3

# Food in daily life

### Area of Study 2: Food choices, health and wellbeing

---

In this area of study, students focus on patterns of eating in Australia and the influences on the food we eat. Students look at relationships between social factors and food access and choices, as well as the social and emotional roles of food in shaping and expressing identity and how food may link to psychological factors. They inquire into the role of politics and media as influences on the formation of food habits, beliefs and food sovereignty. Students investigate the principles of encouraging healthy food patterns in children and undertake practical activities to develop a repertoire of healthy meals suitable for children and families.

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# Chapter 5

## Food choices

### Key knowledge

- The patterns of eating in Australia, including recent developments, changes and trends in food purchasing and consumption behaviours.
- The ways in which social factors across Australia, including education, income, location, accommodation, available time and cultural norms, influence responses to food information, food accessibility, food choices and healthy eating.

### Key skills

- Discuss recent changes and current trends in food behaviours.
- Analyse social factors that may influence responses to food information, accessibility, choices and healthy eating through practical activities.

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Video 5.1 Chapter Overview

Why do you eat what you eat? Have your family favourites changed over time? Have you ever talked to your grandparents about what they were eating when they were your age?

The food we eat is influenced by many factors, including changes relating to what's available, **food trends**, cultural norms and available time. Perhaps before you take your next bite, think about why you are eating this food and what has influenced getting it onto your plate.

### Get knowledge ready



- 1 Suggest any food trends or changes in patterns of eating in Australia.
- 2 Describe how being time-poor influences healthy eating.
- 3 Discuss the statement: 'Discretionary foods are the number one issue affecting Australian health today.'

### food trend

a widespread change in food preferences, consumption and behaviour that is often long-lived

### Patterns of eating

Australia's patterns of food purchasing and consumption behaviour are constantly changing. The foods we select and eat can be influenced by new trends, the season, personal preferences, cultural background and other social factors.

Some patterns of eating have a greater influence over food choices and healthy eating. Let's have a look at some changes seen recently that are having a big impact on the Australian diet.



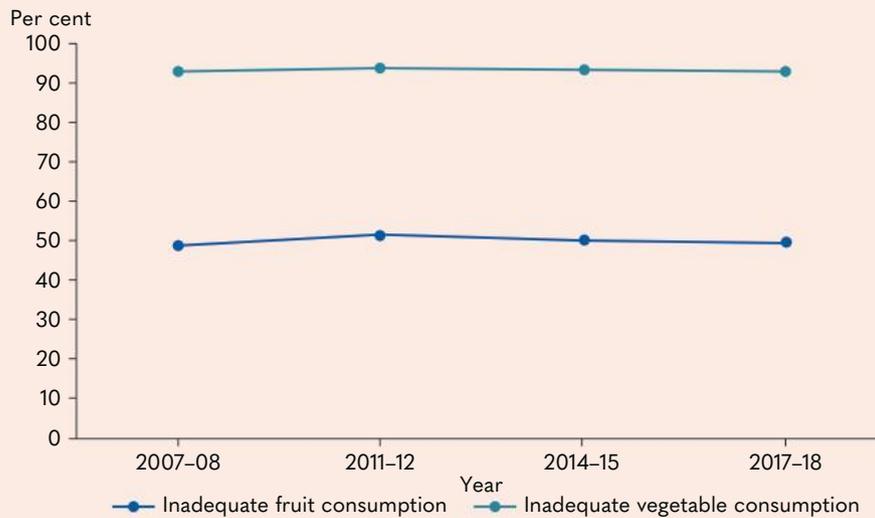
**Let's talk**

Suggest why individuals, families and communities have changed their eating patterns over time.

**Fruit and vegetable consumption**

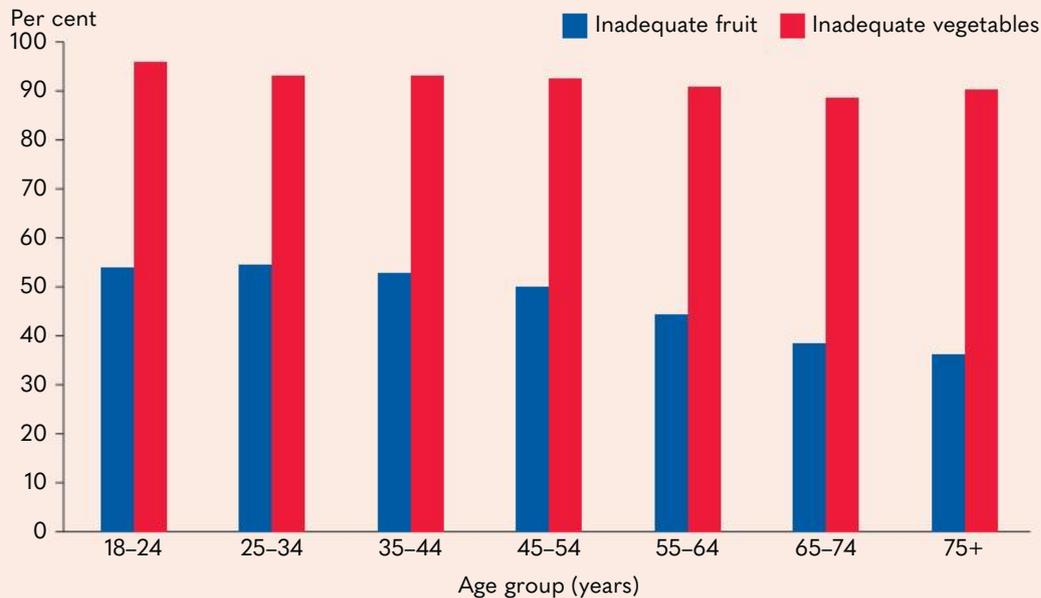
The Australian Dietary Guidelines recommend five serves of vegetables and two serves of fruit every day. Yet Australian consumption data tells a different story. Why is it that fruit and vegetable consumption is not higher? Think about the variety of food available in Australia. It's no wonder the good old fruits and vegetables miss out.

**Activity 5.1 (Data analysis): Patterns of eating fruit and vegetables**



**Figure 5.1:** Trend in the prevalence of inadequate fruit and vegetable intake for persons aged 18 and over, 2007-08 to 2017-18

Sources: ABS 2018; AIHW analysis of ABS 2019.



**Figure 5.2:** Prevalence of inadequate fruit and vegetable intake for persons aged 18 and over, 2017-18

Sources: ABS 2018; AIHW analysis of ABS 2019.

**prevalence**  
the number of people in a population who have a particular characteristic at a specific point in time or period of time

- 1 Outline one trend evident in each of the graphs in Figures 5.1 and 5.2.
- 2 State approximately how many Australians over the age of 18 years met the guidelines for the recommended daily serves of fruit.
- 3 State approximately how many Australians over the age of 18 years met the guidelines for the recommended daily serves of vegetables.
- 4 Suggest why vegetable consumption is lower than fruit consumption.
- 5 Describe two factors contributing to the pattern of fruit and vegetable consumption in Australia.
- 6 Describe the consequences of a diet insufficient in fruits and vegetables.
- 7 Design a meme to encourage people to consume the recommended amount of fruits and vegetables.
- 8 Investigate the food consumption patterns of the other food groups.

### Australia's number one diet issue

Findings from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Healthy Diet Score survey indicate that

discretionary foods are the number one issue affecting Australian diets today.

### Activity 5.2 (Case study): CSIRO's Junk Food Analyser



CSIRO research scientist Dr Gilly Hendrie said new approaches were needed when it came to discretionary foods and Australians' diets.

'Discretionary or junk foods are the number one issue affecting Australian diets today, with excessive consumption resulting in poor nutrition, high rates of obesity and an even higher risk of lifestyle diseases,' Dr Hendrie said.

To help Australians improve their diets, CSIRO has launched a free, online tool to provide the community with a greater understanding of their discretionary food intake and where they can make improvements to their eating habits.

'Launching just in time for those who may have overindulged this Easter, the new Junk Food Analyser provides individuals with specific advice on which categories of discretionary foods they are consuming the most, with the interactive tool providing strategies and tips on where kilojoules can be reduced, which is essential for weight loss,' Dr Hendrie said.

On average, Australian adults are eating about twice as much as what is recommended in the Australian Dietary Guidelines, with a whopping 5.1 servings of discretionary foods consumed each day, the equivalent to about 3000 kJ, or 20 small solid chocolate Easter eggs daily.

The results also uncovered our top weaknesses, with alcohol taking out the top spot (21% of total discretionary food intake), followed by cakes and biscuits (19%), sugar sweetened beverages (12%) and savoury pies and pastries (9%).

'While these types of foods and drinks are often high in sugar, kilojoules and fat, they do bring enjoyment, which means alternative methods must be explored in helping people enjoy their favourite treats in the context of a healthy diet,' Dr Hendrie said.



# Scientists combat Australia's #1 diet issue: junk food

**5.1**  
SERVES

The average amount of discretionary foods eaten daily

**3,000**  
KILOJOULES

The approximate number of daily kilojoules from discretionary foods

**0-3**  
SERVES

The number of discretionary foods recommended in the Australian Dietary Guidelines

5 serves equates to about one of these:



20 mini Easter eggs



¼ of a family bag of chips



10-15 sweet biscuits



1¼ bottles wine



3 bottles of soft drink



½ tub of ice cream

## Why eat less discretionary foods?

**1** Assist with weight loss

**2** Boost your diet quality

**3** Improves your health risk

## Most popular discretionary foods and drinks

#	Category	% of intake*
1	Alcohol	20.8%
2	Cakes & Biscuits	18.7%
3	Sugary Drinks	12.2%
4	Savoury Pastries	9.0%
5	Takeaway	8.1%
6	Processed Meats	7.2%
7	Chocolate & Lollies	6.8%
8	Fried Potato	5.4%
9	Salty Snacks	5.2%
10	Ice Cream	5.0%
11	Snack Bars	1.6%

\*Condiments and fats have been excluded from this calculation

References James-Martin, G.; Baird, DL.; Hendrie, GA.; Strategies to Reduce Consumption of Unhealthy Foods and Beverages: Scenario Modeling to Estimate the Impact on the Australian Population's Energy and Nutrient Intakes, Journal of the Academy of Nutrition and Dietetics, 2020

Hendrie GA, Lyle G, Mauch CE, Haddad J, Golley RK. Understanding the Variation within a Dietary Guideline Index Score to Identify the Priority Food Group Targets for Improving Diet Quality across Population Subgroups. Int J Environ Res Public Health. 2021 Jan 6;18(2):378

## Top ways for reducing discretionary food intake



**Eliminate**  
↓26% reduction in total energy (kJ)



**Halve amount**  
↓17% reduction in total energy (kJ)



**Cut back (eat less often)**  
↓6-18% reduction in total energy (kJ)

Discover if you are eating too much discretionary food and how to cut back with the all new **Junk Food Analyser** at the CSIRO Total Wellbeing Diet



[junkfoodanalyser.com](http://junkfoodanalyser.com)



**Figure 5.3:** The Junk Food Analyser helps Australians have their cake and eat it too!

Source: CSIRO Australia, "New CSIRO tool to combat Australia's #1 diet issue" (7 April 2021)

A range of strategies have been modelled in the Junk Food Analyser to help users reduce kilojoules in an achievable way.

'While the elimination strategy is common in diet programs and can reduce kilojoules the most, the interactive Junk Food Analyser lets users explore a combination of strategies to reduce discretionary food intake, without cutting their favourite foods altogether. That might include choosing to eliminate alcohol, take a break from cakes and biscuits and halve confectionery consumption,' Dr Hendrie said.

'The Junk Food Analyser really does help Australians have their cake and eat it too.

'With the additional support of a balanced and evidence-based framework such as the CSIRO Total Wellbeing Diet, Australians can feel assured that they are embarking on a health journey that fits into their lifestyle, without the sacrifice,' she said.

Source: CSIRO, 'New CSIRO tool to combat Australia's #1 diet issue', 7 April 2021

### Questions

Complete these questions using the data in this case study:

- 1 Name the top five most popular discretionary foods and drinks.
- 2 State the current patterns of eating of Australians.
- 3 Describe the consequences of these patterns of eating.
- 4 Outline the suggested reasons provided for these patterns.
- 5 Explain the strategies suggested to change these patterns of eating.
- 6 Visit the Junk Food Analyser website and complete the survey.

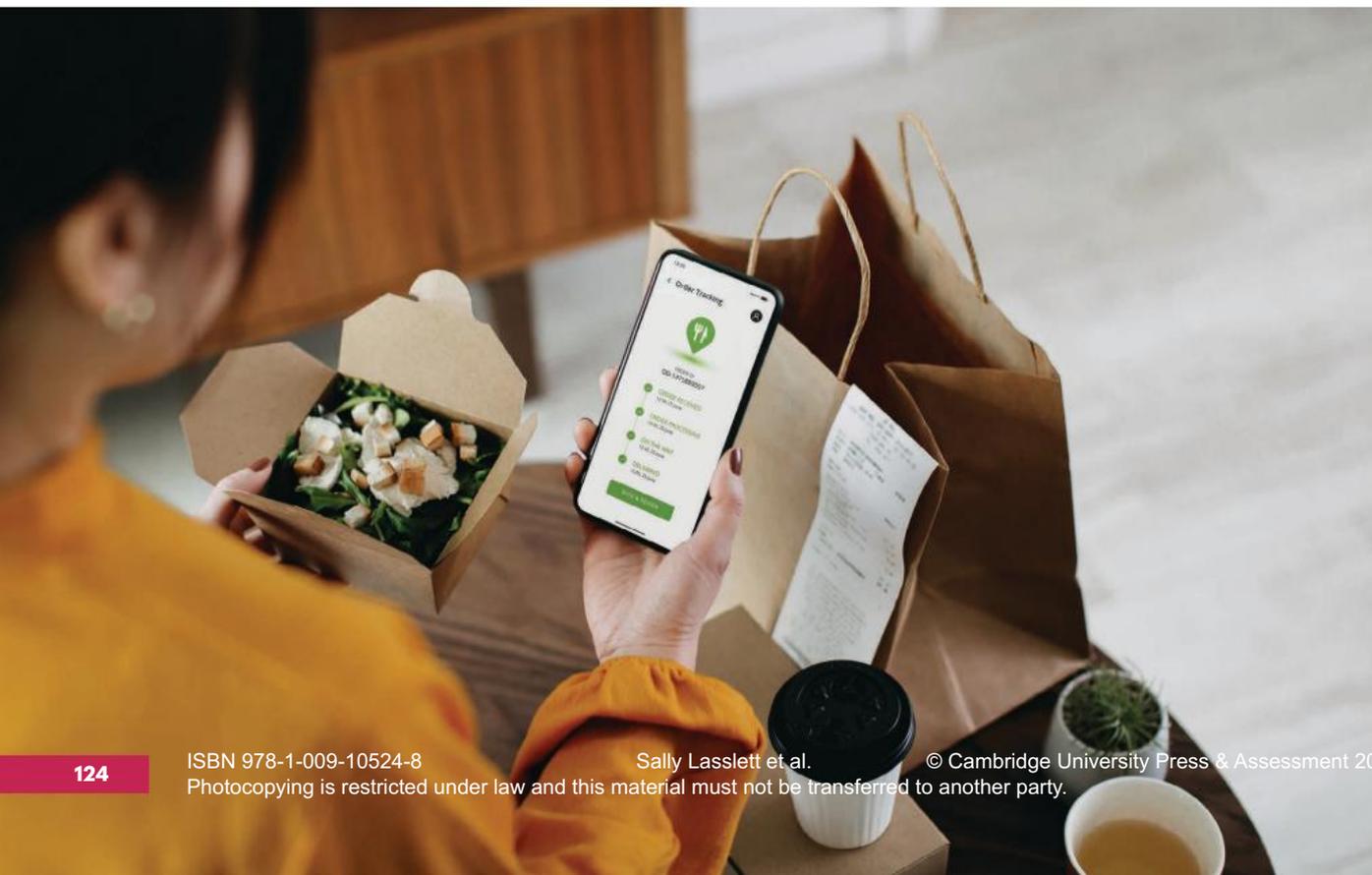


### Let's talk

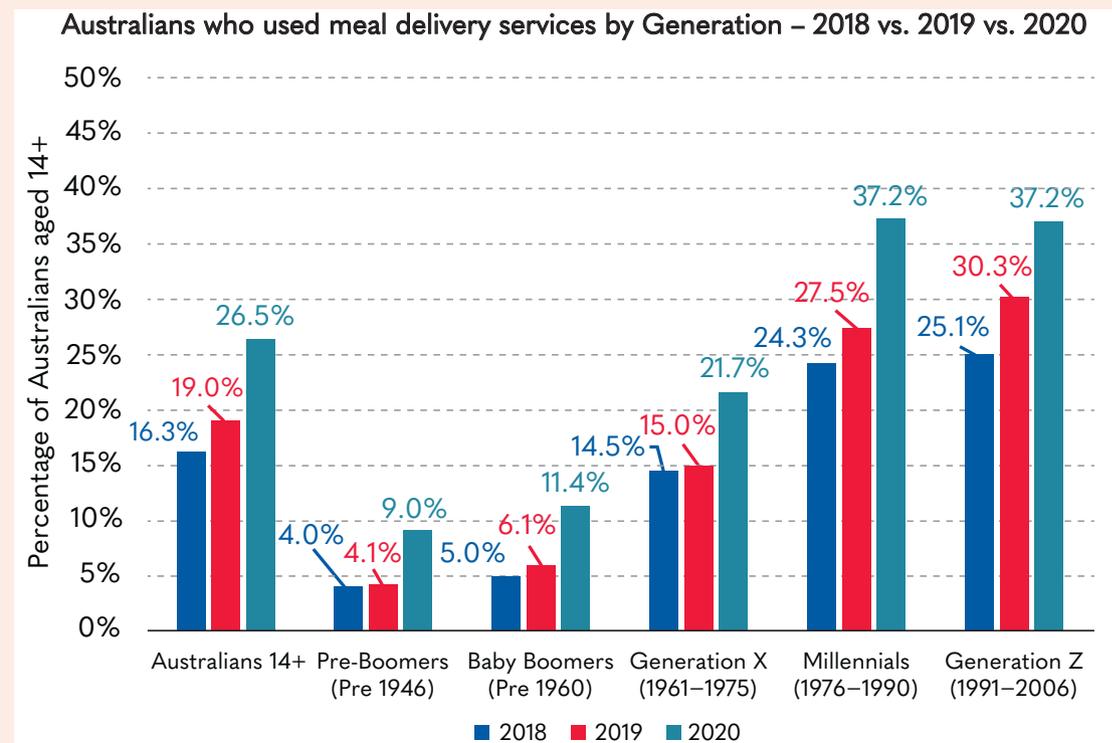
Why do you think that consumption of takeaway foods has increased significantly? How do you think COVID-19 lockdowns have impacted on takeaway and meal deliveries?

### Takeaway and online meal delivery

Takeaway foods, particularly meal delivery services, have seen significant increases in usage.



## Activity 5.3 (Data analysis): Meal delivery services



**Figure 5.4:** Australians who used meal delivery services by generation, 2018–20

Source: Roy Morgan Research

- 1 Outline two trends in the data in Figure 5.4.
- 2 Suggest a reason for each trend.
- 3 Provide two reasons why having access to meal delivery services may have a positive impact on consumers.
- 4 Provide two reasons why having access to meal delivery services may have a negative impact on consumers.
- 5 Predict how meal delivery services may continue to impact current trends in food purchasing and consumption behaviours.
- 6 Investigate the most recent Uber Eats or online meal delivery service usage statistics. Compare these results to the data provided in this chapter.

## Activity 5.4 (Practical): Beat the burger



- 1 Order a hamburger from an online delivery service (or your local takeaway).
- 2 Prepare your hamburger using the following recipe.  
Can you beat the burger?

# Hamburger

Serves 1

## Ingredients

### Burger



120 g beef mince (or vegan alternative)



1 tablespoon tomato sauce



2 teaspoons Worcestershire sauce



1/2 teaspoon mixed herbs



1/2 onion, finely diced



1/2 carrot, grated



1/2 clove garlic, minced



1 tablespoon breadcrumbs



2 teaspoons olive oil



1 multigrain hamburger bun



1 tablespoon mayonnaise



1 slice cheese



1 lettuce leaf



1 slice tomato

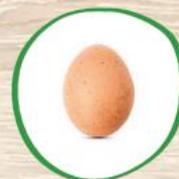


2 slices beetroot

### optional ingredients



1 bacon rasher



1 egg



1 pineapple ring



2 slices pickle



1 teaspoon mustard



1 tablespoon tomato sauce



1 tablespoon BBQ sauce

## Method

- 1 In a medium-sized bowl, combine the mince, tomato sauce, Worcestershire sauce, mixed herbs, onion, garlic, carrot and breadcrumbs. Make sure the ingredients are mixed well.
- 2 Shape into a ball and then flatten to form a meat patty.
- 3 Heat the olive oil in a frying pan and cook the burger, making sure you turn the patty only once to avoid it breaking apart.

- 4 Toast the hamburger bun under the grill. Spread with mayonnaise. Cook any optional ingredients.
- 5 Place the beef patty in the bun, then add the lettuce, cheese, tomato and beetroot.
- 6 Serve.



### Evaluation questions

- 1 Copy and complete the product analysis table.

	Home-made burger	Delivery burger
Cost		
Time taken to prepare/ deliver		
Sensory analysis: <ul style="list-style-type: none"> <li>• Appearance</li> <li>• Aroma</li> <li>• Taste</li> <li>• Texture</li> </ul>		

- 2 Determine which burger was the best value for money. Justify your response.
- 3 Determine which burger was the quickest. Justify your response.
- 4 Explain which hamburger was the healthiest choice.
- 5 Suggest why people are using online meal delivery services over home-made meals.
- 6 Outline ways people could be encouraged to make their own burgers at home rather than use delivery services.

**Activity 5.5 (Practical): Meal boxes**

Healthy meal subscription boxes are a popular, convenient and growing trend in Australia.

- 1 There are over 21 home meal delivery services available in Australia. How many can you list?
- 2 Research the current patterns of healthy meal box subscriptions.
- 3 Design a meal that could be included in one of these meal boxes.
- 4 Present your final meal solution as a recipe card, like those provided in the box when delivered.

**Activity 5.6 (Inquiry): Food purchasing and consumption**

Research recent changes and current trends in food purchasing and consumption behaviours. Present your findings as an infographic to share with your class.

**Let's talk**

Patterns for the consumption and purchasing of food change over time. How have your patterns changed over time?

**Social factors**

There are a range of factors that influence the food we eat. These factors, known as social factors, have a clear relationship between food access, food choices, healthy eating and individual food behaviour.

**Let's talk**

How do your friends influence the food that you eat? What social occasions do you attend where food is served?





**Figure 5.5:** Social factors that influence responses to food information, food accessibility, food choices and healthy eating

## Education

Education is how we gain knowledge and skills about food. Having the skills to critically read and analyse food information enables consumers to make informed decisions about their food choices and behaviours.

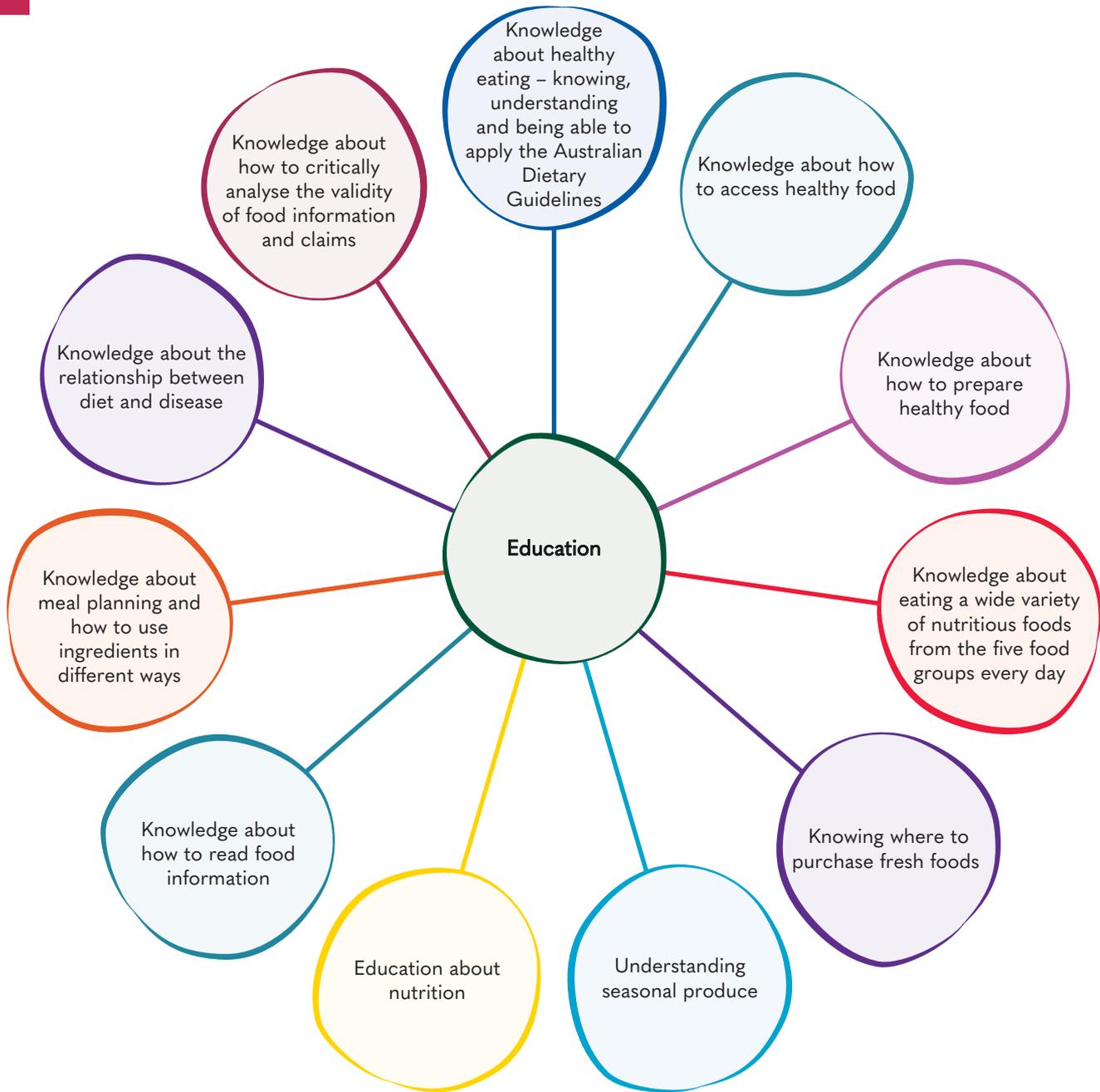
Being knowledgeable about food enables us to select and prepare food in a safe and hygienic manner. It also allows individuals and families to have the skills to produce a range of food items. Understanding what constitutes healthy eating and what are better food choices stems from being educated.



**Figure 5.6:** Cookbooks are a good source of education about food.

Access to education and the resources required is also important in our ability to gain knowledge and skills about food. Those who have access to the tools required, such as

cookbooks, online video clips and TV cooking shows, will gain more food knowledge and skills than those who do not have access.



**Figure 5.7:** Education about food has a wide-ranging influence on our lives.

**Activity 5.7 (Inquiry): Food knowledge**



- 1 List everything you know about this vegetable.
- 2 Where has your education about vegetables come from?
- 3 Describe how having education about this vegetable or different cooking methods would influence individuals and families to regularly incorporate this vegetable into their weekly meal plan.
- 4 How might the social factor of education be used to influence more people to choose to consume this vegetable?

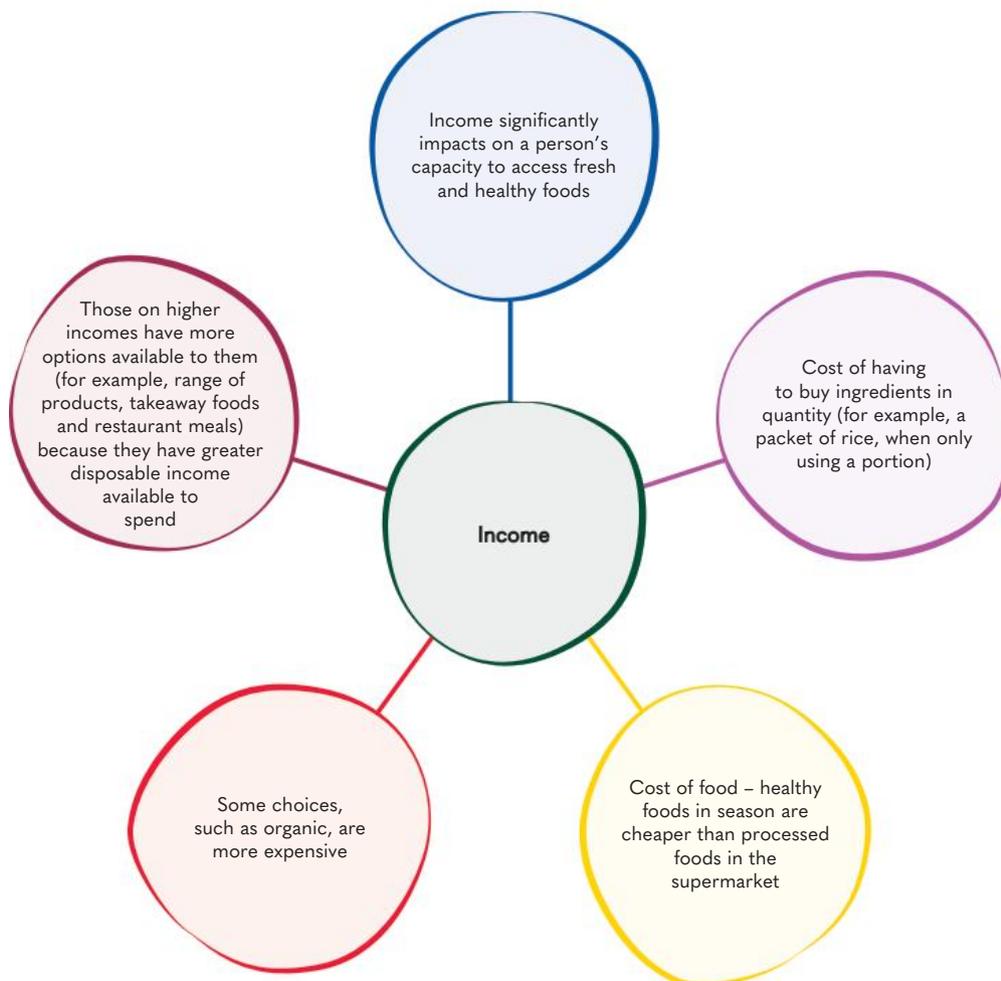


**Let's talk**

Where and how did you learn to cook? What education have you had about how to combine ingredients?

**Income**

The amount of money that we have available to purchase food, whether that be at a supermarket or in a restaurant, for example, can influence our food choices in a number of different ways. Those with access to a secure high income will have significant variation in the types and amounts of foods they can purchase, compared to those who have lower or insecure income. The amount of money you have greatly impacts the food available to you, how readily you can access certain foods, your food choices and your ability to eat healthy foods.



**Figure 5.8:** The impact of income on food choices

**Activity 5.8 (Practical): Meat-free meal**

Working in pairs, each person is to plan a meat-free meal, consisting of at least three vegetables and a protein source.

One person has a budget of \$5. The other person has a budget of \$15.

- 1 Plan and produce your meal.
- 2 Conduct a sensory analysis to compare your meals.
- 3 Analyse how the social factor of income influences food accessibility.
- 4 Analyse how the social factor of income influences healthy eating.

**Location**

Where you live makes a significant difference to what you can buy or order, the amount of choice and cost of foods. Particularly impacted can be the range of fresh ingredients and new products available. People living within major cities are exposed to increased food accessibility options, such as markets, delis, supermarkets and

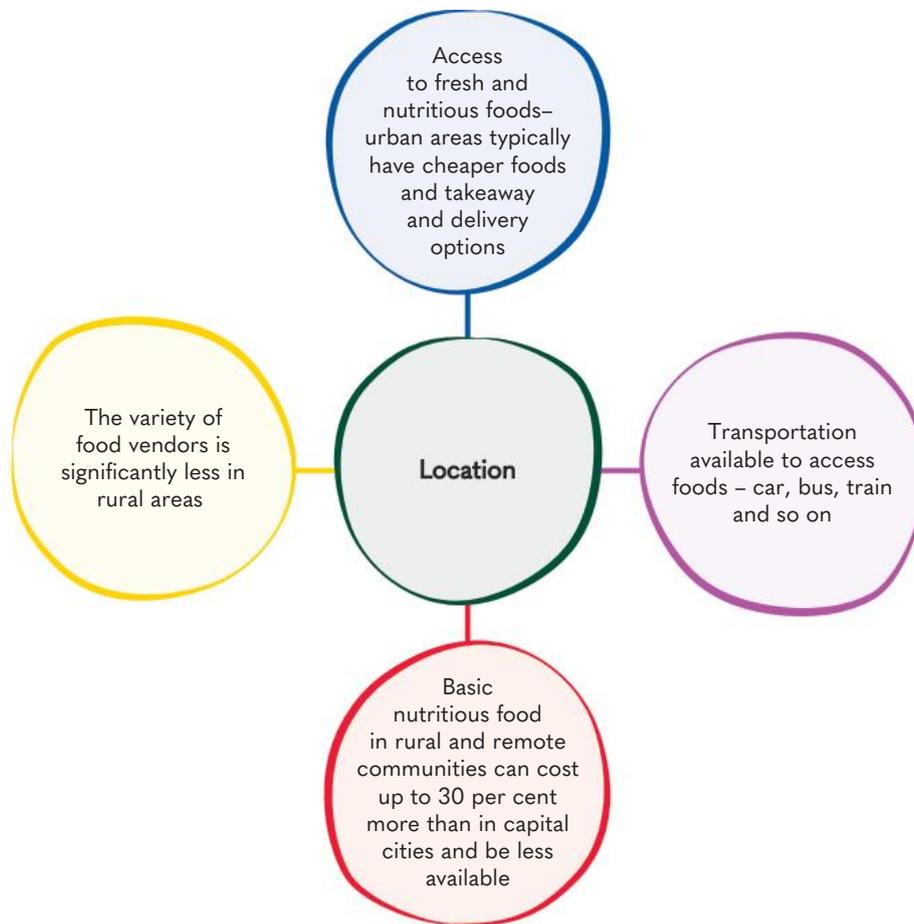
gourmet food stores. This range of options provides greater access to a variety of foods from different cultures and cuisines. People who live outside major cities are less likely to have a range of places to purchase their foods and reduced options on the shelves, as businesses will tend to stock products that are guaranteed to be sold in this area. There are also fewer options to purchase food made outside the home.



**Figure 5.9:** The location of remote communities has a significant impact on their food purchases.

**Let's talk**

Suggest how transportation impacts a person's food accessibility and food choices.



**Figure 5.10:** Geographic location affects many issues around food choices.

 **Let's talk**

Explain why a bunch of broccoli might cost more in a regional location than in a city.



### Accommodation

Many of us are lucky enough to live in a house and have access to the cooking equipment required to prepare a meal. For some in our community, having access to cups, plates, a microwave and an oven is a luxury. How can you even begin to think about cooking a delicious meal if your home is your car?



**Figure 5.11:** When finding a place to sleep at night is your first priority, purchasing and cooking a meal are certainly not at the top of your list.

Many apartments are developed without big kitchens. The kitchens are very basic in terms of cooking equipment, as the intention is that the residents of this form of accommodation purchase takeaway meals or eat out.

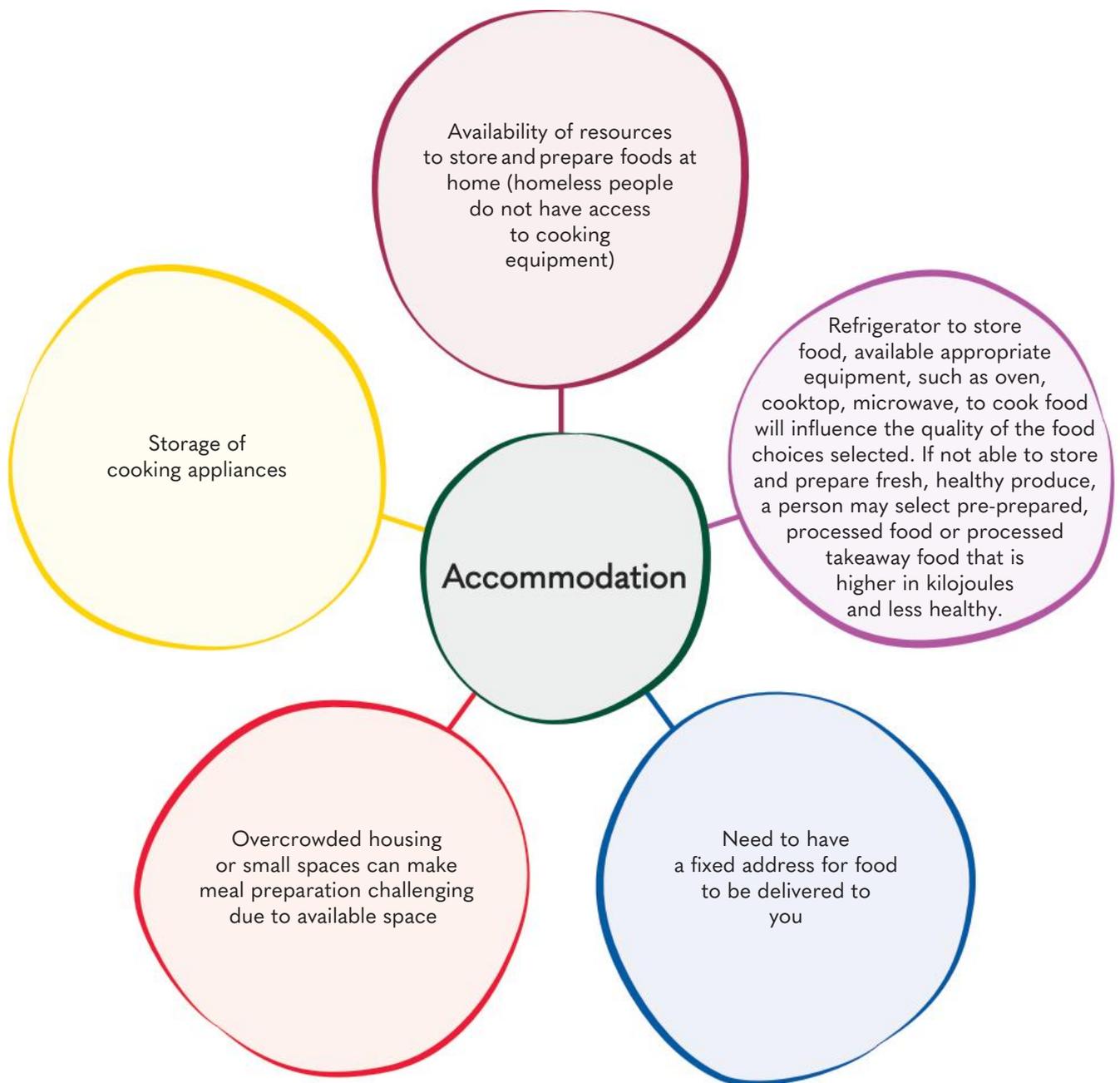
Big families living together in a house with a proper kitchen may be more likely to prepare and eat a meal together. Cooking a meal in this sort of accommodation becomes part of family life.

### Activity 5.9 (Inquiry): Moving out of home



Some people choose to leave the family home when they commence tertiary education. Some may choose to live on campus in university accommodation, while others move into shared accommodation. This may impact the types and amounts of foods a person can purchase.

Take a virtual room tour of the university apartments available in Victoria. Compare these to shared residency housing. Discuss how each would impact a person's ability to complete a weekly grocery shop.



**Figure 5.12:** Food choices are determined by the type of accommodation available.



### Let's talk

How does having a kitchen influence healthy eating? Discuss the impact having refrigeration has on food purchasing.

Describe the barriers that people who are experiencing homelessness could face in food access, food choices and healthy eating.

### Activity 5.10 (Practical): Using equipment



Design a healthy meal that can be cooked with the following equipment:

- one small saucepan
- one wooden spoon
- one butter knife
- one plate
- stove top – one working burner.

### Available time

Now more than ever individuals, families and communities are experiencing time pressures. Our fast-paced, instant, modern world sees people juggling to balance their time. We never seem to have enough time to cook. Whether it's going to work or school, being a parent, sleeping, playing sport or whatever else we do with our time, there is never enough of it.

One of the biggest losers in our busy lifestyle is available time for healthy meal preparation in the home. Food planning and preparation – and therefore good food choices – are often the things that suffer. Processed, convenience

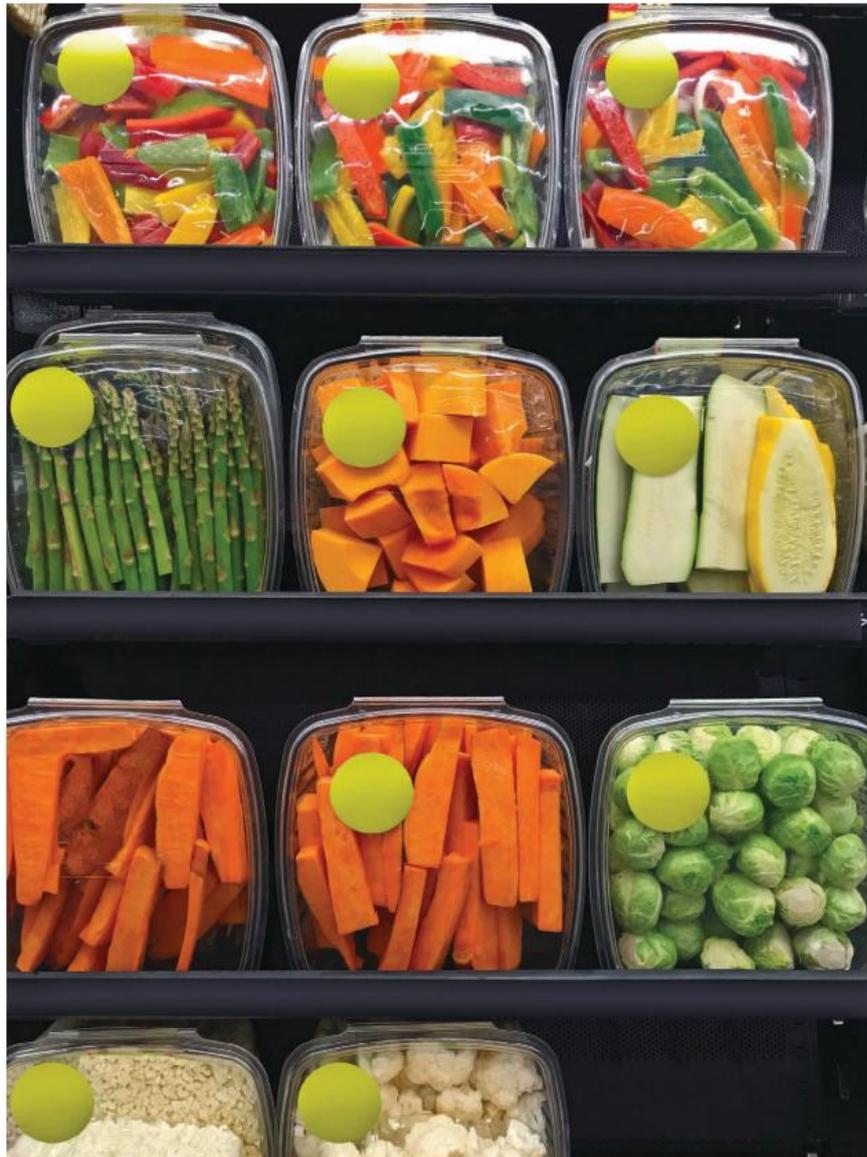
and fast foods are frequently useful for those who are time-poor.

Convenience foods have become a growing market, with many consumers looking for quick and easy meals, either delivered to the home, eaten outside the home, or short cuts for meal preparation.



### Let's talk

Suggest reasons why individuals, families and communities are time-poor.



**Figure 5.13:** Discuss the advantages and limitations of pre-cut vegetables. Consider available time, income and environmental sustainability.



**Figure 5.14:** Factors influenced by the time available to access and prepare food

**Activity 5.11 (Practical): Product test – scrambled eggs**



Investigate and purchase an instant scrambled egg product such as Primo Scrambles and complete the questions for the product you choose.

- 1 Suggest who this product is targeting.
- 2 Identify the social factors that have led to the development of this product.
- 3 Describe how these social factors could influence a person to buy a product like this.
- 4 Complete a comparison between this product and a home-made scrambled egg equivalent.
- 5 Copy and complete the product analysis table.

	Instant scrambled eggs	Home-made scrambled eggs
Cost		
Time taken to prepare		
Sensory analysis:		
• Appearance		
• Aroma		
• Taste		
• Texture		

### Cultural norms

Australia is a truly multicultural society, and this is reflected in the variety of foods we have available. Increasingly, we are seeing the growth of staple foods from different cultures in supermarkets and local farmers' markets. International supermarkets increase the availability of specialist foods from international suppliers. The availability of international foods diversifies our food systems and enables migrants to still cook and enjoy foods from their cultural backgrounds.

The so-called Australian culture is a wonderful mix of so many cultures and food traditions. The innovative flavours and techniques used to prepare the abundant fresh foods we have in Australia make for a very special cultural food mix that is part of the everyday Australian food culture.

Culture not only relates to the foods we eat, but the behaviours we engage in surrounding foods. In some households, you will find people eating from communal dishes and eating with their hands, while in other households, people will have individual portions that are consumed with a knife and fork or chopsticks. Cultural norms at birthdays see some gather around a cake, while others are presented with longevity noodles.



#### Let's talk

What did you eat yesterday? Last week? Chat about the food that you eat regularly at home. Identify the foods and ingredients that have been influenced by Australia's cultural diversity.



**Figure 5.15:** Lygon Street in Carlton is one of Melbourne's many dining precincts that feature international cuisine, reflecting Australia's cultural diversity.

# Sushi

Serves 2

## Ingredients



$\frac{3}{4}$  cup water



$\frac{3}{4}$  cup sushi or  
koshihikari rice



1 tablespoon  
sushi seasoning  
or rice vinegar



1 teaspoon  
caster sugar



$\frac{1}{4}$  teaspoon salt



4 nori sheets



$\frac{1}{2}$  cucumber,  
sliced



$\frac{1}{2}$  red capsicum,  
sliced



100 g tuna, tinned



2 teaspoons  
mayonnaise

## To serve



Soy sauce



Wasabi



Pickled ginger

## Method

- 1 Bring  $\frac{3}{4}$  cup of water to the boil. Stir in the rice and reduce to a simmer. Cover and leave until the rice has absorbed the water, about 12 minutes. Drain when cooked.
- 2 In a small bowl, mix the sushi seasoning or rice vinegar, sugar and salt.
- 3 Add the liquid mixture to the cooked, drained rice.

- 4 Mix the tuna with the mayonnaise.
- 5 Place a nori sheet shiny side down onto a sushi roll mat.
- 6 Spread  $\frac{1}{4}$  of your rice evenly over the nori, leaving a 2 cm strip empty at one end.
- 7 Arrange  $\frac{1}{4}$  of all your filling ingredients in a line down the centre of your rice.
- 8 Gently lift the sushi mat and roll it over your filling ingredients, pressing down gently. Keep rolling until your mat is completely rolled. Repeat the process.
- 9 Cut each roll into 4–6 pieces with a sharp knife.
- 10 Serve with pickled ginger, soy sauce and wasabi.



### Evaluation questions

- 1 List the ingredients in this recipe that would not have been available in the supermarket 30 years ago.
- 2 Suggest three different ingredients you could modify in this recipe and explain your reason why.
- 3 Name two social factors and describe how each of these has influenced the availability of sushi in Australia.

### Activity 5.12 (Inquiry): Cultural norms



Visit your local supermarket.

- 1 List five foods that are available for purchase that could be considered cultural staples.
- 2 For each product, suggest the culture it reflects.
- 3 Describe how the social factor cultural norms influences food accessibility.
- 4 Describe how the social factor cultural norms influences healthy eating.

## Chapter revision

- Patterns of eating in Australia have changed over time. These changes can be the result of trends in food purchasing and consumption behaviours.
- Some changes include underconsumption of fruits and vegetables, and increased use of takeaway and online delivery services, consumption of discretionary foods and healthy meal box subscriptions.
- Social factors influence responses to food information, accessibility, choices and healthy eating.
- Social factors include education, income, location, accommodation, available time and cultural norms.

### Apply your knowledge

- 1 Discuss a recent change or current trend in food behaviours.
- 2 Discuss how food trends influence food purchasing behaviours.
- 3 List the social factors.
- 4 Describe how accommodation influences healthy eating.
- 5 Explain how location impacts the price of food.
- 6 Explain how the lack of public transport can impact a person's ability to complete a weekly food shop.
- 7 'Hot pies, cold drinks' is synonymous with attending an AFL game. Describe how cultural norms can impact food choices.

## Practice exam questions



### Question 1 Multiple choice

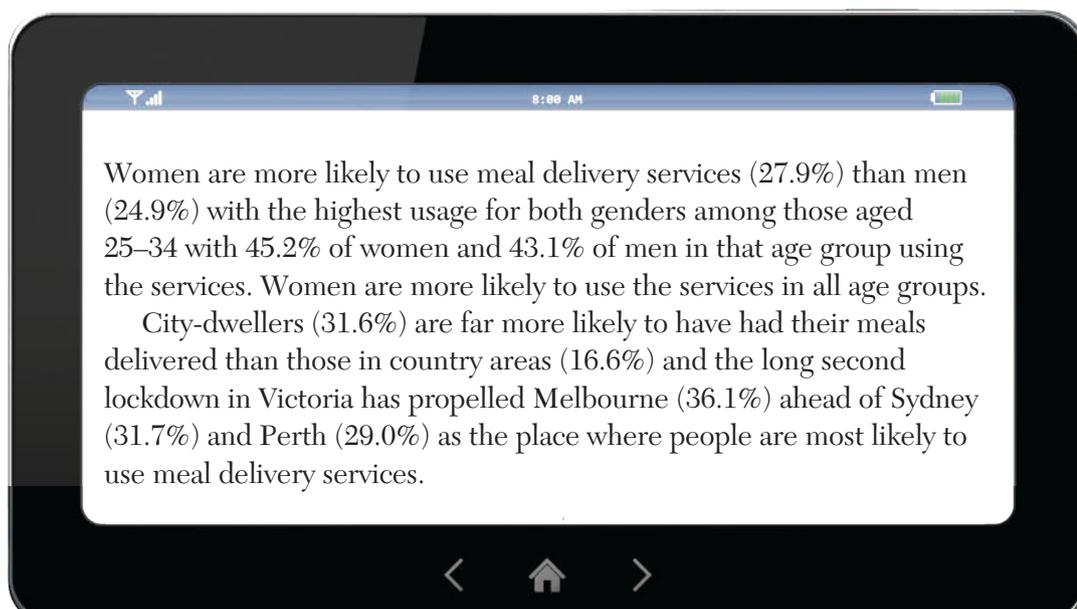
A current social media campaign focused on how to use up what's in your fridge is supporting the recent food development addressing patterns of household food waste.

This campaign is seeking to influence which social factor?

- A Income
- B Location
- C Education
- D Food behaviours

1 mark

### Question 2



**Figure 5.16:** Data from Roy Morgan, 'Meal delivery services Uber Eats, Menulog, Deliveroo and DoorDash experienced rapid growth during 2020 – a year of lockdowns & work from home', 28 May 2021

Source: Roy Morgan Research

Select two social factors and describe how these could account for the data in Figure 5.16.

6 marks

### Question 3

Your school wants to put in a community garden. Using two social factors, justify the benefit of this for the community.

6 marks

## Chapter 6

# *Roles of and responses to food*

### Key knowledge

- The social and emotional roles of food in shaping and expressing individual identity and connectedness, including its sharing and celebratory role within families, peer groups and communities.
- The role of food in influencing mental health.

### Key skills

- Explain social and emotional roles of food, analyse behaviours and discuss consequences relating to the psychology of food through practical activities.

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Is a celebration even a celebration without food? Have you ever noticed how food is actually what all cultures and communities have in common? Food is more than nutrition; it is something that brings us all together. It helps define who we are, and helps to connect individuals, families and communities. Food plays such important **social** and **emotional** roles.

Food also has a role to play for an individual to experience positive mental health. Building on your understanding of the role of gut microbiota in health from Chapter 2, this chapter will take a deeper look into understanding the role of food in influencing mental health.



**Video 6.1** Chapter Overview

### Get knowledge ready

- 1 Name foods that have a role in celebrations.
- 2 Explain how food can promote connectedness within communities.
- 3 Suggest how your food consumption and habits can influence your mental health.

### *Social and emotional roles of food*

Food connects us socially, getting together for a meal, sharing a picnic or even just meeting for a coffee and a catch-up, food is

social. Food also plays an emotional role. It helps to make connections to feelings and the occasions we are celebrating. These connections leave lasting memories for us.

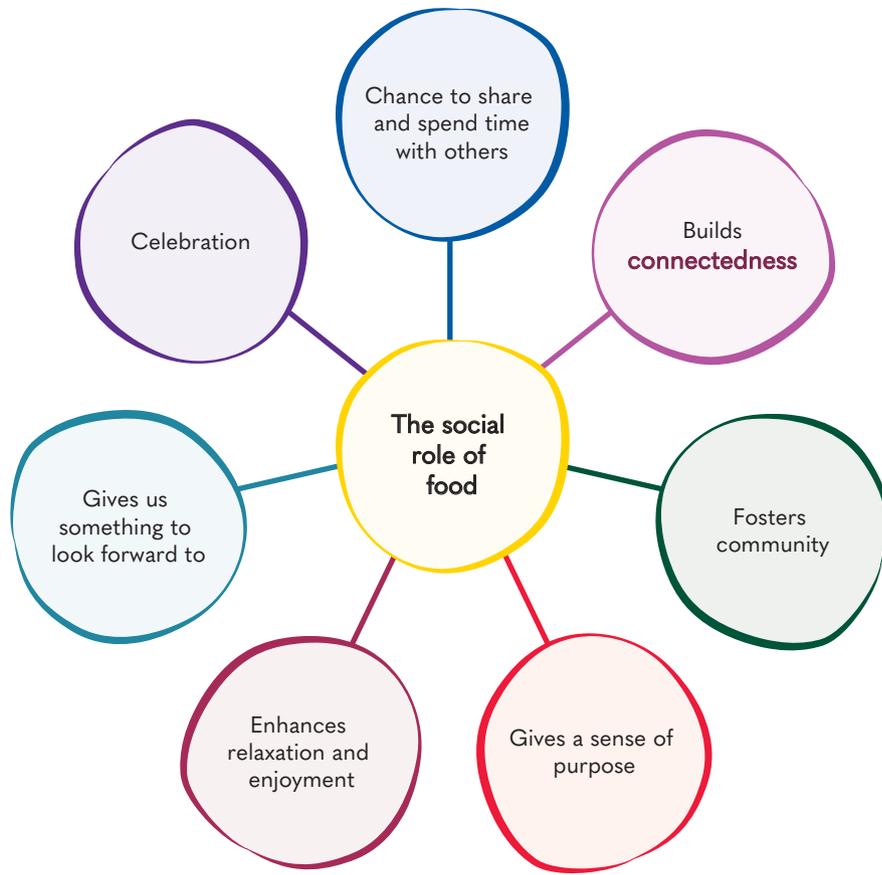


**social**  
relates to interaction with other people

**emotional**  
a state or feeling

**connectedness**

a feeling of belonging to or having an affinity with a particular person, group or as a family



**Figure 6.1:** The many different social roles of food for individuals, families, peer groups and communities

**identity**

who a person is or the qualities of a person that makes them different from others

**Individual identity**

You probably have never thought of defining your **identity** through food, but food does have a role in expressing individuality. The choices we make, the foods we celebrate with, the importance of what we consume

on an everyday basis – all are part of us developing our own individual identity with food. Our experience with food provides us with our identity and the social and emotional connections with certain foods or occasions when food is consumed.

**Figure 6.2:** For many people, cooking for others is a way of expressing their love.





**Figure 6.3:** Being a good cook or taking pride in what you cook can be an integral part of a person's identity, especially as a nurturer.

### Activity 6.1 (Investigate): Foods consumed inside and outside the home



- 1 Think about the food you have eaten over the past two weeks. Record what you ate according to where you ate it, inside or outside the home, and state whether or not it was in a social setting.

**Foods consumed inside the home**

**Foods consumed outside the home**

- 2 Name the social setting in which you consumed the food.
- 3 Analyse how the foods you consumed outside the home were influenced by the people you were eating with.
- 4 Discuss the differences between food consumed inside and outside your home.
- 5 Evaluate the nutritional value of the foods consumed inside compared to outside your home.
- 6 Describe how eating outside the home makes you feel.
- 7 Describe how eating inside your home can be social.

## Vegetarian

Food choices and habits can be highly individual and become part of a person's individual identity. Vegetarianism has existed for many thousands of years and there are a number of factors that may influence a person's decision to adopt a vegetarian or vegan lifestyle.

Today, vegetarians hold many and varied social, emotional and ethical beliefs or values

that determine this personal choice. An individual may choose to be a vegetarian for a variety of reasons, which can include:

- importance of diet in maintaining health
- an interest in Eastern philosophy and religion
- a concern about animal welfare
- a concern for the degradation of the environment.



**Figure 6.4:** This choice can also form a strong connection to expressing individual identity.



### Let's talk

What is the difference between a vegan, an ovo-vegetarian, a lacto-ovo vegetarian and a lacto-vegetarian?

### Activity 6.2 (Inquiry): Vegetarian food



- 1 Describe how choosing to become a vegetarian can affect the planning of meals for families and communities.
- 2 Many products have hidden animal products. Visit your local supermarket or online shop to find three food products that look as if they could be vegetarian, but aren't.

## Culture/religion

All cultures and religions have a strong connection with food, socially and emotionally. For many individuals, their culture or religion shapes and expresses their individual identity. Food plays an important role in many cultural and religious celebrations.



### Let's talk

What foods do you eat for special cultural occasions? Who makes that food and when do you eat it?

### Activity 6.3 (Case study): Chinese New Year



More than two billion people all over the world celebrate the beginning of the lunar year on the first full moon in the first month of the Chinese lunar calendar. Traditionally, this time was when people prayed to the harvest gods to ensure that their next year's harvest would be abundant. Today, this has changed but praying plays a role, as remembering your ancestors as family is one of the more important activities during this celebration.

There are many traditions and superstitions associated with Chinese New Year, including lucky Lunar New Year Foods.



**Figure 6.5:** Longevity noodles are a popular Chinese New Year dish. Individuals use their chopsticks to seek out the longest noodles, which bring the promise of a long life.

#### Questions

- 1 Research foods associated with Chinese New Year. List each food and what it symbolises, then copy and complete the table.

Lunar New Year's food	What this food symbolises

- 2 Research three more facts about Chinese New Year.
- 3 Explain how the foods eaten during this celebration help build community connectedness.
- 4 Outline how celebrating Chinese New Year might help to express individual identity.

**Activity 6.4 (Practical): Cultural food celebration**

Investigate another example of a food from a cultural or religious celebration.  
Prepare this food item and have a cultural food celebration as a class.

**Connectedness**

In many families, food is what brings people together. Spending time in the kitchen producing food to be shared with extended family and loved ones is the norm and an integral part of their heritage and culture.

Specific foods can also become family favourites, shared on special occasions, such as plum pudding at Christmas or besan laddoo during Diwali.



**Figure 6.6:** Specific foods can also become family favourites, shared on special occasions, such as plum pudding at Christmas or a particular chocolate cake made for birthdays.

It might be a Taco Tuesday or a special meal that brings a family together each week. For some families, it used to be a roast at Grandma's on Sunday. Who still follows this tradition of connectedness?

Food not only brings families together, it is often used to bring communities together. Food and eating is something we all have in common.



### Let's talk

In Sweden, it is important that all family members eat the same food. Suggest why this might be the case and how it influences connectedness as a family. How does this food 'rule' apply in your house?

**Figure 6.7:** Food brings families together, creating a family bond.



**Figure 6.8:** Is a birthday even a birthday if there isn't cake? What happens on your birthday? Is there a special birthday cake that is made every year?





### Let's talk

Do you come together as a family to eat your meals? Suggest why.



**Figure 6.9:** In some households, the entire family comes together in summer to make the year's supply of passata. Everyone has a job or role in the process.

### Activity 6.5 (Practical): Food traditions



Some families have traditions that involve food, bringing people together, such as Sunday night roast, cake celebrations, Taco Tuesday or Iftar.

- 1 List your family/household traditions that involve food.
- 2 Explain the social role of food for you and your family/household.
- 3 Explain the emotional role of food for you and your family/household.
- 4 Describe how food can enable the expression of connectedness within a family or group of people.
- 5 Do you have any family or traditional recipes that have been handed down over generations? Describe how these recipes can connect different generations.
- 6 Prepare your traditional or special recipe, sit as a class and enjoy a meal together.

## Peer groups

Peer groups often socialise around food. Hanging out with your friends for the day often includes having a bite to eat together, either sharing a meal at home, or heading out.

Pandemic picnics: it's a feel-good movement, and one that many will recall after lockdown. Involving social connection and celebration

around food, picnics fast became the safest way for friends and family to gather in small groups, outdoors, with a platter in the park.

### Activity 6.6 (Practical): Picnic platter



Plan a picnic to share with your friends. Develop a 'platter for the park'.



**Figure 6.10:** Not only does sharing food with friends help build feelings of connectedness with what is served, but it can also encourage healthy food behaviours and consumption.

## Communities

Food is often used to bring people together; it develops food communities. Sharing a meal or freshly grown produce, leftovers or even a special treat can strengthen bonds between people and unite individuals from all different cultures into bigger social communities, including those who identify with different celebrations and religions.

Food also provides the opportunity for people to share their culture, traditional foods and special treats. My next-door neighbour makes us pizza and gnocchi. Are you lucky enough to have an amazing neighbour or friend like this?

Sharing food enables community members to observe similarities, to connect with each other through food and build empathy with others.

## Activity 6.7 (Case study): Veg Out Community Garden



**Figure 6.11:** Located in St Kilda, the Veg Out Community Garden connects people through their love of gardening and food.

Source: Veg Out Community Garden

Veg Out is an organic, chemical free community garden run by volunteers and located in St Kilda, Melbourne, Australia.

Formerly a lawn bowling green, the land Veg Out is situated on is administered by the local council for the state of Victoria, and has been permanently reserved for public use since 1881. We have over 140 garden plots, where members, friends, families and community groups enjoy getting their hands into the soil. Many have little or no gardening experience – but they soon learn, as advice, seedlings and friendships are readily shared.

A commitment to a sense of community, conservation and organic gardening principles underpins all activities on the site. Unlike most community gardens in Melbourne, Veg Out lacks rigid barriers between common land and each plot; the paths curve and meander; flowers, vegetables and artworks have equal standing; the rabbits, chickens, budgies and quails add yet another dimension; and the friendships that have sprung up between gardeners, artists and visitors make the gardens an oasis of calm in one of Melbourne's busiest tourist precincts.

Source: Veg Out

### Questions

- 1 Explain the benefits of this community garden to individuals.
- 2 Discuss the role of this garden in building connectedness in the community.
- 3 Suggest how this community garden is influencing the diet of those involved.
- 4 Outline the importance of this community garden in creating social connections.
- 5 Think about and then explain how you could go about creating a social community connection that focuses on food in your area.

## Activity 6.8 (Debate): Class line debate



As a class, divide into two teams or sides.

Make a line and conduct a line debate on the topic: 'Food should not be used as a reward'.

You can rebut the comment from the person before you or add in a new point for your side.

# Tear and share bread

## Ingredients



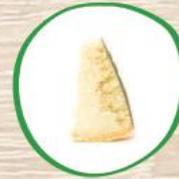
3 cups (300 g)  
plain flour



1 teaspoon oil



1 clove garlic



1 tablespoon  
parmesan  
cheese



1 teaspoon salt



1 teaspoon milk



1 teaspoon  
dried basil



125 g  
mozzarella or  
bocconcini



2 teaspoons  
dried yeast



1½ cups (375 mL)  
warm water



6 sundried  
tomatoes



2 teaspoons  
olive oil (extra)



1 tablespoon  
skim milk  
powder or milk



12 black olives

## Method

- 1 Mix the flour, salt, yeast and milk powder together in a medium bowl.
- 2 Add the oil, milk and warm water. Mix to form a soft dough.
- 3 Cover closely with cling wrap and allow to prove in a warm place, until doubled in size, about 20 minutes.
- 4 Using a mortar and pestle, crush the garlic, tomatoes and olives. Add the extra olive oil, parmesan cheese and basil, and season with salt and pepper. Form into a paste.
- 5 Turn the bread dough onto a lightly floured surface and knead for 3–5 minutes, until just smooth.
- 6 Preheat your oven at 220°C.

- 7 Divide the dough into 2 equal pieces. Roll and stretch these into 2 identical circles, roughly the size of a dinner plate.
- 8 Place 1 circle onto a lined baking tray. Spread the paste from the mortar and pestle all over the dough.
- 9 Tear pieces from the mozzarella cheese and place all over the paste on the dough.
- 10 Place the other circle of dough on top and press down lightly to seal.
- 11 Make a hole in the middle of the circles, placing a glass in the hole to help keep its shape.
- 12 Make 12 cuts into the dough evenly around the circle, from just inside the glass to the edge of the dough.
- 13 Pick up the bread from each cut one at a time, and twist it over 2–3 times before placing back down onto the tray. Cover and leave to prove for another 20 minutes.
- 14 Glaze with milk or olive oil, place in the oven and bake for 20–25 minutes until golden brown and sounds hollow when tapped.
- 15 Leave to rest for 15 minutes before tearing and sharing with friends and family.

### Evaluation questions

- 1 Explain how this recipe can promote connectedness in families.
- 2 Explain how this recipe can promote connectedness with peers.
- 3 Suggest flavour modifications that could be made to change this recipe.
- 4 Discretionary foods can often play a social role for peers. Outline how sharing this bread might change that.
- 5 Suggest five other foods that could be shared with families, peers and communities that meet the recommendations of the Australian Dietary Guidelines.

## Food and mental health

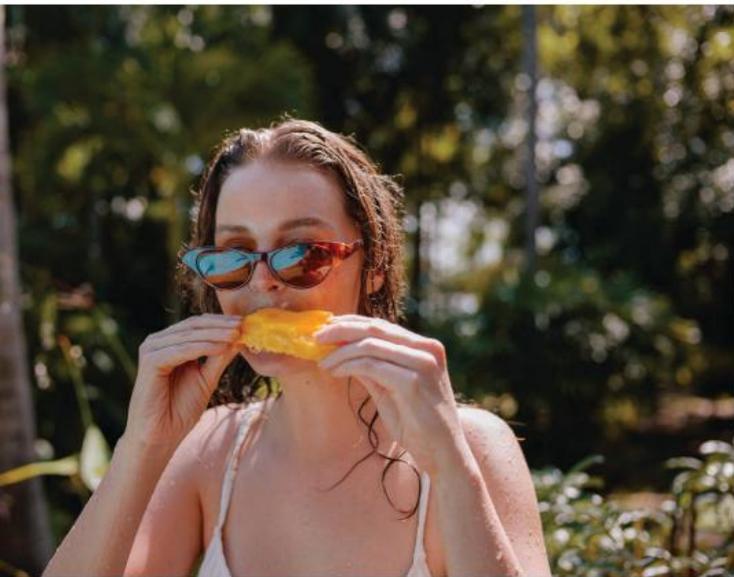
As you have already learned in Chapter 2, food has a role in health, particularly mental health.

Sharing food brings us together. Baking and gifting food is uplifting.

Cafe culture, going out and participating in the hospitality scene are about interactions, connections, sharing in a meal and enjoying good food. These activities lead to positive mental health.

Food plays a role in how we feel, and what we eat has a huge impact on this. For example:

- feeling sluggish after takeaway that is high in fats and salt
- enjoying feel-good foods, like fresh fruit on a summer day.



**Figure 6.12:** There is no better feeling than the juice of your first mango of the season dribbling down your chin. It feels like summer and holidays and sunshine.

When reflecting on childhood memories, or memories of celebrations gone by, we often recall the food that was shared. Food has a social and emotional connection that impacts on how we feel and our mental health.

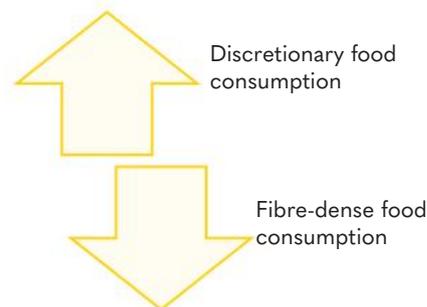


**Figure 6.13:** The social and emotional roles of food and the connections they can create have positive impacts on how we feel and our mental health.

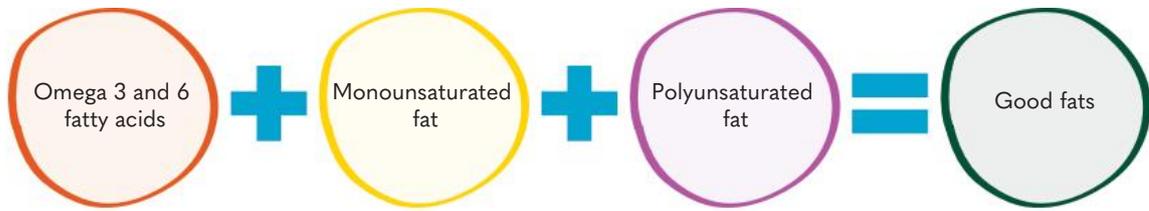
If you're wondering what diet is best for mental health, the good news is that there's no one specific diet to optimise your mental health. While the Mediterranean Diet has been the subject of recent studies showing it can treat even severe clinical depression, research from all across the world, in different countries, cultures and populations, has shown that following a healthy, traditional diet, whether that be Mediterranean, Scandinavian or Japanese, is associated with a reduced risk of depression and anxiety. Although these diets may seem quite different, they actually have many things in common. They generally include plenty of wholefoods, plant foods (wholegrains, fruits, vegetables and legumes), and healthy fats coming from fish, nuts, seeds and olives.

Source: Deakin University, Food & Mood Centre

An increased consumption of discretionary foods has been linked to mental health issues.



**Figure 6.14:** Changes in diet that can negatively impact mental health



**Figure 6.15:** Consuming 'good' fats can have a positive impact on mental health.



**Figure 6.16:** Food behaviours may affect mental health. Studies have shown that those with severe mental illnesses eat higher amounts of pro-inflammatory foods, such as ultra-processed foods, refined grains, saturated and trans fats, and added sugar.



### Let's talk

Discuss what modifications you could make to your diet to encourage consuming foods that are good for your mental health.



**Figure 6.17:** Who do you eat with? How can this sharing of food improve your mental health?

### Activity 6.9 (Practical): Nostalgia – cook a trip down memory lane



Food can make you happy. It has a strong connection to your past and brings feelings of nostalgia.

Think about your favourite childhood memory attached to food – your strongest, happiest memory.

You need to produce this food or meal that takes you back to your childhood. Make a dish that brings nostalgia to life.

Your product can be sweet or savoury; it just has to evoke childhood memories. It has to make you feel good.

This activity is all about connecting to your memories and emotions of food, having fun and sharing this with others.

Once this practical task is finished, share the story and product with the class.

#### Evaluation questions

- 1 Explain how eating this food influences your mental health.
- 2 Describe the emotional role of this food in expressing your individual identity.
- 3 Does this food have a social role in your family or community? Explain how.

## Chapter revision

- The social role of food includes bringing people together to share meals. This can be as a family, a peer group, work lunch or coffee catch-ups. Food is something that almost everyone enjoys.
- We all have an emotional connection to food, as it is more than just nourishment and fuel for the body. Emotions can be felt through eating the food and the connections we have to it, or through how we are eating the food.
- Food is a significant part of celebrations. Many occasions include traditional food items that have a significance to what is being celebrated.
- Food and food behaviours, such as who we eat with and how we eat, influence mental health. Many feel-good moments are connected with food.
- The social and emotional connections to food influence our mental health.

### Apply your knowledge

- 1 Explain the role of food in expressing individual identity.
- 2 Describe the difference between a social role of food and an emotional role of food.
- 3 Using an example, explain how food can be an important part of a celebration.
- 4 There is a link between the role of food and mental health. List the foods that should be consumed for mental health.
- 5 Discuss how sharing a meal with family and friends can impact on an individual's mental health.
- 6 Explain how the social role of food impacts on an individual's mental health.
- 7 Explain how the emotional role of food impacts on an individual's mental health.

## Practice exam questions



### Question 1 Multiple choice

How could families promote connectedness through food?

- A By inviting the neighbours over for dinner once a week.
- B By making a healthy lunch box every day for school and work.
- C By having Friday movie night as a family, including discretionary food treats.
- D By creating a bond by preparing and sharing a meal together as a family.

**1 mark**

### Question 2

Our family tradition is that when it's your birthday, you decide what's cooked for dinner.

Explain the sharing and celebratory role of this within families.

**3 marks**

### Question 3

Discuss the role of food in influencing mental health.

**6 marks**

## Chapter 7

*Role of the media*

## Key knowledge

- The role of the media in shaping food information, choices and values and how this can elicit emotional and psychological responses to food, including behaviours and consequences relating to body image, restrictive dieting and comfort eating.
- The political influences on the food systems including the manufacturing industry, the advertising industry and consumer activism, and how these impact on food choices and food sovereignty.

## Key skills

- Analyse the role of media in shaping food information and values, and in influencing food choices.
- Discuss links between food, behaviours and effects on health and wellbeing.
- Analyse political influences on the food systems and discuss the potential impacts on food choices including food sovereignty.

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**food systems**

the components and activities involving the primary production, processing and packaging, distribution and access, media and marketing, consumption and waste management of food, all of which can affect food accessibility and health

Our food knowledge, choices and values are affected by a range of internal and external factors. These can influence how we respond to food information and our engagement within **food systems**. The different types of media that we consume play a significant role in the food choices we make. The lens through which we view and engage with various media platforms can have a significant impact on our emotional and psychological responses to food, which in turn affect our health and wellbeing.

Political influences on the food systems aim to promote healthy food consumption through policy, legislation, funding and programs. These can have a direct impact on food choices and **food sovereignty**.

Choosing a food item from the supermarket shelf or from the fridge is not a simple process! Every food product that we have access to and choose to eat is influenced in some way by food systems, policies, the **media**, our cultural beliefs, past food experiences and even our emotions at the time of food consumption.

**Get knowledge ready**

- 1 Identify different types of media that contain food information and advertising.
- 2 Explain how a person's body image can impact their food choices.
- 3 Discuss ways in which the Australian Government influences the food systems.



## The role of the media in shaping food information

Food and cooking have become prominent in media and publishing. The media plays a significant role in shaping food information, choice and values. This can have a considerable impact on emotional and psychological responses to food.

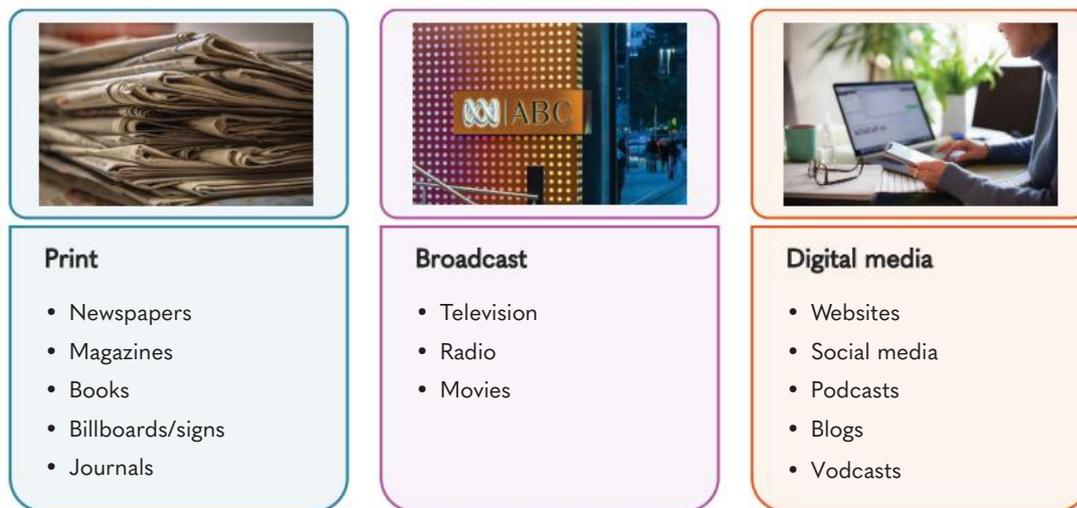
**Body image** portrayed in the media can impact the food choices we make and the

related food behaviours of each of us. These food behaviours then have direct effects on our health and wellbeing.

Technological advancements over the past 20 years have accelerated at a rapid rate, greatly influencing how and where we consume media. The types of media we are in contact with on a daily basis come in a variety of forms, including print, broadcast and digital media.



**Video 7.1** Chapter Overview



**Figure 7.1:** Types of media

**food sovereignty** ‘the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems’ (Declaration of Nyéléni)

**media** a means of mass communication such as broadcast, print and new media (electronic communication generated through digital technologies such as the internet)

**body image** refers to how you perceive, think and feel about your body as well as how you think others see you. This can refer to your general appearance, size, weight and shape



### Let's talk

We are flooded with information and advertising from the moment we wake up until we go to bed at night. Identify and describe the food information and advertising you see across the day. Is this coming predominantly from print, broadcast or digital media?



**Figure 7.2:** Food advertising is everywhere.

With the ever-evolving media landscape, we are inundated with food information and **advertising** every day. Many of us spend a large proportion of our time online consuming even more information and advertising. Conducting an internet search with the question, 'What is a healthy diet?', produces approximately 650 million results

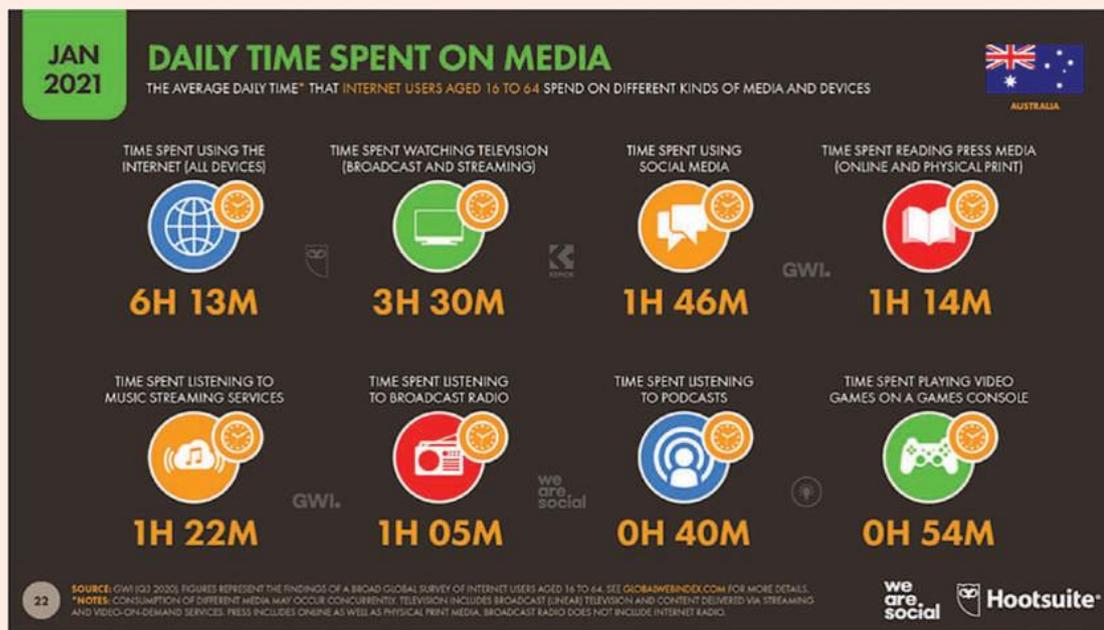
in under a second. The volume and ease of access to food information can have a profound impact on how a person thinks, feels and behaves. Every media message we consume works to influence our opinions, beliefs and values and ultimately guide our food choices.

**advertising** promoting a product; the activity or profession of producing advertisements for commercial products or services

**restrictive diet** limiting the intake of a particular food, food groups or overall energy consumption; often associated with the desire to lose weight

**comfort eating** consuming foods as a reaction to an emotional state rather than hunger or appetite. The consumption of these foods provides a sense of wellbeing and pleasure

### Activity 7.1 (Data analysis): Daily time spent on media



**Figure 7.3:** Average daily time that internet users aged 16–64 spend on different types of media and devices

Source: © 2021 We Are Social Pty Ltd.

- 1 Conduct a class survey. Find out how much time each member of the class spends on media each day in relation to the eight categories shown in Figure 7.3.
- 2 Discuss the similarities and differences between the class data and the 2021 national data in Figure 7.3.
- 3 Suggest reasons why there are differences in the two data sets.
- 4 Aside from general internet use, identify the category that the class spent most of their time on. Describe the types of food information and advertising that appear on this platform.

### *Body image, restrictive dieting and comfort eating*

The persuasive techniques used by companies and food information supplied by the media can have a detrimental impact on how people view food and their own bodies. Associating food messages with negative emotions such as guilt can result in people

feeling shameful if they consume certain foods, or if their body does not match the beauty standards depicted in the media. This can lower one's self-esteem and can elicit emotional and psychological responses to food. These persuasive techniques may result in behaviours such as **restrictive dieting** and **comfort eating**.

## Understanding body image

Body image is experienced on a continuum from negative to positive and is heavily impacted by external cues and societal norms. Engagement with and exposure to media and image-related content can impact the way a person thinks and feels about their body. Consumers of media will often make comparisons between their body and what the media portrays as an ideal figure. Although

beauty standards shift throughout time, males are often portrayed in media as lean and muscular, while females have an hourglass body shape with little stomach fat. Having a fixation on achieving these results can have a detrimental impact on one's psychological wellbeing. Aspiring to look like people in the media is often unrealistic as many images are digitally manipulated, distorting the size of the body and airbrushing away any flaws in order to produce the 'perfect' figure.



### Let's talk

Companies have been called out for using harmful weight-shaming messages to promote their products, such as 'Are You Beach Body Ready?' and 'Keep Australia Beautiful'.

Discuss the impact these messages may have on a person's body image and psychological response to food.



**Figure 7.4:** The media sometimes presents unrealistic body images as the 'norm'.

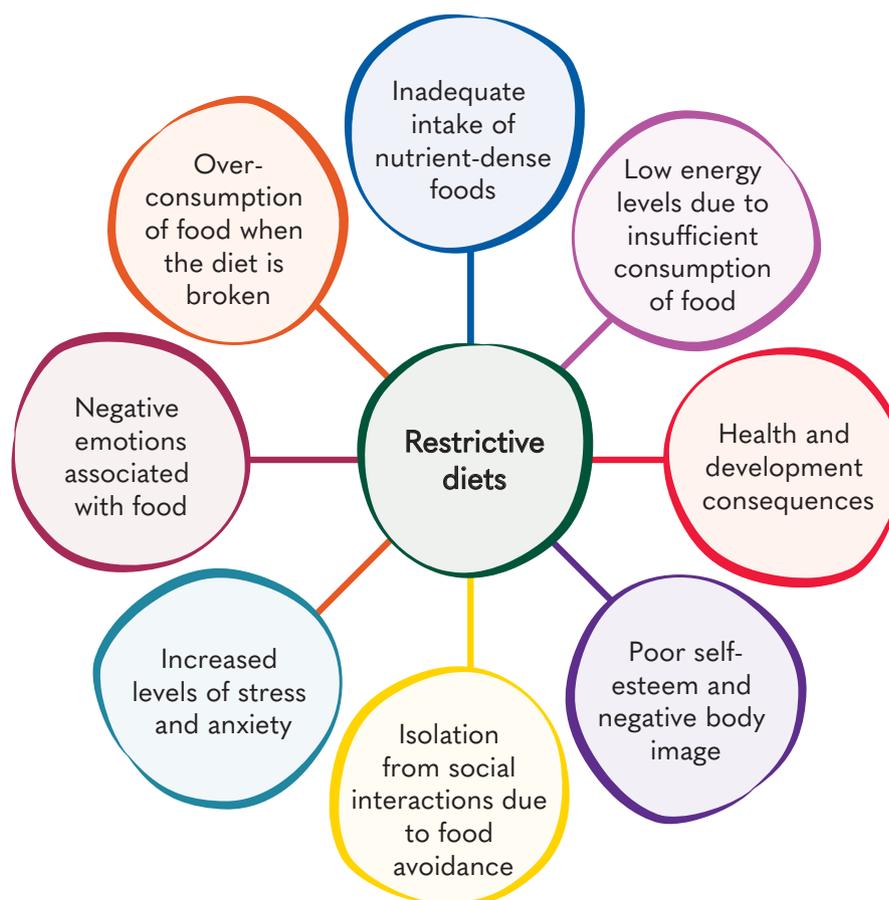
## Restrictive diets

Restrictive diets limit the intake of a particular food, food groups or overall energy consumption. They often do not align with the recommendations outlined in the Australian Dietary Guidelines and can have harmful effects on a person's health and wellbeing.

Restricting the consumption of nutrient-dense foods and/or food groups can impact one's health, wellbeing and development. Restricting food and/or food groups in this

way may result in the underconsumption of essential nutrients and create an unhealthy relationship with food.

These restrictive diets commonly stem from having a negative body image and the desire to lose weight. These diets are often unsustainable, as they promote extreme measures and constraints. When a person 'breaks' the diet they may overeat, feel shameful and guilty due to their actions and then further deprive themselves of food. Often this cycle repeats itself over and over again.



**Figure 7.5:** Restrictive diets impact on health and wellbeing.

## Comfort eating

Food can change one's mood by increasing calmness and reducing stress. Food is often used for comfort. Consuming foods in order to enhance one's mood, rather than to satisfy hunger, is known as comfort eating. Comfort foods evoke a pleasurable state

when eaten and often are a personal dish to the consumer, holding some nostalgic or sentimental value. The food that a person chooses to eat for comfort can be influenced by social identification, context and a conditioned response.

Eating a chicken noodle soup when you are feeling unwell, for example, may be a family tradition or conditioned response. This dish may have been what you were always served when you were sick growing up. For some people, chicken noodle soup provides comfort when they are unwell.



### Let's talk

What types of foods do you seek out when you are upset, stressed or feeling unwell? Are these similar to the foods your peers choose?

Competitive product **marketing**, social pressures and media images can impact a person's body image and how they view beauty and weight. This may result in an individual seeking comfort from food, which can then result in a loss of control while eating.

**marketing**  
the action or business of promoting and selling products or services, including market research and advertising

The overconsumption of food can occur as the individual loses their ability to regulate their hunger and satiety. This self-soothing strategy is especially harmful to health and wellbeing if discretionary foods are consumed, such as chocolate or ice cream. Although the nutrient composition of comfort foods may vary, it is best to separate negative emotions and eating habits.



**Figure 7.6:** Moderation is the key.

Consistently using food as a distraction or to temporarily alleviate negative feelings can lead to an unhealthy cycle of overeating and guilt. Moderation is key. Swap out the discretionary choices with nutrient-dense options and try to identify the root of negative feelings, rather than turning to food as a quick fix.

### Food advertising and marketing

Food advertising and marketing penetrates all media platforms. Companies use a wide variety of techniques to attempt to influence

peoples' knowledge and preferences. Ultimately, they are trying to persuade us to purchase their products. Great advertising results in increased sales and profit. Billions of dollars are spent annually in order to promote products, engage audiences and influence consumers' food choices. The persuasive methods used by companies tap into our values and belief systems as consumers and seek to elicit emotional and psychological responses to food.



**Figure 7.7:** 'A glass and a half of full cream dairy milk in every block.'



**Figure 7.8:** 'You're not you when you're hungry.'



**Figure 7.9:** 'Have a break, have a KitKat.'

### Commercials

Advertisements often show young attractive people having fun in order to target consumers' emotional wants and needs rather

than rational logic and facts. This plays on peoples' desires, beliefs, fears and insecurities in order to influence their behaviour. Fitness models are used to promote a variety of

products, especially those linked to weight loss and health. People with a negative body image and aesthetic values are more likely to

be persuaded by this tactic as they see the figures as aspirational, associating the product with their ideal body.

**Figure 7.10:** 'Taste the feeling!'



Marketing aimed at family values is another method that provides an emotional appeal. This aims to evoke a lifestyle that is aspirational to the consumer. Kellogg's Nutri-Grain often focuses on a mother and son relationship, with the mother serving her son the breakfast cereal as she adoringly watches him grow up into an 'iron man'.

Products advertised in food and beverage commercials on television are often high in fat, added sugar and/or salt, and low in nutritional value. The volume of these advertisements far outweighs the promotion of nutrient-dense food options such as fruit and vegetables. The persuasive techniques used by discretionary food companies often target a younger audience. Companies

recognise the strength of **'pester power'** and also know that parents are likely to give in and purchase a food product in order to appease their child and stop their relentless nagging.

**pester power**  
the ability of children to pressurise their parents into buying them a particular product through constant nagging

### Music and jingles

Music, jingles and slogans catch consumers' attention and create a quick association to the brand. Think of McDonald's 'ba da ba ba ba'; these five notes are a globally recognised sound. Hearing this jingle can elicit a psychological response, where the sound triggers the consumer to think of the fast-food chain, therefore increasing the likelihood of purchasing from the store.



#### Let's talk

What other food marketing can you think of that is aimed at family values? What types of families are portrayed in these marketing campaigns?

#### Activity 7.2 (Media analysis): Marketing campaigns



Research two marketing campaigns that:

- use pester power
- have catchy music and jingles.

Share your findings as a class.

### Celebrity endorsements and sponsorship

Celebrity endorsements and sponsorships are popular advertising techniques that often target children and youth. Young people, through popular culture, idolise well-known figures and sporting teams. If a product is endorsed by their idol, or the person or team they know and love, they are more likely to trust the messages portrayed in the advertisement and purchase the promoted food product.

This tactic can also work for an older audience. When celebrity chefs market particular food products, people are more inclined to purchase the products as they have previously experienced and enjoyed the chefs' recipes. Curtis Stone, a well-known celebrity chef and media personality, is a brand ambassador for the Coles supermarket chain. Coles Online promotes a variety of Curtis Stone's recipes and the store sells a range of his personal brand products.



**Figure 7.11:** 'If these high-profile people are advertising products, the products must be good!'



## Let's talk



**Figure 7.12:** McDonald's partner with sporting clubs and sponsor junior sporting events to align themselves with activities associated with a healthy lifestyle.

McDonald's sponsors a wide range of sporting events, such as Little Athletics, Cricket Victoria, football community leagues and Basketball Victoria.

Consider the impact this may have on children's food information, choices and values.

### Activity 7.3 (Case study): Healthy sports rewards



Search online for the Healthy Sports Rewards initiative, which will see some local council junior sporting clubs replace fast-food and takeaway vouchers with healthy activities, such as free or discounted access to a local pool or tennis court. The initiative aims to celebrate children's sporting achievements in a healthy and active manner.

Explain the impact this VicHealth initiative can have on consumer food choices.

### Advergaming, competitions and rewards

Companies use digital media and **advergaming** to entice a younger audience and promote active engagement in their advertising campaign. These games and reward programs create an experience for the consumer, forming a relationship between them and the brand.

These types of techniques often involve earning points that unlock rewards, so

the more you play and purchase, the more rewards you earn, strengthening the relationship between the company and consumer. When companies market these games and competitions to children, they can be very powerful in influencing young peoples' food choices. Children may pester their parents in order to play advergaming as they are a form of entertainment, reinforcing the connection between consumer and brand.

Enticing consumers through rewards, competitions and gameplay keeps them engaged and creates repeat customers. The appeal of winning provides people with a rush of excitement and can trigger a psychological response as the reward system in the brain is activated. This causes our brains to release feel-good chemicals such as dopamine, providing a sense of pleasure, euphoria and motivation. As engagement in these activities brings enjoyment, whether the customer is rewarded or not, they will often continue to participate in these food advergaming.

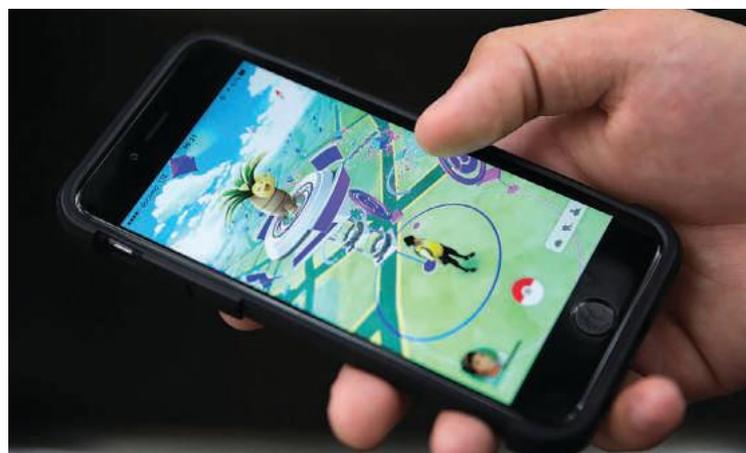
**advergaming**  
a form of advertising in video games where the consumer interacts with the advertisement through gameplay



**Figure 7.13:** The McDonald's Monopoly game is a sales promotion run by McDonald's, with a theme based on the board game Monopoly.

### Television

Australians spend a considerable amount of time watching television. There is a growing number of food-related programs, commercials and dedicated food channels on our screens. *MasterChef Australia* and *My Kitchen Rules* are two of the biggest



**Figure 7.14:** The Japanese version of the game app Pokémon Go. In Japan, 3000 McDonald's restaurants were turned into Pokémon gyms in collaboration with the fast-food chain.

competitive cooking shows that appear on primetime TV. These shows draw millions of viewers each year. They provide entertainment, but more importantly for marketing purposes, they also influence viewers' food information and choices.

**Figure 7.15:** *MasterChef* is a reality TV entertainment program where contestants are judged on their cooking abilities. It provides information and education about food and recipes, and features celebrity chefs such as Curtis Stone, who endorses the program's partner store Coles. Viewers are encouraged to try the recipes at home using *MasterChef* cookware that is exclusive to Coles, further persuading viewers to shop at the supermarket.



After the hibachi grill appeared on *MasterChef Australia*, online sales of the grill increased by 1600 per cent. Exposure to new styles of cooking, ingredients and

kitchen equipment encourages consumers to branch out and try new recipes and cooking techniques at home.

### Activity 7.4 (Practical): *MasterChef* comfort food invention test



As *MasterChef* contestants, your challenge for this week is to invent a nostalgic and comforting dish that evokes feelings of happiness and wraps you up in a great big hug. The dish must be prepared within 60 minutes and be individual to you.

- 1 Prepare a food order.
- 2 Prepare and present your dish for judging. Explain why this dish is a comfort food to you by describing how it relates to your life and the emotions you feel when consuming the dish.

### Media campaigns

Mass media campaigns work to provide public health messages using a range of platforms such as television, radio, print and digital media. Government media campaigns such as 'Food Fight', 'Swap It, Don't Stop It', 'LiveLighter' and 'Rethink Sugary Drink' aim to influence peoples' knowledge, attitudes, intentions and behaviours in order to improve diets and address the prevalence of obesity and related lifestyle diseases.

### News and print media

News reports and print media can shape food information, choice and values by informing consumers about current events, issues and research. Journal articles, news reports and written publications should provide unbiased, balanced and factual information.

Food information provided in news and print media often relates to food safety, nutritional advice and relevant food issues. Major recalls of contaminated food products will be publicised nationwide, as well as research on preventative measures relating to lifestyle diseases. This informs consumers about foods to limit and avoid, therefore impacting their choices. Media reports highlighting important issues, such as supporting local businesses after tragic events like bushfires, floods and the global COVID-19 pandemic, can influence

consumers to change their food purchasing and consumption behaviours as they value the impact their choices have on local industries.

### Social media

The growth in **social media** has changed the way we perceive and engage with food. Platforms such as Instagram, YouTube, TikTok and Facebook allow users to post, comment and share food information to millions of people with a simple click of a button. Features such as 'share', 'likes' and 'hashtags' work to expand the reach of content, build followers and connect content to topics.

Social media enables businesses and consumers to interact with one another directly, strengthening bonds and creating ease of advertising. This ever-evolving landscape can provide opportunities to build **food literacy** and shape values. However, it is also a tool for spreading misinformation and can significantly impact a person's emotional and psychological wellbeing.

Circulating food imagery and information on social media can build connected communities among users who share similar food values. This connectivity has seen the rise of digital food **activism**, amateur chefs and **social media influencers**.

#### **social media**

internet-based applications that facilitate the exchange of user-generated content

#### **food literacy**

a set of knowledge, skills and attitudes that impact food behaviours

#### **activism**

campaigning to bring about social, political, economic or environmental reform

#### **social media influencer**

a content creator who has built a large following across their social media platforms. Their wide reach, reputation, knowledge and relationships enable them to persuade others to act based on their recommendations



**Figure 7.16:** Food photography was among the earliest Instagram trends.

**Activity 7.5 (Inquiry): Social media platforms**



Copy and complete the table. Briefly describe each platform and identify types of food information you find on each.

Social media platform	Description	Food information
Instagram		
TikTok		
YouTube		
Twitter		
Facebook		
Blogs		



**Let's talk**

What social media platforms do you engage with? Have you ever shared or accessed food information on social media?

**Activity 7.6 (Practical): TikTok's viral baked feta pasta**

The baked feta pasta recipe had a humble beginning on a Finnish food blog. Once the recipe hit TikTok, it became a worldwide viral sensation. Sales of feta began to skyrocket and food vendors were quickly selling out of the salty tangy cheese. The original blog post now has over 3 million views and the hashtag #bakedfetapasta has since had more than 177 million views on TikTok.

To create the dish, pour  $\frac{1}{4}$  cup olive oil into the bottom of a baking dish. Place a 200 g block of Greek feta cheese in the middle of the dish and surround with 500 g cherry tomatoes and 4 garlic cloves cut in half lengthways. Top the feta with half a sliced red chilli, cracked black pepper and  $\frac{1}{4}$  cup olive oil. Bake in a 200°C oven for 15 minutes. Meanwhile, cook 450 g pasta in salted boiling water until al dente. Remove the baking dish from the oven and break up the feta with a spoon. Place the cooked pasta in the baking dish and toss. Add shredded basil leaves and serve immediately.



**Figure 7.17:** Baked feta pasta

- 1 Discuss how 'viral recipes' such as the baked feta pasta impact consumers' food knowledge and choice.
- 2 Identify other recipes that have gone viral on social media platforms.

Digital communities connect like-minded people and provide a forum in which issues can be shared and debated. The scope and reach of digital networks enable users to mobilise narratives around the issues they are concerned about in relation to food and the food systems.

Social media platforms are saturated with health messages from influencers and celebrities as they share filtered and edited versions of their lives. Influencers often have no formal qualification; however, young people are drawn to their messages in preference to health professionals. The content and product

endorsements from these accounts are often misaligned with health promotion messages. Foods and food groups can be labelled as 'fattening' and 'bad', such as carbohydrate-based foods. Social pressures to copy the guidance of influencers can lead followers to restrict their consumption or hide their eating patterns for fear of judgement.

Constant exposure to images of idyllic lifestyles and manipulated images of bodies creates an online environment of competition and comparison. Fixation on achieving a similar body and lifestyle to influencers can impact self-esteem, increase anxiety, create unrealistic aspirations and result in unhealthy eating patterns.

### Activity 7.7 (Inquiry): Influences on food literacy, choice and values



Brainstorm how each of the following could influence a person's food literacy, choice and values:

- Posting recipes
- Sharing nutrition information
- Advertising and marketing campaigns
- Product and venue recommendations
- Diets and trends
- Online purchasing
- Activism.

### Activity 7.8 (Case study): The farmer showing city slickers how it's done



**Figure 7.18:** Mark Merrett works on his family farm in Western Victoria.  
Source: Australian Broadcasting Corporation

In 2016, Mark Merrett started to produce vlogs (video blogs) about his day-to-day activities on his family farm in Western Victoria. At first these were made for his nephews and niece in Melbourne, but then Merrett was inspired to reach a greater audience in order to address the disconnect between farmers and consumers. His belief is that if people understand where their food comes from and the amount of effort put into producing it, they will place greater value on their food choices.

See Merrett's YouTube channel, 'Merrett Contracting – Australian Farm'.

#### Questions

- 1 Explain why having a greater understanding of agriculture and production systems may impact consumer values and food choices.
- 2 Discuss reasons why you think Merrett has gained a large online following.

**Activity 7.9 (Media analysis): Australian Bananas' integrated media campaign**


Australian Bananas is fighting back against discretionary food marketing with its integrated media campaign. TV commercials continue to use the classic slogan 'Make your body sing' through promoting choosing a 'na-na', nature's energy snack, over a discretionary food 'no-no'.

Australian Bananas has invested in out-of-home advertising with its print media campaigns. These can be seen on buses, gym screens and billboards in high-traffic areas.



**Figure 7.19:** Examples of the Australian Bananas' media campaign

Australians often forget just how versatile the humble banana is when it comes to fuelling our passions. So, to give them a gentle reminder Australian Bananas relaunched the iconic 'Make your body sing' soundtrack, with a tongue-in-cheek campaign promoting a faux range of bananas, each one specifically suited to a popular Aussie pastime.

There's the sunrise swim banana, the pre-gym banana (not to be confused with the post-gym banana) and this is just the tip of the...banana. You see, whatever your thing there's a banana to make your body sing.

The campaign ran across television, digital out of home, radio, social media and online. It was also supported by public relations activity educating on the nutritional value of Australian Bananas.



**Figure 7.20:** Advertising is placed in high-traffic shopping areas for immediate impact on consumers.

Billy Slater, a former Australian professional rugby league footballer, has been an active ambassador for Australian Bananas for over 15 years, fronting numerous advertising campaigns and media events.

Australian Bananas' digital and print media content offers a wide range of recipes and provides information on the health benefits of the nutritious fruit for every lifestyle and lifespan stage.

Social media platforms such as Facebook, Instagram, Twitter and TikTok are used to target a younger generation with humorous videos and memes. These platforms are also used to promote competitions. For example, Australian Bananas' Facebook posts leading up to National Banana Day encourage consumers to enter competitions, share their content and use the hashtag #nationalbananaday to further spread the message.

These integrated marketing strategies work together in order to reach a wider audience and encourage the viral promotion of the fruit.

- 1 Discuss reasons why Australian Bananas uses such an extensive integrated marketing campaign.
- 2 Consider the marketing strategies used in the promotion of Australian Bananas. Describe how this might appeal to consumers' values and influence their food choices.

### Activity 7.10 (Practical): Buddha bowl design task



#### Build your own buddha bowl

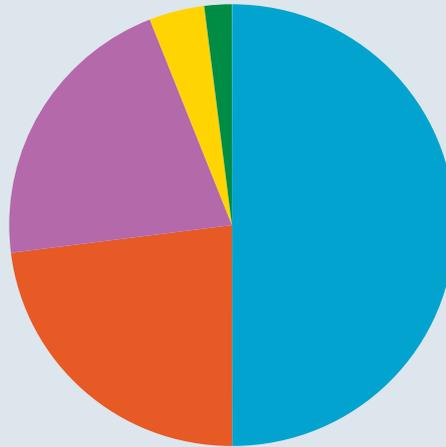
Buddha bowls are a favourite among social media 'wellness warriors'. These super-charged salads offer a variety of colours, textures and flavours. There are over 577 800 posts on Instagram of these visually appealing #instaworthy bowls.



**Figure 7.21:** #buddhabowl

The key to constructing the perfect buddha bowl is ensuring variety and vibrancy. Vegetables should fill up half the bowl, with the remaining components coming from carbohydrate and protein food sources. Top with healthy fats and a dressing to complete the dish.

Buddha bowl



- Vegetables:
  - broccolini
  - carrots
  - cucumber
  - tomato
  - pumpkin

- Unsaturated fats:
  - nuts
  - seeds
  - avocado
  - hummus
  - tahini

- Protein:
  - lentils
  - chickpeas
  - edamame
  - tofu
  - fish
  - eggs

- Complex carbohydrates:
  - brown rice
  - wild rice
  - quinoa
  - couscous

- Dressing:
  - olive oil
  - lemon juice
  - balsamic vinegar

**Step one:** select a complex carbohydrate base

**a** Select a carbohydrate base that is high in fibre to provide you with a feeling of fullness.

**Step two:** select your protein

**b** Keep your body strong with a protein source that will build and repair tissue.

**Step three:** choose your vegetables

**c** Add vibrancy by selecting a variety of vegetables and/or fruit that add a diverse range of colours and textures to the dish.

**Step four:** add some texture

**d** Optimise your heart health and enhance the taste and texture of your bowl with unsaturated fats.

**Step five:** bring the flavours together with a dressing

**Plating:** unlike other salads, buddha bowls keep the ingredients separated. Alternate the colours and include a variety of textures and shapes to add to the visual appeal of your bowl.

Create a TikTok or Instagram post of your recipe. Include the following:

- description of the buddha bowl
- images and captions showing the preparation of ingredients
- image of the completed dish
- outline of the health benefits of your bowl
- sensory evaluation of the bowl to entice readers to try your recipe themselves.
- tag your post with the hashtag #getinmybelly

## Political influences on the food systems

The food systems are multifaceted and are heavily influenced by political factors. Challenges within the food systems involve the **duopoly** of the supermarket industry, consumer dependence on year-round access to seasonal foods, marketing and advertising of discretionary choices, and the disconnect between local producers and consumers. Policies, guidelines, legislation, resources and consumer activism work together to address these concerns.

A food system analyses raw commodities, from farm to consumer, and includes supply of agricultural inputs, primary food production, processing and manufacturing sectors,

packaging, food distribution, food retailing and marketing, food catering and domestic food. The various ways consumers eat (prepare and consume) and dispose of and/or recycle food are also part of a food system.

The power of politics has a direct impact on food availability and choice. As food sovereignty is based on the right of peoples to define their own food systems, peoples' needs should be at the centre of food policies in collaboration with consumers and small-scale farmers.

Federal, state and local governments aim to create healthy, equitable, sustainable and resilient food systems that support connected communities and nutritious food for all.

### duopoly

a situation in which two companies dominate the market

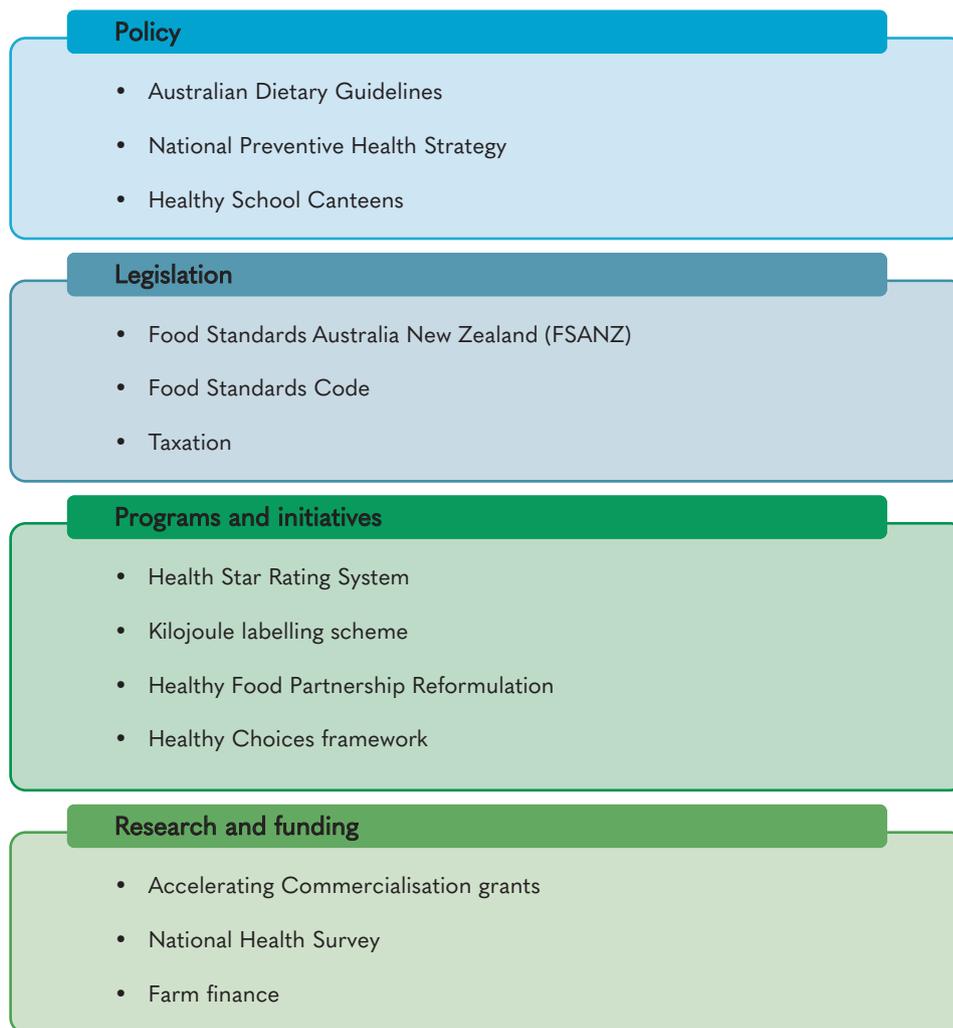


Figure 7.22: Political influences on the food systems



### Let's talk

Many staple foods sold within Australian supermarkets are exempt from goods and services tax (GST) – for example, fruits and vegetables, breads, milks and breakfast cereals. Other food products, such as pies, savoury snacks, flavoured milk and cakes, are taxable.

Discuss how taxation could impact food choices when shopping at the supermarket.

## The manufacturing industry

The manufacturing industry encompasses abattoirs, bakeries, dairies, factories and processing facilities. Australia's food manufacturing sector is one of the largest employers in the country. These industries are regulated by all levels of government and industry-specific legislation. As food manufacturing continues to grow in both local and international markets, it is essential that the people who produce and distribute these foods are involved in the legislation and policies that govern their industry.



### Let's talk

The Federation of Victorian Traditional Owner Corporations has partnered with the Victorian Government to provide over \$2 million in grants to support Aboriginal Victorian-owned food businesses. The Djakitjuk Djanga grants program, which translates to 'Country's food' in Dja Dja Wurrung language, will support the growth of the native food and botanicals industry.

Discuss the importance of funding First Nations-owned businesses when commercialising the native food industry.

Consumers have access to a wide variety of processed food and drinks within Australia, with these products forming a large part of people's daily food consumption. Not all foods within this industry align with the recommendations of the Australian Dietary Guidelines.

The Healthy Food Partnership Reformulation Program is a federal government strategy to reduce the amount of added sugar, sodium and saturated fat in processed and manufactured products. This initiative aims to help consumers make healthier choices, while still enjoying the convenience of these food products.

Targeted foods within this industry include various types of bread, breakfast cereals, savoury snacks, processed meat, flavoured milk and cheese. This is a voluntary program where the government, the public health sector and the food industry can work together in order to empower food manufacturers to make positive changes that enable healthy food choices and tackle obesity.

### Activity 7.11 (Inquiry): Healthy Food Partnership Reformulation Program targets



Search for and read the Healthy Food Partnership Reformulation Program targets.

One of the program's targets is to reduce the sugar content of commercial breakfast cereals containing dried added fruit. By June 2026 the nutrient target is for breakfast cereals containing fruit to have a maximum of 22.5 g of sugar per 100 g.

Conduct an online inquiry to investigate the amount of sugar currently found in breakfast cereal varieties that contain fruit. Review the nutrition information panel of at least five products.

How many products currently compare to the 2026 target?

## The advertising industry

Nutrition and health related claims that can be made on food labels and in advertisements are monitored by the FSANZ Food Standards Code. This ensures that companies cannot falsely advertise their products. This important legislative measure enables consumers to make informed choices.

In order to ensure that we can all make informed food choices, this legislation should be extended to the food advertising industry within Australia.

The Australian Communications and Media Authority has set general protections to prohibit particular advertising methods during children's or preschool classified programs. Food advertisements and standards for food marketing to children are predominantly

set and regulated by the food advertising industries themselves.

Discretionary food advertisements dominate mainstream media, especially during primetime programs where the whole family is more likely to be watching together. Health organisations and consumers are pushing for the government to review its food advertising laws, as current practices can be seen as creating an obesity-promoting environment.

Consumer concern regarding the impact that discretionary food advertising has on young peoples' food choices extends beyond television. The Australian Capital Territory has banned discretionary food and drink advertising on public transport and at transport stations in a bid to make outdoor spaces and publicly owned assets align with national health strategies.

### Activity 7.12 (Case study): Brands off our kids!



#### Four actions for a childhood free from unhealthy food marketing

The processed food industry spends millions of dollars every year targeting Australian children with marketing for unhealthy food in every aspect of their lives, with increasing sophistication.

Food companies and fast-food chains craft campaigns to ensure unhealthy food brands are present in children's lives from a young age, building powerful brand awareness and normalising unhealthy food, grooming them to be loyal customers for life.

**Brands off our kids!**

Four actions for a childhood free from unhealthy food marketing

- 1 Ensure TV, radio and cinemas are free from unhealthy food marketing from 6am to 9.30pm
- 2 Prevent processed food companies from targeting children
- 3 Ensure public spaces and events are free from unhealthy food marketing
- 4 Protect children from digital marketing of unhealthy food

opc.org.au/brands-off-our-kids  
#brandsoffourkids

**Figure 7.23:** Brands off our kids!  
Source: The Obesity Policy Coalition

Currently, Australian governments have no formal standards that protect children from unhealthy food marketing. Instead, the processed food and advertising industries have been allowed to design their own codes for how they market unhealthy food to children.

The Australian Government must adopt comprehensive regulation to effectively protect children from unhealthy food marketing, including in all forms of media and in the online environment – starting with ensuring that television, radio and cinema are free from unhealthy food marketing when children are watching and listening, and protecting children from digital marketing of unhealthy food.

Source: K Hickey, A Schmidtke and J Martin, *Brands off our kids!*, Obesity Policy Coalition, Melbourne, 2021

### Questions

- 1 Explain why the Obesity Policy Coalition is concerned with the current food advertising practices.
- 2 Discuss how creating formal advertising regulations would impact food choices.
- 3 Do you agree with the four actions recommended by the Obesity Policy Coalition? Justify your response.
- 4 If you were to set political legislation regarding food advertising, what laws would you put in place? Explain your reasons for these.

### Kilojoule labelling scheme

Large chain food businesses and supermarkets are required to display the kilojoule content on their menu items under the kilojoule labelling scheme introduced by the Victorian Government. The average kilojoule content of each standard food item for sale must be displayed on menus, menu boards and food labels. This is to be accompanied by the statement, 'The average adult daily energy

intake is 8700 kJ'. This statement is to assist consumers in understanding what the kilojoule content for each menu item means in terms of what the average adult consumes over a whole day. The aim of the scheme is to provide Victorians with information about the energy content of foods to help them reduce their total energy consumption in order to improve health and wellbeing.

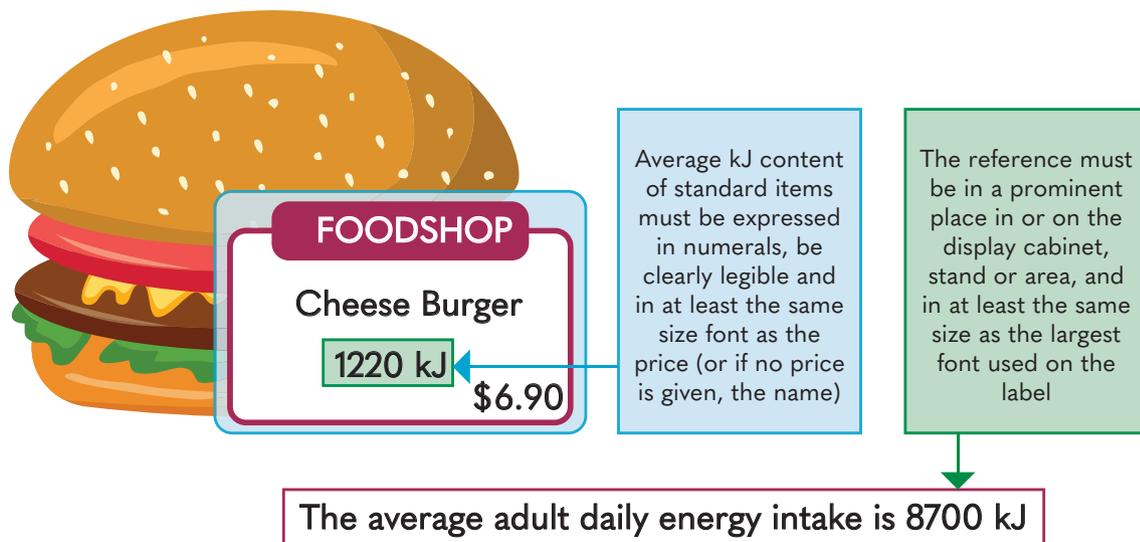


Figure 7.24: Kilojoule labelling scheme guidelines



### Let's talk

Foods can have a similar kilojoule rating but vary greatly in their ingredients and nutritional profile. For example:

- chicken caesar salad 2960 kJ
- chocolate sundae 2803 kJ
- large chips 2950 kJ
- beef burger 2250 kJ.

Discuss the advantages and limitations of basing your food choices solely on the kilojoule labelling scheme.

### Traffic light system

Foods and drinks advertised, promoted and displayed in government sport and recreation centres, hospitals, workplaces and health services should promote healthy choices. Healthy Choices is a Victorian Government framework for improving the availability and promotion of healthier foods and drinks in community settings such as sport and recreation centres, workplaces and hospitals and health services. The framework is based on a traffic light classification system which categorises foods and drinks as GREEN (best choices), AMBER

## Choose well. Feel great.

For more healthy eating tips visit  
[heas.health.vic.gov.au/healthy-choices](https://heas.health.vic.gov.au/healthy-choices)

Healthy Eating Advisory Service

Nutrition Australia

VICTORIA State Government

## Choose well. Feel great.

Foods and drinks with a coloured dot have been classified using the Victorian Government's Healthy Choices guidelines – making it easier for you to make a better choice for your health.

Best choice

These foods and drinks are the healthiest choices for every day. Choose **GREEN** foods and drinks as often as possible.

Choose carefully

These foods and drinks have some nutritional value, but may also be higher in energy (kilojoules), and have some saturated fat, added sugar and/or added salt. Choose **AMBER** foods and drinks sometimes, as healthier options are available.

Limit

These foods and drinks are not essential in a balanced diet. They usually have little nutritional value and are high in energy (kilojoules), saturated fat, added sugars and/or added salt. Choose **RED** foods and drinks rarely and only in small amounts.

To find out more about the Healthy Choices guidelines visit:  
[heas.health.vic.gov.au/healthy-choices](https://heas.health.vic.gov.au/healthy-choices)

The Healthy Eating Advisory Service is delivered by Nutrition Australia Vic Division and supported by the Victorian Government.

**Figure 7.25:** The Healthy Choices framework

Source: *The Healthy Eating Advisory Service (HEAS)* © State of Victoria 2013.

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(choose carefully) and RED (limit) and includes standards for the provision and promotion of items in each category. In food retail outlets and vending machines, GREEN foods and drinks should make up at least 50 per cent of the menu and be promoted and displayed prominently, and less than 20 per cent of foods and drinks available should be RED. RED foods and drinks should not be promoted or used in fundraising or sponsorship activities.

### Consumer activism

Critically aware consumers are concerned about how actions within the food systems impact on health and wellbeing, environmental sustainability and food sovereignty.

Individuals, groups and organisations across Australia are continuously campaigning for reforms to the food industry. Advocating for change generates demand for ethically and environmentally sound products that promote health and wellbeing. This is in line with food sovereignty objectives as it calls for people to have the capacity to make decisions and influence their food systems.

A sustainable food system asserts that food is a human right rather than a market commodity and that it should be delivered in an economic, social, ethical and environmental manner that does not compromise future generations.



### Country of origin labelling

July 2016

**More than 26,000 consumers signed CHOICE's petition to fix country of origin labelling – and politicians listened! The Government agreed on an entirely new labelling scheme, meaning you can now more clearly identify where your food comes from.**

**Figure 7.26:** Activism in action – changes to country of origin labelling requirements

Source: CHOICE wins: "Fighting for your rights since 1960"

**Figure 7.27:** Consumer activists protesting against live animal exportation



# Macadamia-crumbed pork schnitzel with a beetroot salad

Serves 2  
Ingredients

## Salad



1 large beetroot



¼ cup orange juice



½ cup Greek yoghurt



70 g feta, crumbled



1 tablespoon mint leaves, chopped



1 cup baby spinach leaves



1 tablespoon macadamia nuts



1 tablespoon extra virgin olive oil

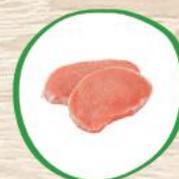


Salt and pepper



1 tablespoon balsamic vinegar

## Pork schnitzel



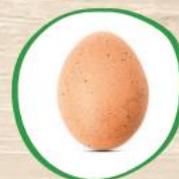
2 x 200 g pork loin steaks, trimmed



1 tablespoon brown sugar



½ cup macadamia nuts, crushed



1 egg



½ cup panko breadcrumbs



3 tablespoons sunflower oil



¼ cup plain flour

## Method

Preheat the oven to 200°C. Wrap the beetroot in foil and place it in the oven for 40–60 minutes, or until tender. When cool enough to handle, peel away the skin and cut the beetroot into bite-sized pieces. Place the beetroot in a bowl with the orange juice and set aside.

- 2 For the pork, combine the brown sugar, crushed macadamias and panko breadcrumbs in a bowl. In a separate bowl, add the egg and lightly beat. Place the flour in a third bowl.
- 3 Using a rolling pin, flatten the pork between 2 sheets of baking paper until approximately 1.5 cm thick.
- 4 Dust each pork steak in flour, dip in egg, then coat in the panko mixture. Place the pork schnitzels in the refrigerator for 15 minutes.
- 5 Fold the yoghurt and mint leaves together in a small bowl and set aside.
- 6 Arrange the baby spinach leaves and crumbled feta on a serving platter.
- 7 Remove the beetroot from the orange juice liquid, reserving the juice. Scatter the beetroot over the salad leaves.
- 8 Whisk the extra virgin olive oil into the reserved orange juice mixture and season with salt and pepper.
- 9 Dollop the minted yoghurt mixture over the beetroot. Scatter the salad with the balsamic vinegar and macadamia nuts and lightly drizzle with the orange dressing.
- 10 Heat the sunflower oil in a non-stick frying pan over a medium-high heat. Cook the pork schnitzels for 3–5 minutes each side until golden and cooked through. Drain the schnitzels on a paper towel before serving with the salad.

### Evaluation questions

- 1 Classify the recipe as green, amber or red. Justify your choice with reference to the Australian Guide to Healthy Eating.
- 2 Vegetables and meat are exempt from Australia's 10 per cent GST. Explain how taxation impacts consumers' food choices.
- 3 Research and explain how activist groups such as Animals Australia and Voiceless work to influence consumers' food knowledge and selection of animal products.
- 4 Australian Pork has released a number of 'cheeky' advertisements encouraging viewers to 'Get some pork on your fork'. Search YouTube for Australian Pork's 'Waiting Room' and 'Quickie' commercials and describe the tactics used to promote the pork products.

## Chapter revision

- Political influences on the food systems aim to promote healthy food consumption through policy, legislation, funding and programs.
- The persuasive techniques used by companies and food information supplied by the media can have a detrimental impact on how people view food and their own bodies.
- Engagement with and exposure to media and image-related content can impact on the way a person thinks and feels about their body.
- Social media platforms are saturated with health messages from influencers and celebrities as they share filtered and edited versions of their lives. The content and product endorsements from these accounts are often misaligned with health promotion messages.
- A sustainable food system should assert that food is a human right rather than a market commodity and that it should be delivered in an economic, social, ethical and environmental manner that does not compromise future generations.

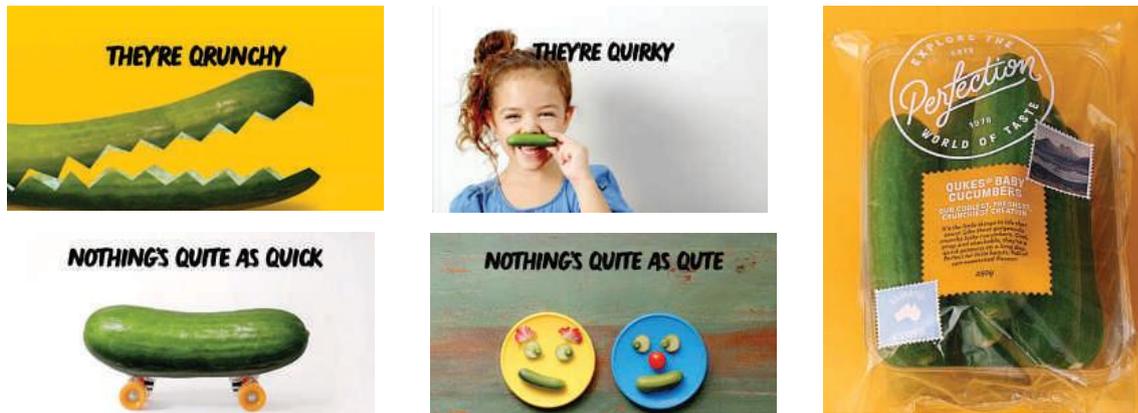
### Apply your knowledge

- 1 Describe techniques used in advertising that appeal to consumers' values.
- 2 Outline how consumer activism aligns with food sovereignty.
- 3 Explain how a person's body image can impact their dietary choices.
- 4 Discuss how the use of social media can shape an individual's food knowledge and values.
- 5 Comfort foods are sometimes described as a 'guilty pleasure'. Outline how labelling food with this term can impact a person's body image and psychological response to food.
- 6 Explain how Victoria's 'traffic light system' and kilojoule labelling scheme impact food choices.

## Practice exam questions



### Question 1



**Figure 7.28:** 'They're qrunchy, they're quirky, the quintessential kid friendly veggie, nothing's quite as quick, nothing's quite as qute, nothing's quite as qool as qukes.'

Source: <https://qukes.com.au/>

Discuss how marketing and advertising are used to influence parents' food choices for their children in the Qukes promotional material in Figure 7.28.

**5 marks**

### Question 2

'Social media is the cause of negative psychological responses to food.'

Analyse this statement.

**6 marks**

### Question 3

Discuss ways in which political influences impact food choices and food sovereignty.

**4 marks**

# Chapter 8

## *Food, behaviours and health*

### Key knowledge

- The relationships between current food systems and personal and social behaviours, with a focus on patterns that may encourage overconsumption of food and sedentary behaviour.
- The role of key behavioural principles for the establishment of healthy diets in children and nutritious meal patterns within the home: exposure, modelling, and repetition.

### Key skills

- Discuss links between food, behaviours and effects on health and wellbeing.
- Explain key behavioural principles behind establishing healthy meal patterns in families and, through practical activities, develop a repertoire of healthy household meals.

VCE Food Studies Study Design extracts © VCAA; reproduced by permission



Video 8.1 Chapter Overview

Do you want fries with that? Will that be a large today? How many opportunities are there in a day, personally and socially, where our food connects with patterns of overconsumption? We often desire more than we need, take more than our body requires and participate in behaviours that can affect our health and wellbeing.

Where do we learn our food behaviours? Most start in the home, as we model behaviours from our parents/carers who expose us to new foods and build our repertoire of everyday eating.

### Get knowledge ready

- 1 Describe one food behaviour that has a negative implication for physical health and wellbeing.
- 2 Provide an example of how our current food systems encourage overconsumption.
- 3 Describe the difference between modelling and exposure.



### *Food systems*

Food systems refers to the many components and activities involving the **primary production**, processing and packaging, distribution and

access, media and marketing, consumption and waste management of food, all of which can affect food accessibility in different ways and subsequently people's health.

#### primary production

the production, growing or rearing of raw materials (e.g. harvesting)

As described in Chapter 7, a food system involves raw commodities, from farm to consumer, and includes supply of agricultural inputs, primary food production, processing and manufacturing sectors, packaging, food

distribution, food retailing and marketing, food catering and domestic food. The various ways consumers eat (prepare and consume) and dispose of and/or recycle food are also part of a food system.



**Figure 8.1:** All of these components of our food systems in Australia impact on the food we choose to eat, our behaviours when choosing and eating food and, ultimately, our health and wellbeing. These components are not linear or discrete but form complex interactions.

 **Let's talk**  
How are you connected to the food systems?

**Activity 8.1 (Inquiry):** What impact do the food systems have on your food choices and health and wellbeing? 

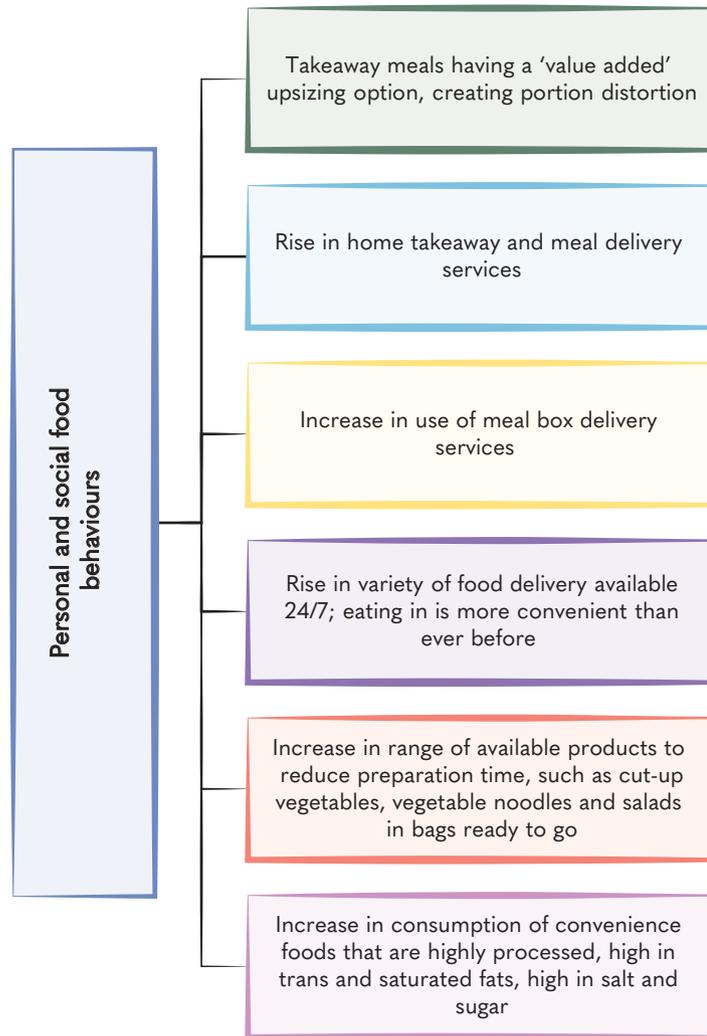
Consider what aspects of the food systems impact your food choices and health and wellbeing, then copy and complete the table.

Food system component	Impact on food choices	Impact on health and wellbeing

## Food, behaviours and effects on health and wellbeing

Food nourishes our body and allows us to create connections and shared moments around a meal. Personally and socially we

engage in behaviours associated with food that are ultimately influenced by the food systems we have around us. These behaviours can have positive and negative effects on our short-term and long-term health.



**Figure 8.2:** Examples of personal and social behaviours within our current food systems

### sedentary behaviour

'a state in which body movement is minimal, such as sitting time while watching television, reading, working at a computer, talking on the telephone, driving a car, or meditating' (NHMRC)

### Sedentary behaviours

We live in a modern sedentary society.

**Sedentary behaviour**, or physical inactivity, is defined by the National Health and Medical Research Council (NHMRC) as 'a state in which body movement is minimal, such as sitting time while watching television, reading, working at a computer, talking on the telephone, driving a car, or meditating'. We know we are less active as a society than ever

before and we also have ever-expanding food systems with more variety available to us.

Sedentary behaviour, little to no movement and a lack of physical activity result in a lack of energy expenditure. Weight gain occurs if energy consumed is higher than energy output. Over a long period of time, this imbalance is associated with risks including the development of diet-related diseases such

as cardiovascular disease, type 2 diabetes, obesity and some forms of cancer.

An example of sedentary behaviour in our food systems is the rise in home delivery of food services from our grocery shopping to our takeaway dinners. We have less time to prepare food and so we look for quick and easy food that is conveniently prepared for us, contributing to our sedentary behaviours.

Leading a sedentary lifestyle has impacts on our health, in particular obesity. Obesity levels in Australia are the highest they have been and are rising. Obesity is a leading cause of heart disease, diabetes and some cancers.



### Let's talk

How do the current food systems facilitate physical activity? How could you include physical activity or movement into your personal and social food behaviours?

## Overconsumption

Overconsumption refers to food intake and energy requirements exceeding what is required by the body for functioning and energy expenditure. Overconsumption of energy is usually through a high intake of unhealthy foods/nutrients – for example, salt (sodium), saturated fat, sugar-sweetened beverages and processed meat.

This has become evident through the high rates of overweight and obesity in Australia as well as diet-related disease such as type 2 diabetes and cardiovascular disease. Overconsumption habits and behaviours are becoming normalised personal and social behaviours that individuals participate in frequently.

These habits are causing **mindless eating** and the brain is failing to register the feelings of satiety and fullness, leading to overconsumption.

**mindless eating** consuming foods without full awareness or conscious thought of the process



**Figure 8.3:** Overconsumption often occurs when eating in front of the TV and other screens.



**Figure 8.4:** Snacking is a common part of an individual's diet. But 'snack foods' are usually not suitable snacks and are often loaded with trans and saturated fats, sugars or salt.

We have seen an increase in food delivery services over recent years. This can be a cause for overconsumption because foods that may not be needed to satisfy hunger are ordered and consumed, leading to an excess in energy intake. Most of these services require a minimum spend for the food to be delivered. Overconsumption is common when a minimum spend is required.

For families, having rules such as not leaving the table until the meal is finished, or 'finish your dinner and then you get dessert' could impact on the child's ability to know how much enough is. Parents are now encouraged to respect a child's appetite and focus on allowing the child to determine how much they need to eat to feel full.



**Figure 8.5:** Food delivery services include HelloFresh, Uber Eats, Deliveroo, DoorDash and Menulog.



### Let's talk

When ordering food delivery services, how does 'minimum spend' contribute to overconsumption?



### Let's talk

State your favourite snack food and describe why you love it. Where does this snack food fit within the Australian Guide to Healthy Eating? Is this snack food eaten often and in large amounts? Is this snack food the best choice for meeting the recommendations of the Australian Guide to Healthy Eating?

## Activity 8.2 (Practical): Design a meal card



Home meal delivery services are becoming a popular choice in Australian homes. A home meal delivery service is a convenient way to prepare dinner, with each meal provided in the box coming with portioned ingredients and clear instructions on a card with photo images of key steps. Popular services include HelloFresh, Dinnerly, EveryPlate and Marley Spoon.

Design a meal card that could be included in a meal delivery service box. Your meal card is to serve one, making it easy for families to adjust the serving. Your recipe choice must reflect the recommendations of the Australian Dietary Guidelines and the Australian Guide to Healthy

Eating. Include photographs of the method when creating your meal card. Once completed, write an evaluation of your chosen recipe. Your evaluation should:

- provide a comprehensive analysis of the food product with specific and accurate reference to the Australian Dietary Guidelines and/or the Australian Guide to Healthy Eating
- discuss the number of serves of the recipe in relation to the five food groups and compare this with the recommended number of serves
- include positives and areas for improvement
- effectively utilise examples of ingredients and cooking
- suggest how to improve the nutritional quality of the meal and/or recommend other food products that should be consumed throughout the day.

### Activity 8.3 (Data analysis): Overconsumption of sugary drinks

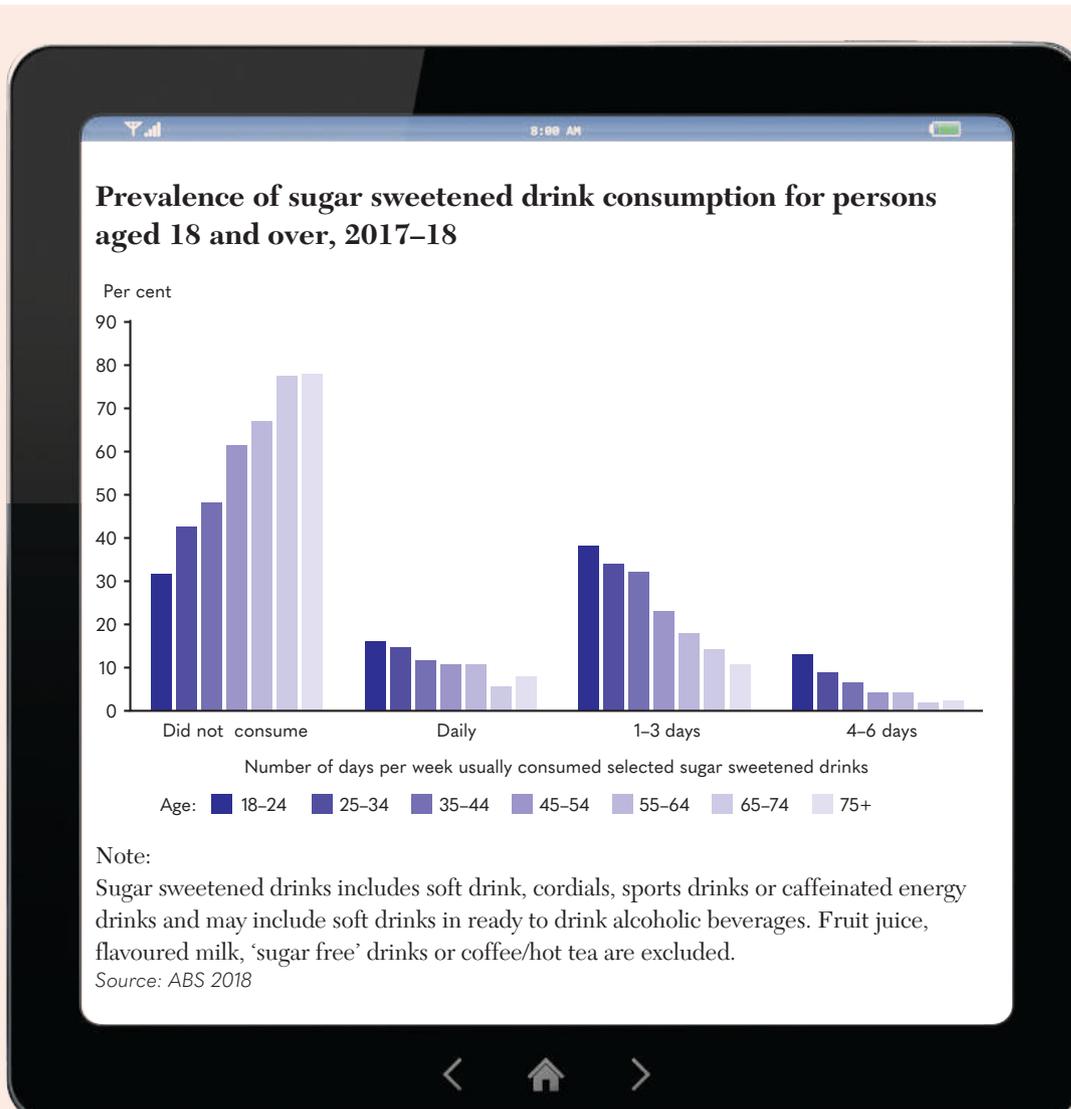


A concerning trend in the diet of many Australians is the overconsumption of sugar-sweetened drinks. The following data from the Australian Institute of Health and Welfare (AIHW) illustrates the prevalence of sugar-sweetened drink consumption in Australia in 2017–18.

***Sugar sweetened drinks***

The Australian Dietary Guidelines recommend to limit intakes of drinks high in added sugars, as they can provide excess kilojoules with little nutritional value and can increase the risk of excessive weight gain (NHMRC 2013). In 2017–18:

- 9.1% of adults aged 18 and over consumed sugar sweetened drinks daily
- A greater proportion of men consumed sugar sweetened drinks daily than women – 12% compared with 6.4%
- 18–24-year-olds had the highest daily consumption – 16% of men and 10% of women
- Women were more likely than men to report not consuming any sugar sweetened drinks – 72% compared with 56%
- Overall, sugar sweetened drinks consumption decreased as age increased.



**Figure 8.6:** Article extract from the Australian Institute of Health and Welfare, 'Poor diet in adults', 19 July 2019

Source: Australian Institute of Health and Welfare

- 1 State two trends evident in this data.
- 2 Outline personal and social behaviours of 18-24-year-olds that may encourage the overconsumption of sugar-sweetened drinks. Discuss how this could explain the reasons for this data.
- 3 Discuss the health impacts of the overconsumption of sugary drinks for adults.
- 4 Consider the reasons why Australians are not drinking enough water in their diet and choosing to consume sugar-sweetened drinks.
- 5 Using the recommendations of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating, suggest solutions to reducing the overconsumption of sugary drinks in the Australian adult population.

## Activity 8.4 (Practical): Apple taste test



Copy and complete the table. Compare the four products by taste-testing each product and describing its sensory properties.

Snack food		Appearance	Aroma	Taste	Texture
	Apple (whole, fresh)				
	Apple slices (pre-packaged portions)				
	Apple puree cup				
	Apple and spice fruit bar				

## Evaluation questions

- Using your sensory analysis data, explain which apple snack food you would prefer and why.
- List and compare the ingredients for each food product tested in the sensory taste test.
- Explain how snacking can lead to overconsumption of foods. Consider the ingredients list in your response.
- Provide advice on the best snack food option and justify your decision.
- Discuss the links between snack foods and snacking (behaviour) and health and wellbeing.

# Hummingbird muffins

Makes 6 muffins

## Ingredients

### Cake



1 1/2 cups plain flour, sifted



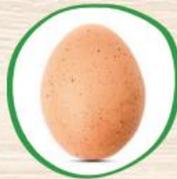
1/2 teaspoon ground cinnamon



1/2 teaspoon bicarbonate of soda



1 cup caster sugar



3 eggs, lightly beaten



1/2 cup oil



1/2 cup milk



2 overripe bananas, mashed



1/2 cup pineapple, crushed

### Icing



60 g cream cheese, softened



30 g butter



1 teaspoon vanilla essence



1 1/2 cups icing sugar

## Method

### Cake

- 1 Preheat the oven to 180°C.
- 2 Lightly grease a muffin tray or line the tray with muffin papers.
- 3 Sift the flour, cinnamon and bicarbonate of soda into a large bowl. Stir in the sugar.
- 4 Add the eggs, oil, milk, banana and pineapple. Stir until just combined.
- 5 Pour the mixture into the prepared muffin tray.
- 6 Bake in the oven for approximately 18–20 minutes.
- 7 Allow the muffins to cool slightly before turning onto a cake cooler.

## Icing

- 1 Use an electric beater to beat the cream cheese, butter and vanilla essence in a small bowl until light and fluffy. Gradually add the icing sugar.
- 2 Place a drop of cream cheese icing onto the top of each muffin.



### Evaluation questions

- 1 List a personal and social behaviour that could influence the consumption of this type of muffin.
- 2 Describe how celebrations can lead to the overconsumption of foods.
- 3 Discuss reasons why these muffins are a better choice than other cakes, considering the Australian Guide to Healthy Eating in your response.
- 4 Suggest why this recipe was written to make six muffins rather than one whole cake.

**Activity 8.5 (Practical): Design task – healthy dinner meals for a week**



- 1 Taking into account the social factors from Chapter 5, use one or more factors to design dinner meals for your family for a week. In your design, include two meat-free dinner meals and one **fakeaway** dinner meal. Your repertoire of healthy meals is to be suitable for children and families and needs to reflect the recommendations of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating.
  - 2 Choose one of your dinner meals and create it in class, modifying the recipe to serve one.
  - 3 Complete a SWOT evaluation of your cooked dinner meal, commenting on its strengths, weaknesses, opportunities and threats in relation to:
    - being a healthy meal suitable for children and families
    - reflecting the recommendations of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating
    - the influence of the social factors on this dinner meal. (For example, is it budget-friendly? If so, the social factor of income can be discussed as a strength.)
- Copy and complete the table.

<b>Strengths</b>	<b>Weaknesses</b>
<b>Opportunities</b>	<b>Threats</b>

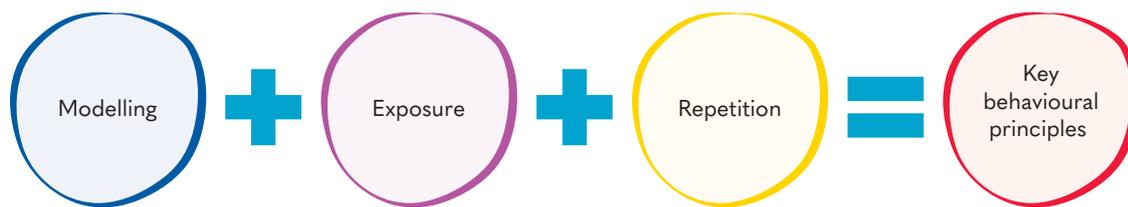
**fakeaway**  
home-made version of a takeaway meal

**modelling**  
the behaviour where parents and/or carers demonstrate nutritious eating habits. Modelling can be intentional or unintentional

**exposure**  
the action of continually introducing foods and experiences around healthy and nutritious food for children

**repetition**  
being offered the same healthy foods a number of times, creating a familiarity with nutritious foods

*Key behavioural principles*



**Figure 8.7:** These three principles combine to develop healthy food behaviours in children.

Key behavioural principles play a role in helping to establish healthy diets in children and nutritious meal patterns within the home. The three principles are **modelling**, **exposure** and **repetition**. These principles can help to establish healthy food habits in the home and assist in creating a positive environment around food and food preparation. We know that children’s eating behaviours are crucial to the dietary behaviour patterns they are likely to adopt throughout life. Through their own eating habits, parents can set a good example for their children.

Modelling, exposing and repeating healthy eating behaviours from a young age can have long-term impacts on the growth, development and overall health of the child now and into adulthood.

Children’s eating behaviours are constantly being examined, mainly due to the rise of childhood obesity that is occurring worldwide. Empowering families with knowledge and skills can assist in creating healthier futures for children and ultimately reduce the prevalence of diet-related lifestyle diseases.

**Activity 8.6 (Practical): Memories**



Share your favourite early childhood memory related to food. Describe who was there, what food was involved and details about the experience. Can you link this experience to an eating behaviour listed in Figure 8.8?



**Figure 8.8:** There are a range of variables that can impact on children's eating behaviours.

## Modelling

Modelling eating behaviours demonstrates and moulds the same patterns for children. If parents model healthy eating behaviours, studies have shown that this behaviour will more likely be passed on to children. Parents, carers and educators all play a role in modelling best practice around food and eating for children. Examples of ways we can model food behaviours include the following:

- Adding variety to a child's school or day-care lunch box, especially fruits and vegetables, models the inclusion of these foods in a child's daily diet.
- When talking about food, model conversations around foods that are positive and encouraging.
- Actions around food are copied by children, so model actions that promote healthy behaviours. An example could be choosing to snack on a piece of fruit instead of a snack from a packet (for example, chips).



**Figure 8.9:** Parents sitting down to eat a variety of nutritious foods with their children is a great way to model healthy eating behaviours.

- Sit down and eat with children wherever you can – kinder and school lunchtimes, day-care settings and meal times at home. This models eating behaviours, conversations, enjoyment of food and connection.

- Encouragement is key. Children don't have to like what is being eaten but they should feel encouraged to give it a go next time.
- Sharing knowledge about food and participating in the cooking of meals models knowledge and skills around healthy food practices.
- Teaching children how to shop and buy foods, grow and produce home-grown foods and cook all demonstrate modelling of food behaviours to children.
- Try modelling rules such as fruit for breakfast and morning tea and vegetables with lunch and dinner as this provides an opportunity for modelling best practice in healthy eating habits.



### Let's talk

How does modelling food behaviours look like in your family environment? What actions do you take that you have learned from influential others in your life? Similarly, do you have younger people in your life who are modelling their food and diet from your actions? Explain.



**Figure 8.10:** Eat the rainbow!

## Exposure

Exposing and continually introducing foods and experiences around healthy and nutritious food for children will help in the adoption of healthy food behaviours for life. The key with this behaviour is to introduce and expose new foods on a regular basis. Exposure to a variety of foods is also exposure to a variety of different nutrients needed for growth and development of the body.

Exposure provides a greater chance of establishing healthy diets as children grow. Examples of the key behavioural principle of exposure include:

- Start small! When learning new foods, start out by introducing small amounts consistently.
- Add colour to the plate or in a little side bowl next to the meal. Colour could be a different fruit or vegetable that would increase the exposure to a new food.
- Platters are a great way to expose and offer a variety of foods from a range of different plant-based food groups. Think vegetable sticks, cut up fruits, popcorn, nuts and seeds, home-made baked products, dips such as hummus.

- Introduce children to new foods and experiences with food by getting out and about. An example could be taking children to the local day or night market and experiencing new flavours and cuisines.
- Use a range of preparation techniques with the same food to increase exposure. For example, eggs can be scrambled, boiled or poached, with each technique changing but exposure to the food being given in a variety of ways.
- Pick one night of the week and choose a new meal to cook. Exposure to new foods and recipes adds to the family meal repertoire and increases exposure to a variety of nutrients in the diet.



### Let's talk

Think and share about a time that you were exposed to a new food that was unfamiliar to you. Did you like it? Have you had it since? If you could try it again now, would you?



**Figure 8.11:** Examples of repetition of meals include family favourites such as Taco Tuesday and weekend pancakes. During the COVID-19 pandemic, #SolidarityPancakes became a popular food movement in which pancakes were cooked and shared on social media on Sundays to show support for frontline health workers.

## Repetition

You can create a familiarity of nutritious foods through repetition. Repetition will help establish an acceptance of a wide variety of foods in the diet. We can incorporate the key behavioural principle of repetition into food practices:

- Repeating meals in the family repertoire, including favourite meals such as Taco Tuesday.
- Repetition of food can be varied by preparing and cooking foods in different ways. It could also be incorporating a particular ingredient in a variety of ways on a regular basis.
- Repeated exposure is key to helping children eat the right foods as they will consume what is familiar to them. You just have to keep repeating the behaviour.
- Don't force-feed a new food, just keep offering it and leave the child to it. They will discover the food themselves in their own time.

- Parents can promote healthy eating patterns by continually offering children fruit and vegetables after they return home from school. This repetitious pattern then becomes the norm within the household.
- Family participation in shopping for food at the market or grocery store on a regular basis.

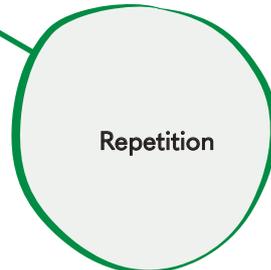
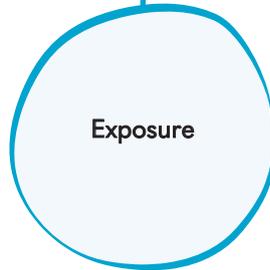
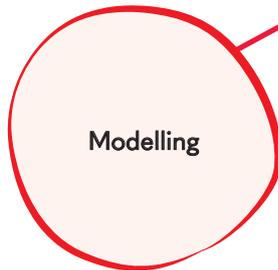


### Let's talk

Discuss the repeated recipes and foods that are in your families' repertoire of meals each week. What food and nutrition actions are repeated? Why do you think this could be?



Key behavioural principles



**Modelling**

• **Description:**

Modelling is the behaviour where parents and carers demonstrate healthy and nutritious eating habits in the home. Parents or role models who eat with children will be encouraging the children to eat more of that particular food, as children model the actions of those around them. The principle of modelling suggests that parents who model healthy eating patterns to their children will increase the consumption of healthy foods by their children.

• **Example:**

Including a variety of foods, especially fruits and vegetables, into a lunch box for a child will help to model the inclusion of these foods in a child's diet.

**Exposure**

• **Description:**

Exposure refers to the action of continually introducing foods and experiences around healthy and nutritious food for children. It is about ensuring contact and introduction with new foods on a regular basis. This allows for new foods to be introduced in the diet, ultimately allowing for increased variety in nutrients consumed. Exposure provides a greater chance of establishing healthy diets as children grow.

• **Example:**

Using a range of preparation techniques can increase exposure of the food at different times of the day. For example, grated carrot in an omelette for breakfast, carrot sticks for morning tea, sliced carrot in the stir-fry for dinner.

**Repetition**

• **Description:**

Repetition is being offered the same healthy foods a number of times, creating a familiarity with nutritious foods. Meal planning can be made easier with repetition. Repetition will help establish a child's acceptance of that food. Studies have shown that if you repeat the exposure of an unfamiliar food or a food that a child does not like, their food exposure will be broadened. Repetition of food can be varied by preparing and cooking foods in different ways. Repetition leads to healthy foods forming part of a healthy repertoire of meals for the child and family.

• **Example:**

Family meal planning could include favourite meals such as Taco Tuesday. It could also be incorporating a particular ingredient on a regular basis. For example, pumpkin can be repeated by not only including it in the weekly meal plan, but also changing how it is included, such as roasted, pumpkin soup or made into pumpkin ravioli.

**Figure 8.12:** Understanding the key behavioural principles can help to establish healthy meal patterns in the home.

**Activity 8.7 (Case study): The Ahmadi family**

Read the following case study and answer the questions that follow.

**Day in the life of the Ahmadi family**

Aryan Ahmadi is 45 years old and lives in an apartment with his wife, Bita, and two children, Azin and Nasir, aged 13 and 16. The Ahmadi family moved to Melbourne from Iran in 2019 due to Aryan's work. Bita has returned to study to pursue her passion for fashion. She is also undertaking online English lessons as she has difficulty with the language. The family speaks Persian at home.

Azin and Nasir are happy about their move to Australia and have easily settled into their new school. When the boys arrive home from school each afternoon, Bita has a range of fresh fruits and vegetables cut up at the kitchen bench. Azin likes to sit down with his mum and talk about the day as they eat. Nasir prefers to go straight to his room to play video games. He often sneaks in packets of chips and chocolate to eat while he plays games. He knows his mum wouldn't approve of the amount of time he spends online or his eating habits, but he lies and says he is doing school work, while really he is gaming.

The month of Ramadan is approaching where the family will abstain from eating during daylight hours. During Ramadan the family walk to the local night market on the weekends for Iftar (meal to break the daily fast). Bita loves this tradition as she has met other families from local Muslim communities and has formed new friendships.

The family's favourite foods to purchase from the night markets are khoresh-e ghormeh sabzi, a slow-cooked lamb and bean stew, and ghotab, an almond and walnut pastry. The children have fond memories of helping their mother and grandmother in the kitchen making these dishes. It would take the whole day as the lamb slowly braises for eight hours and the pastry takes at least two hours to prove. Bita wishes she could recreate these dishes with the children in the apartment, but there is not enough space.

The family love spending time in the local community kitchen garden where they are able to participate in the growing of fruits and vegetables, have made new friendships and have adapted their gardening skills to suit the growing conditions in Melbourne. Growing their own vegetables was something the family did together in Iran before they moved to Australia.

**Questions**

- 1 Identify and explain how the Ahmadi family exhibit the key behavioural principles.
- 2 Using an example from the Ahmadi family, identify a personal behaviour that may lead to the overconsumption of food. Discuss the impact that this could have on long-term physical health and wellbeing.
- 3 Discuss how Bita could use the Australian Guide to Healthy Eating when planning the family meals each day.

**Activity 8.8 (Visual): Promoting healthy eating**

Create a visual presentation for parents outlining practical hints and tips to follow to help establish and promote healthy eating in the home. Be sure to outline each key behavioural principle in your presentation (modelling, exposure and repetition).

# Vegetable frittata

Serves 2

## Ingredients



4 eggs, lightly beaten



1/2 cup milk



1/4 teaspoon salt



1/4 red capsicum, finely diced



1/2 zucchini, grated



1/4 teaspoon pepper



1/2 cup tasty cheese, grated



1/4 red onion, finely diced

## Method

- 1 Preheat the oven to 200°C.
- 2 Lightly grease an ovenproof baking dish, around 5 cm deep.
- 3 Mix together the eggs, milk, salt and pepper until well combined.
- 4 Add the cheese, zucchini, capsicum and onion. Mix well.
- 5 Pour into the baking dish, making sure your vegetables are evenly spread.
- 6 Bake in the oven for 20–25 minutes or until just set.
- 7 Stand for 5 minutes and serve.



### Evaluation questions

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- 1 Outline how this recipe could be used to encourage modelling, exposure and repetition of food behaviours for children.
- 2 Suggest how you could modify this recipe for a child with a dairy intolerance.
- 3 Suggest how you could modify this recipe for a child with an egg allergy.
- 4 List alternative ingredients that could be included in this recipe to better reflect the recommendations of the Australian Guide to Healthy Eating.
- 5 Discuss how this recipe could be used to encourage children to get cooking in the kitchen.
- 6 Explain how this recipe promotes satiety.

## Chapter revision

- Personal and social behaviours in our current food systems can encourage overconsumption of food. Paired with sedentary behaviours, this is having impacts on our health.
- Key behavioural principles of modelling, exposure and repetition assist in the establishment of healthy food behaviours and nutritious meal patterns in the home.
- Parents play a central role in developing the key behavioural principles into family life, and this can lead to positive impacts on the health and development of the family unit.
- We learn most of our knowledge and skills about food in the home and model behaviours from our parents, who expose us to new foods and build our repertoire of everyday eating.

### Apply your knowledge

- 1 List three examples of personal and social behaviours around food.
- 2 For each example, consider the impacts this behaviour can have on short-term and long-term health and wellbeing.
- 3 Explain how sedentary behaviour affects physical health.
- 4 Using examples, outline personal and social behaviours that may lead to the overconsumption of food.
- 5 Describe examples of how parents can use repetition to aid in the establishment of healthy and nutritious meal patterns within the home.
- 6 Explain the role of exposure as a key behavioural principle and how food behaviour impacts on children both in the short term and in the long term.
- 7 Suggest two ways parents could alter their behaviour in order to better model healthy eating to their children.

## Practice exam questions



### Question 1 Multiple choice

Trying new vegetables is an example of which key behavioural principle?

- A Repetition
- B Discipline
- C Modelling
- D Exposure

**1 mark**

### Question 2

Outline a personal behaviour and a social behaviour that encourage the overconsumption of food and sedentary behaviour.

**4 marks**

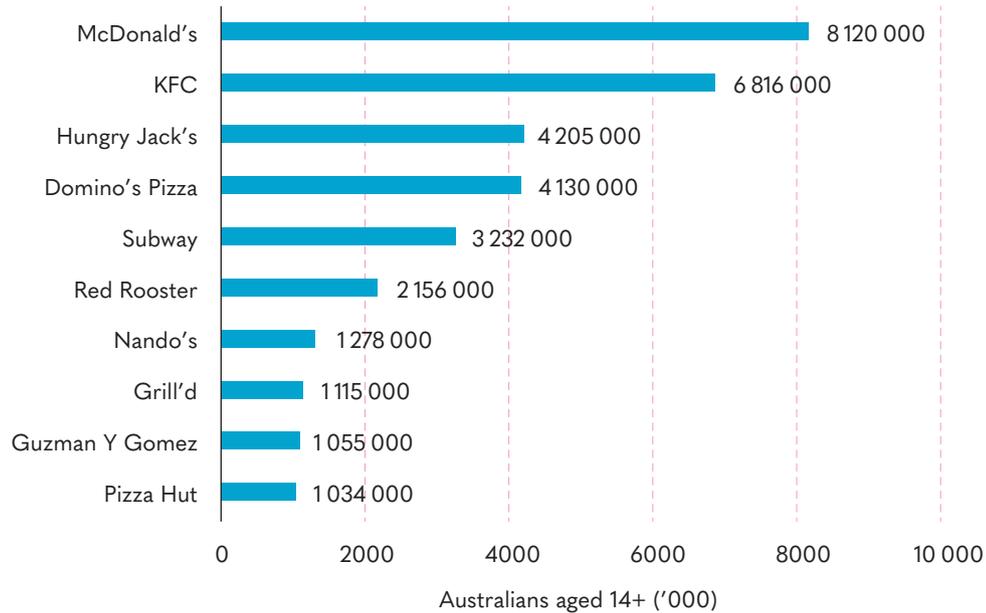
### Question 3

Name a key behavioural principle and explain how it can be utilised to establish healthy diets in children.

**3 marks**

## Area of Study 2: Extended response question

### Question 1



**Figure 8.13:** Top 10 quick service restaurants: number of Australians aged 14+ who ate at or had takeaway in an average four weeks in 2020  
Source: Roy Morgan Single Source: January 2020 – December 2020, n = 61 294. Base: Australians aged 14+

'The latest Roy Morgan data shows over three-quarters of Australians aged 14+, 15.9 million, ate take away food from fast food outlets in an average four weeks during 2020, up from 13.3 million (63.7%) in 2019 ...

'... This represents significant growth on a year earlier but the trend of increasing patronage at fast food outlets has been consistent over the last few years.

'Importantly for these outlets is attracting and retaining repeat customers who may return multiple times over a short period. The data shows that 3.7 million Australians (17.6%) eat 10 or more times from quick service restaurants in an average four weeks, or at least twice a week.

'There is considerable scope for quick service restaurants who can identify who these people are and find ways to increase engagement to add value to their offering through customer loyalty programs that reward frequent visits.'

Source: Roy Morgan, 'McDonald's, KFC, Hungry Jack's & Domino's Pizza are Australia's favourite restaurants', 24 May 2021

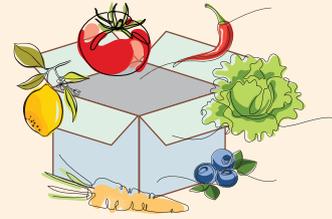
Analyse the information above. In your response, include the following:

- recent changes and trends in food behaviours
- social factors that influence food choices
- links between food patterns, behaviour and effects on health and wellbeing.

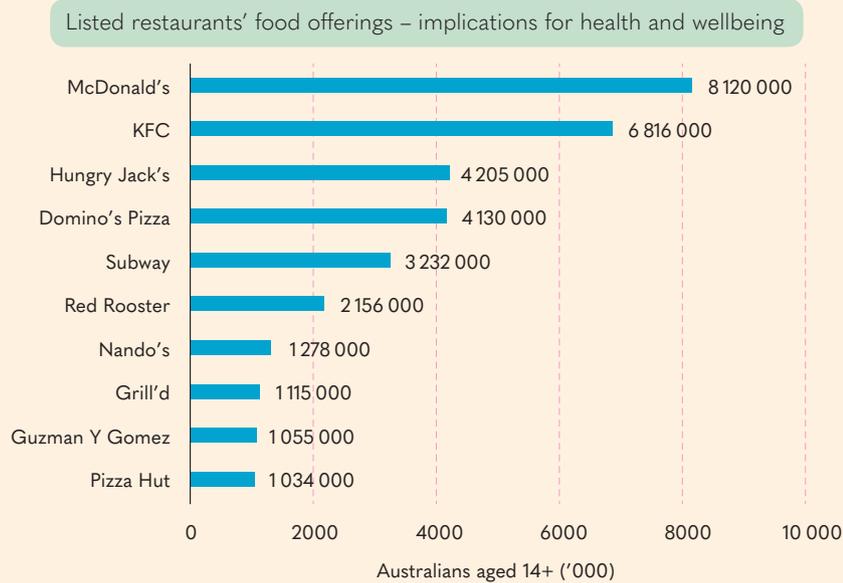
**10 marks**

# Let's unpack it

Refer to 'How to unpack exam questions' on pages xv–xvi as a guide to the following question breakdown.



## Question 1



**Figure 8.13:** Top 10 quick service restaurants: number of Australians aged 14+ who ate at or had takeaway in an average four weeks in 2020

Source: Roy Morgan Single Source: January 2020 – December 2020, n = 61 294. Base: Australians aged 14+

Pattern of eating data to be referenced in response

Trend data – what social factors have influenced this? Effect on health and wellbeing?

'The latest Roy Morgan data shows over three-quarters of Australians aged 14+, 15.9 million, ate take away food from fast food outlets in an average four weeks during 2020, up from 13.3 million (63.7%) in 2019 ...

'... This represents significant growth on a year earlier but the trend of increasing patronage at fast food outlets has been consistent over the last few years.

'Importantly for these outlets is attracting and retaining repeat customers who may return multiple times over a short period. The data shows that 3.7 million Australians (17.6%) eat 10 or more times from quick service restaurants in an average four weeks, or at least twice a week.

'There is considerable scope for quick service restaurants who can identify who these people are and find ways to increase engagement to add value to their offering through customer loyalty programs that reward frequent visits.'

Food behaviours

Implications for health and wellbeing

Source: Roy Morgan, 'McDonald's, KFC, Hungry Jack's & Domino's Pizza are Australia's favourite restaurants', 24 May 2021

Analyse the information above. In your response, include the following:

- recent changes and trends in food behaviours
- social factors that influence food choices
- links between food patterns, behaviour and effects on health and wellbeing.

**10 marks**

**A Annotate the command word:** Analyse means to identify components/elements and the significance of the relationship between them; draw out and relate implications.

**B Parts of question**

**C Count the marks** – holistically marked

**D Determine key words to use**

Trends (use data)

Social factors (education, income, location, accommodation, available time, cultural norms)

Links/relationships

Discretionary foods

Food behaviour

Effects on health and wellbeing

**E Evidence**

Use your knowledge to provide evidence to support your statements made.





## Unit 4

# Food issues, challenges and futures

### **Area of Study 1: Navigating food information**

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In this area of study students focus on food information and misinformation and the development of food knowledge, skills and habits. Students learn to assess information and draw evidence-based conclusions to navigate contemporary food fads, trends and diets. They reflect on a selected food fad, trend or diet and assess its credibility and the reliability of its claims, taking into consideration the principles of evidence-based research and healthy eating recommendations that support the Australian Dietary Guidelines and the Australian Guide to Healthy Eating. Students practise and improve their food selection skills by interpreting the claims of food labels and interrogating the marketing terms on food packaging. Practical activities provide opportunities for students to extend their understandings about food selections and repertoires that reflect the healthy eating recommendations of Australian Dietary Guidelines.

*VCE Food Studies Study Design extracts © VCAA; reproduced by permission*

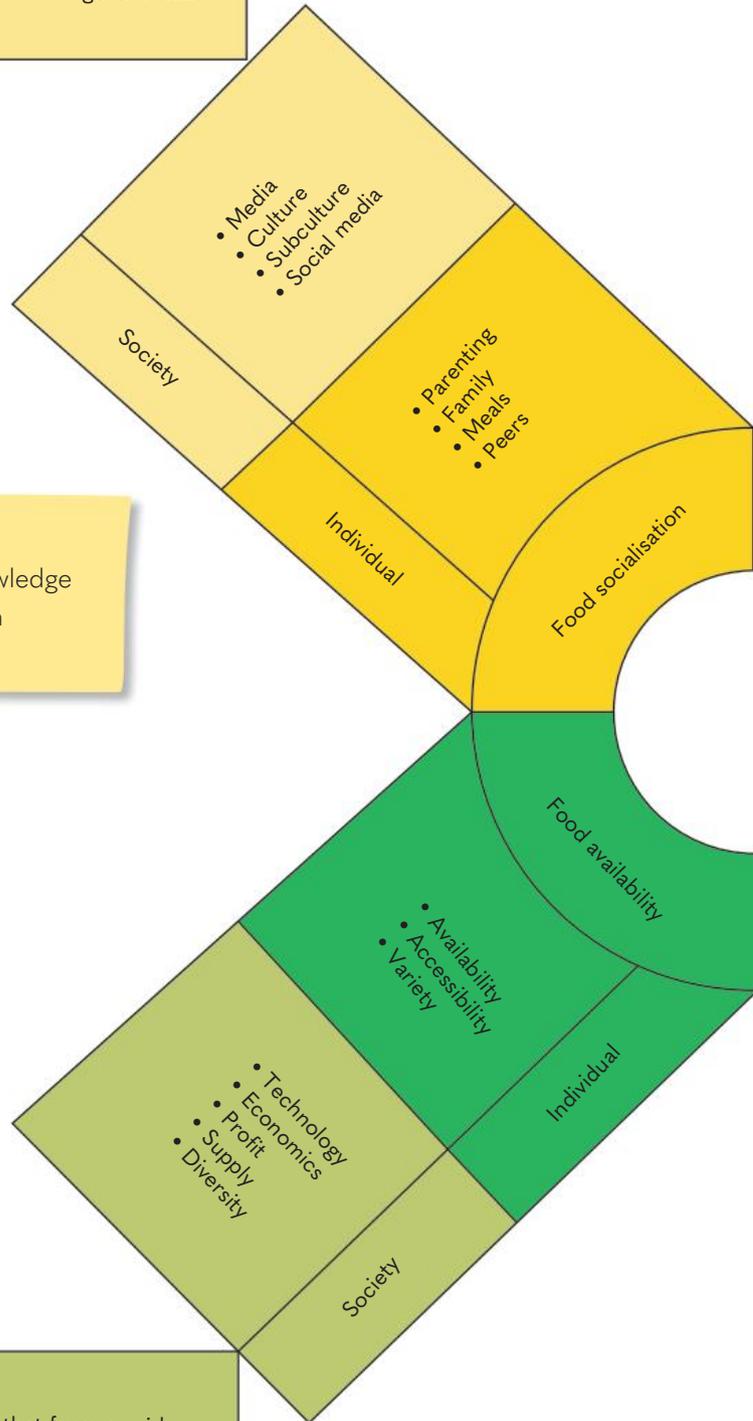
# Contexts for gaining food

Throughout our lives, through our interactions with other people and the food systems, we develop our food knowledge and skills. Food knowledge is influenced by tradition as it involves the transition from generation to generation of knowledge and skills related to food.



### Let's talk

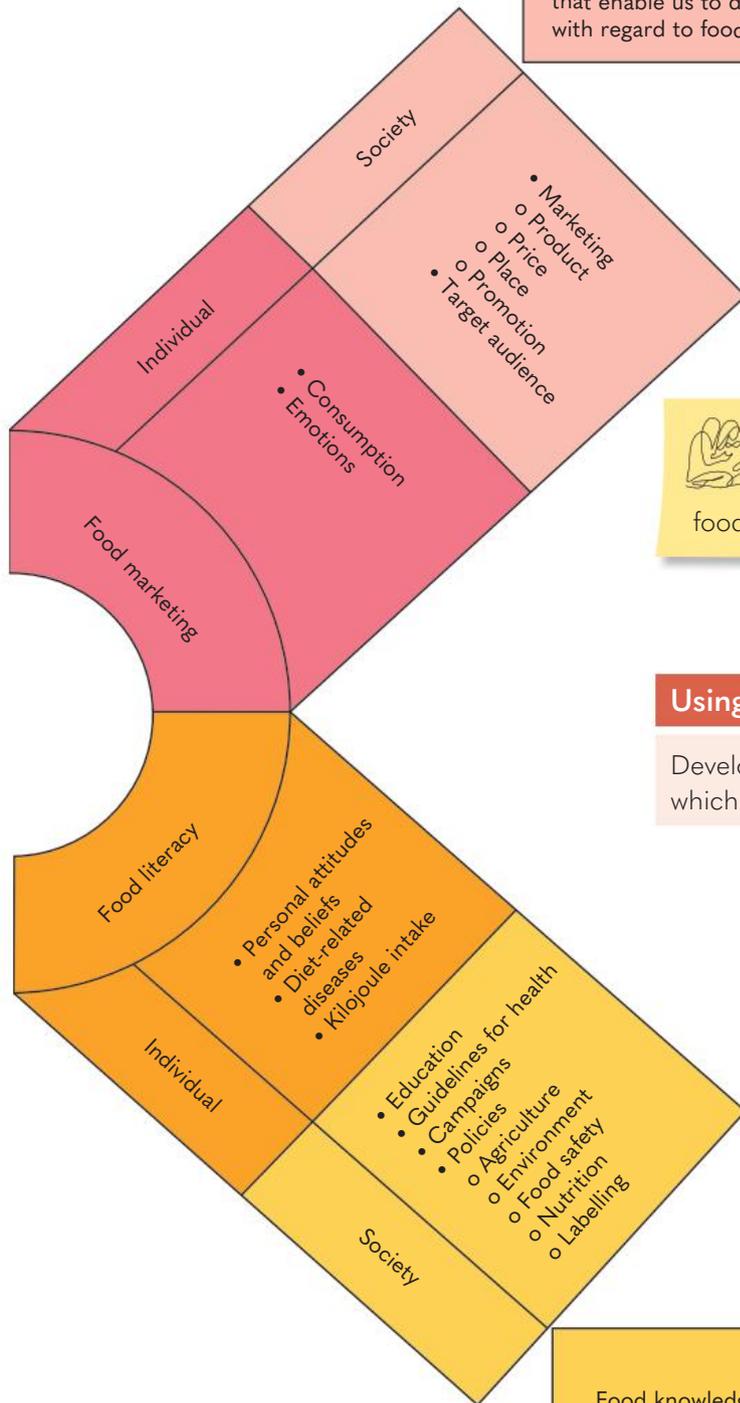
What food knowledge have you had passed down from generation to generation?



The contexts or the circumstances that form our ideas, understanding and development of our food knowledge and skills are varied, depending on the situation and influences that we have throughout our lives.

# knowledge and skills

The food knowledge and skills of an adult are established early in life. Parents and families play a major role in influencing adolescent eating habits and their exposure to food literacy. Parents and families are important in providing the skills and knowledge that enable us to develop eating habits and behaviours with regard to food choices and consumption.



**Let's talk**

Where did you get your food knowledge and skills from?

**Using the skill**

Develop a list of the variety of contexts in which food knowledge and skills take place.

Food knowledge comprises a number of components:

- food nutrition and health
- agriculture and the environment
- social development and equity.

# Chapter 9

## Assessing food information

### Key knowledge

- The principles of evidence-based research used in the development of the Australian Dietary Guidelines and Australian Guide to Healthy Eating and their application in response to contemporary food fads, trends and diets.
- Criteria used when assessing the validity of food information, including source, purpose, context, presentation of evidence and language use.
- Criteria used when assessing claims made by weight-loss and nutrient supplement companies, including commercial gain, ethics, and the effectiveness of the product.

### Key skills

- Assess the validity of information provided by a variety of contexts in which food knowledge and skills takes place.
- Apply principles of research and healthy eating recommendations to assess food information.
- Analyse the nutritional efficacy of contemporary food fads, trends and diets.

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Video 9.1 Chapter Overview

Have you ever heard about a new food product, trend or fad and thought, 'Wow – is that true?' You navigate food information more than you probably realise. In this chapter, we will look at what skills and knowledge are needed to assess the validity of food information you see about diets and foods, and understand how these can help you to make informed decisions about your food choices.

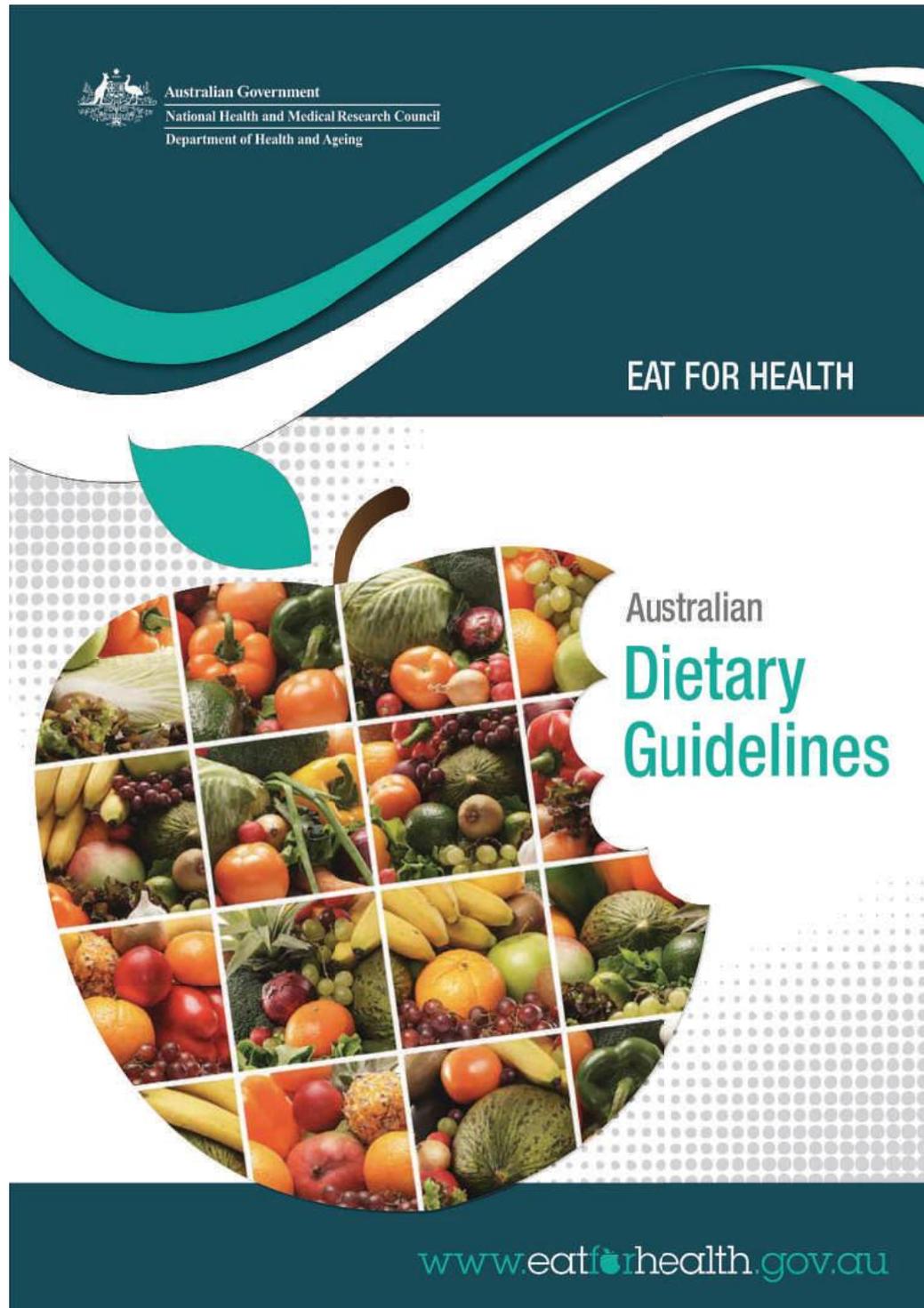
### Get knowledge ready

- 1 Develop a list of the pieces of information you would look for when deciding if food information is valid.
- 2 Discuss strategies used by weight-loss companies to sell their products.
- 3 Explain how you can determine if a diet is a healthy choice.

## *Principles of research*

The Australian Dietary Guidelines and the Australian Guide to Healthy Eating are considered reliable and accurate due to the principles of evidence-based research

used in their formation. The healthy eating recommendations of the Australian Dietary Guidelines support people in making food choices to improve health and wellbeing, assist in the prevention of disease and optimise development.



**Figure 9.1:** The Australian Dietary Guidelines

As the Australian Dietary Guidelines have been developed through rigorous research methodology, the principles of research used in their formation and the healthy eating recommendations of the Guidelines can be used to analyse and assess information and the **nutritional efficacy** of diets.

### Recognition of credible sources

It is important to consider the source of information when assessing its value. Credible sources are trustworthy, unbiased and independent sources that are experts in their field. This can include government agencies, educational institutions, scholarly publications and peer-reviewed journal articles.

The National Health and Medical Research Council (NHMRC) is responsible for the development and oversight of the Australian Dietary Guidelines. This independent

statutory agency is an expert body in health and medical research that works with the Australian Government Department of Health.

The NHMRC established the Dietary Guidelines Working Committee, which comprised a multidisciplinary team with expertise in nutrition, food and health relationships, epidemiology and research methodology. Committee members worked in a diverse range of fields relevant to food and health, such as government agencies, the public health sector, peak professional bodies, advocacy groups and educational institutions.

The Australian Dietary Guidelines were also developed in collaboration with the Dietitians Association of Australia. This is a peak body for dietetic and nutrition professionals in Australia.

#### nutritional efficacy

the effectiveness of the nutritional information

### Activity 9.1 (Inquiry): Determining credible sources



Conducting research into 'what is a healthy diet' provides endless sources of information from a vast array of publications.

Discuss the strengths and limitations of the following sources and rank them from most credible to least credible:

- government documentation of nutrition guidelines
- Coles magazine article about the benefits of high-fibre foods
- thesis written on the relationship between food and mood
- letter to the editor about a family's weekly food shop
- website subscription to their weekly meal plans
- systematic literature review on the impact that vegetable consumption has on cardiovascular disease
- social media influencer post on 'What I eat in a day'.

### Evidence-based information

In order to determine the quality of food information, we must assess the evidence that went into its formation. Quality evidence comes from current research and large sample sizes, and is collected using high-quality research methodology.

The Dietary Guidelines Working Committee undertook a series of systematic literature reviews in order to formulate the Evidence

Report that informed the Guidelines. This review only considered evidence that was published in the past 10 years and included over 55 000 peer-reviewed journal articles.

The Guidelines were also informed by the previous publication, the Food Modelling System and key authoritative reports. The quality and quantity of evidence used in the Australian Dietary Guidelines ensure that the recommendations are accurate.

## Accurate analysis of data

Data needs to be accurately analysed in order to draw objective, unbiased inferences from the evidence. Confirmation bias can occur when researchers only choose data sets that support their own hypothesis, therefore ignoring all other alternatives and results. This can misrepresent the evidence, leading to narrow-minded conclusions.

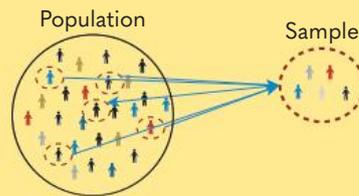
Rigorous research methodology was used in the Australian Dietary Guidelines systematic literature reviews to obtain and analyse the evidence. This was assisted by an expert methodologist to ensure that the analysis was undertaken in a transparent, accurate and unbiased manner. The evidence was assessed using NHMRC protocols to grade its evidence base, consistency, clinical impact, generalisability and applicability. This process ensures that the findings are statistically

significant, and therefore can be utilised in the formation of the Australian Dietary Guidelines recommendations.



### Let's talk

How would you describe the Australian population? Suggest why the most accurate data reflects Australia's population as a whole, including cultural background, gender, age and socio-economic status.

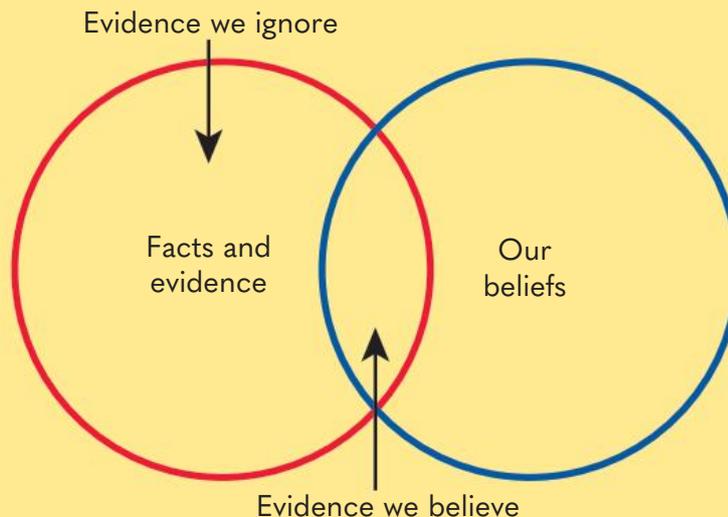


**Figure 9.2:** A representative sample



### Let's talk

Confirmation bias can occur when we only believe facts and evidence that align with our own beliefs and values, disregarding other factual information. What confirmation biases can you think of that occur in the food industry?



**Figure 9.3:** How confirmation bias influences our decisions



**Figure 9.4:** Evidence for and against. Only focusing on one side of evidence shows bias in data analysis.

#### food fad

an intense enthusiasm for a particular food item or way of eating that is often a short-lived craze



#### Let's talk

Your parent or friend is excited to tell you all about a new diet they read about on Facebook that promises to aid in weight loss and fight off disease. They ask your advice, as a Food Studies expert, on whether they can trust the information.

What steps would you take to assess the information?

## Food fads, trends and diets

If you went out for breakfast 10 years ago and asked for matcha pancakes, an acai bowl with an oat milk dirty chai latte, you probably would have received the side-eye from the wait staff. Now these menu items are commonplace at many cafes.

**Food fads**, trends and diets change throughout time. The popularity of particular foods and ways of eating is heavily influenced by the media, innovations in product design, chefs and consumer demand.

## The changing face of grains

A current food fad has seen an evolution in grain-based alternative foods. Consumers are opting to swap grain/cereal products with other plant alternatives. The versatility of cauliflower has resulted in the vegetable being utilised as a rice alternative and even replacing wheat flour in pizza bases. Consumers aren't stopping there – zucchini and enoki mushrooms are replacing pasta and sweet potatoes are being used as burger buns!



**Figure 9.5:** This is one way to get more vegetables in your diet!

**Activity 9.2 (Practical): Cauliflower rice and basmati rice**

Using the nutritional information panels provided, analyse the difference between cauliflower rice and basmati rice.

	Cauliflower rice – per 100 g	Basmati rice – per 100 g
Energy	79 kJ	1470 kJ
Protein	1.2 g	6.3 g
Fat, total	0.4 g	<1 g
Saturated	0.1 g	<1 g
Carbohydrate	1.7 g	78.8 g
Sugars	1.4 g	0.2 g
Dietary fibre	1.8 g	2.1 g
Sodium	19 mg	5 mg

- 1 State reasons why a consumer may choose to purchase cauliflower rice over basmati rice.
- 2 Demonstrating an understanding of the Australian Guide to Healthy Eating, discuss the strengths and limitations of this food trend.
- 3 Conduct a sensory analysis and comparison of cauliflower rice and basmati rice.
- 4 Provide examples of vegetables that can be substituted for grains in traditional recipes.
- 5 Produce the paleo butter chicken with cauliflower rice and analyse the nutritional efficacy of this recipe.



**Figure 9.6:** Cauliflower rice



**Figure 9.7:** Basmati rice

# Paleo butter chicken with cauliflower rice

Serves 2

## Ingredients

2 tablespoons  
coconut oil1 teaspoon  
garam masala1/2 teaspoon  
ground ginger1-2 pinches  
cayenne pepper  
(optional)1/2 teaspoon sea  
salt350 g chicken thigh  
fillets, cut into bite-  
sized pieces1/2 large onion,  
diced1/2 teaspoon  
ground cardamom1/2 teaspoon  
ground cumin1/2 teaspoon  
ground  
turmeric1 tablespoon  
lemon juice1 tablespoon  
olive oil2 garlic cloves,  
crushed1/2 teaspoon  
ground  
coriander1/4 teaspoon  
paprika1 1/2 tablespoons  
tomato paste200 mL can  
coconut cream1/2 head  
cauliflowerCoriander  
leaves, to serve

## Method

- 1 Heat the coconut oil in a large saucepan over a medium heat.
- 2 Add the onion and sauté until translucent. Stir in the garlic and spices and cook until fragrant. Add the tomato paste and cook for 1 minute. Add the salt, lemon juice and coconut cream, and mix well.
- 3 Bring the sauce to a simmer. Add the chicken and stir until well coated with the sauce. Cover the saucepan with a lid and cook, stirring occasionally, for 15–20 minutes, or until the chicken is cooked through and the sauce has thickened.
- 4 Meanwhile, prepare the cauliflower rice. Pulse the cauliflower florets in a food processor until they resemble rice. Heat the olive oil in a fry pan, add the cauliflower and pan-fry for 2 minutes.
- 5 Serve the butter chicken with the cauliflower rice and garnish with the coriander.





**Figure 9.8:** Popular foods from the past decade

Popularised fad diets often promise rapid weight loss or other health benefits in a short duration of time. These can be restrictive in nature, cutting out key food groups or minimising total kilojoule consumption to dangerous levels. These diets often do not align with the recommendations of the Australian Dietary Guidelines and often cannot be maintained in the long term due to their restrictive nature.

When assessing food fads, trends and diets, it is important to apply the principles of research to analyse the credibility and evidence base of the claims. By applying the principles of research and considering the healthy eating recommendations of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating, the nutritional efficacy of these diets can be effectively analysed.



WINE AND EGGS/3 days/loss: 5 lbs (2.5 kg)

- Breakfast: 1 egg, hard-boiled  
1 glass white wine  
(dry, preferably Chablis)  
Black coffee
- Lunch: 2 eggs, hard-boiled is best but  
poached if necessary  
2 glasses white wine  
Black coffee
- Dinner: 5 oz (150 g) steak, grilled with black  
pepper, lemon juice  
Remainder of white wine (one bottle  
allowed per day)  
Black coffee

**Figure 9.9:** The 'wine and egg' diet was published in *Vogue* magazine in 1977. Consider the nutritional efficacy of this restrictive diet.

**Activity 9.3 (Inquiry): Assessing the nutritional efficacy of diets**

Research the following diets and outline their key features by copying and completing the table. Assess the nutritional efficacy of the diets by demonstrating an understanding of the Australian Guide to Healthy Eating.

Diet	Key features	Nutritional efficacy
Paleo		
Keto		
Whole 30		
Intermittent fasting		
Cabbage soup diet		
5:2 diet		

**Activity 9.4 (Case study): Mediterranean diet**

The Mediterranean diet is praised for its nutritional properties and health benefits. It follows the traditional eating patterns of people who live near the Mediterranean Sea, including Spain, Greece and Italy.

The diet is primarily plant-based, consisting mainly of vegetables, fruits, legumes and wholegrains, with the use of healthy fats such as olive oil incorporated into most meals. Fish is the preferred animal protein, which may be enjoyed at least twice a week, with other animal products including poultry, eggs and fermented dairy (yoghurt and cheese). Red meat and processed cereals should be limited to occasional consumption.

A **longitudinal research study** published in **JAMA Network Open**, an American medical journal, found that those who followed the Mediterranean diet had a 25% less risk of developing cardiovascular disease. **Approximately 25,000 women were followed in the study for up to 12 years.**

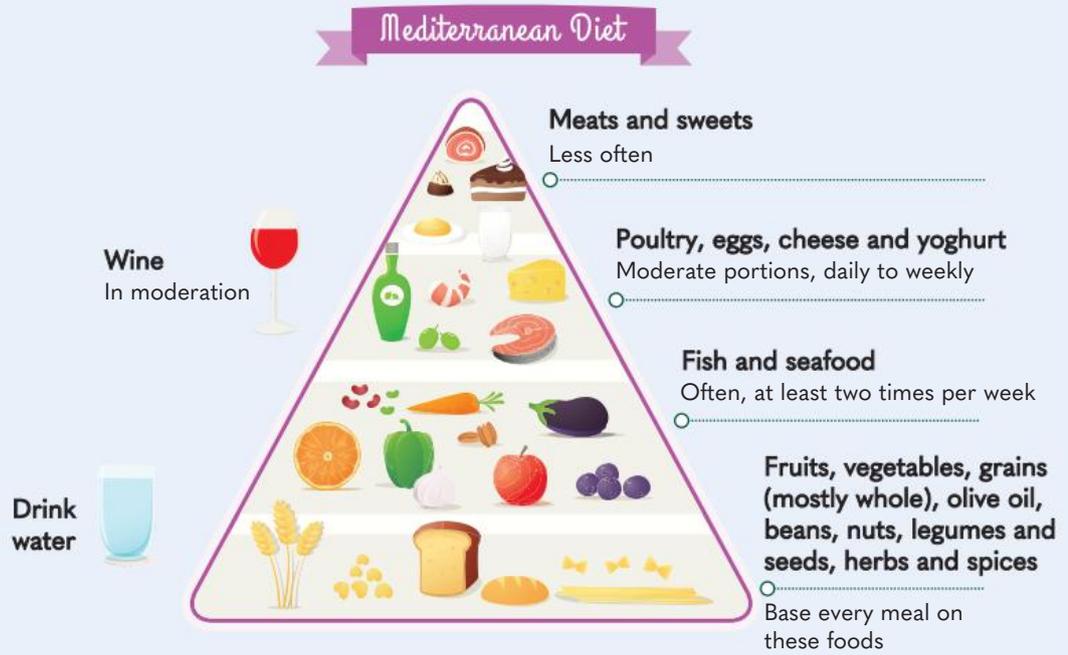
Accurate analysis of data

A **systematic literature review** and **meta-analysis** published in the **British Medical Journal** compared 14 popular named dietary programs to assess their effectiveness in weight reduction and cardiovascular risk factor improvement. Diets included the Mediterranean diet, Weight Watchers, DASH, Atkins and the Palaeolithic diet, just to name a few. The study was based on **121 randomised trials with over 21,000 patients.** From the 14 diets, only the Mediterranean diet was shown to have weight reduction and cardiovascular risk factor improvements at the 12-month follow-up.

Recognition of credible sources

Evidence-based information

Source: S Ahmad et al., 'Assessment of risk factors and biomarkers associated with risk of cardiovascular disease among women consuming a Mediterranean diet', JAMA Network Open, 7 December 2018



**Figure 9.10:** Consider how the Mediterranean diet aligns with the Australian Guide to Healthy Eating.



**Figure 9.11:** Eating for a healthy heart

### Mediterranean diet meal plan

Breakfast	Shakshuka: eggs poached in a simmering tomato and capsicum sauce served with wholemeal bread
Snack	Greek yoghurt topped with mixed berries, nuts and seeds (chia, sunflower and pumpkin)
Lunch	Cannellini and vegetable soup
Snack	Vegetable sticks and hummus
Dinner	Baked fish served with couscous

### Questions

- 1 Draw a Venn diagram to compare the similarities and differences between the Mediterranean diet and the Australian Guide to Healthy Eating.
- 2 Analyse the nutritional efficacy of the Mediterranean diet meal plan, demonstrating an understanding of the Australian Guide to Healthy Eating.
- 3 Apply the principles of research used in the development of the Australian Dietary Guidelines to the Mediterranean diet.



**Figure 9.12:** The Mediterranean diet is primarily plant-based, with the use of healthy fats such as olive oil incorporated into most meals

# Baked fish served with couscous

Serves 2

## Ingredients



1 tablespoon olive oil



1 shallot, thinly sliced



3 cloves garlic, crushed



1 tin diced tomatoes



1 tablespoon basil, shredded



Salt and pepper to taste



2 white fish fillets such as cod



200 g artichoke hearts



8 pitted kalamata olives, sliced in half



1 teaspoon capers



½ cup couscous



125 mL boiling water



½ lemon



1 tablespoon parsley, shredded



30 g feta cheese

## Method

- 1 Preheat the oven to 190°C.
- 2 In a saucepan, heat the oil over a medium heat. Sauté the onions and garlic until translucent. Add the chopped tomatoes, basil, salt and pepper. Bring to the boil and remove from the heat. Stir through the artichoke hearts, olives and capers.
- 3 Place the fish fillets onto the base of a small baking dish, and top with the prepared tomato sauce.
- 4 Bake for 15–25 minutes, or until the fish flakes easily with a fork.
- 5 While the fish is cooking, prepare the couscous. Combine the couscous with the boiling water, cover and allow to stand for 5 minutes. Remove the cover and fluff with a fork to separate the grains.
- 6 Serve the baked fish and tomato sauce with the couscous, and garnish with parsley and lemon slices.



### Evaluation questions

- 1 Describe the sensory properties of the completed dish.
- 2 Explain how this dish reflects the Mediterranean diet.
- 3 Evaluate the nutritional quality of the recipe with reference to the Australian Guide to Healthy Eating.

## Assessing validity

As a consumer of food and food information, it is important to be able to make decisions about the information that you are presented with. We often see and hear about new diets or claims made about food products. Consumers need to be able to critically analyse this information to assess the validity of these claims.

In some cases, the claims are accurate and provide important nutritional and food information. In other circumstances, the food information is biased and written in a manner to market a product or influence a consumer; therefore, it is not necessarily valid in its claims. Being able to assess the validity of food information is a critical skill of food literacy and something everyone should be able to do.



**Figure 9.13:** Food information comes from a number of sources, some more reliable and valid than others.



### Let's talk

Rank the examples of information sources provided in Figure 9.13 in order from most reliable and valid to least reliable and valid. Justify your ranking.

Compare your list with your partner. What differences are there between your rankings? Work together to make a new ranking list.

Why might word of mouth from family and friends not be a valid source of information?



**Figure 9.14:** The five criteria used when assessing the validity of food information

### Source

Source refers to the author/publisher and their credentials. Valid food information comes from experts in their field, such as dietitians, universities or government organisations. These sources can all be considered reliable because they have qualifications in the field of nutrition and diet. They don't have a bias or commercial gain to be provided in order to influence you with their information.

When reading food-related information, it is important to ascertain the source of the information. This should always be provided. If there is no named source, who is accountable for the information? Who do you follow up questions with? No named or obvious source can suggest the information presented to you is not valid.



**Figure 9.15:** Examples of reliable sources and authors of food information

### Purpose

Purpose is the aim, the focus or the message being conveyed in the information. When presented with food information, ask yourself why this has been written. What is the key message of this information?

Valid food information and claims made should be based on factual information or evidence rather than trying to persuade or sell. In academic research, the purpose of the study is usually clear, but food information presented in forums such as social media can often be hard to determine. Is the purpose to share factual information with food consumers or is it to provide an opinion? Is it to seek profit through purchases?

### Context

The context relates to the reasons for the information and the date of publication. Valid food information should be based on the latest, up-to-date evidence, which has been published in the last 10 years. Ask yourself, are you being provided with factual information or is this advice that you are being persuaded to follow? Valid food information seeks to inform. What circumstances have led to the development of the information?

### Presentation of evidence

The presentation of evidence relates to the method of research and data collection. Valid scientific evidence should come from expert sources, utilising peer review or cross-checking of information and reliable research methods. This involves the use of randomised controlled trials as a source of data collection.

A large sample size and longitudinal studies are more likely to produce evidence that can be considered accurate and valid. If the evidence presented does not include these details (sample

size, length of research, who has conducted the research), validity is difficult to determine, as statistical information has not been provided on which to form this judgement.



**Figure 9.16:** The Australian Dietary Guidelines were developed due to the rising prevalence of obesity and other diet-related conditions. The Guidelines are reviewed every ten years to ensure that they remain current.



**Figure 9.17:** Accurate and reliable evidence can be presented in many different ways. So can inaccurate evidence, so it is important to assess the evidence provided carefully and critically.

The research used should be referenced and available for the consumer to access. If the presentation of evidence does not have a source listed, it cannot be validated. Research conducted in partnership (for example, a university with a government organisation) is more likely to be accurate and reliable. When presented with evidence, it is essential to carefully and critically assess its validity.

### Language use

The language used in providing information will be presented in a certain style. The language should be free from bias and not presented using persuasive techniques. Information or research should be written in a clear and informative manner.

Technical and professional language is used when presenting accurate food information. If the language does not reflect scientific evidence, or if it is trying to be convincing over informing, it is less likely to be accurate and reliable.

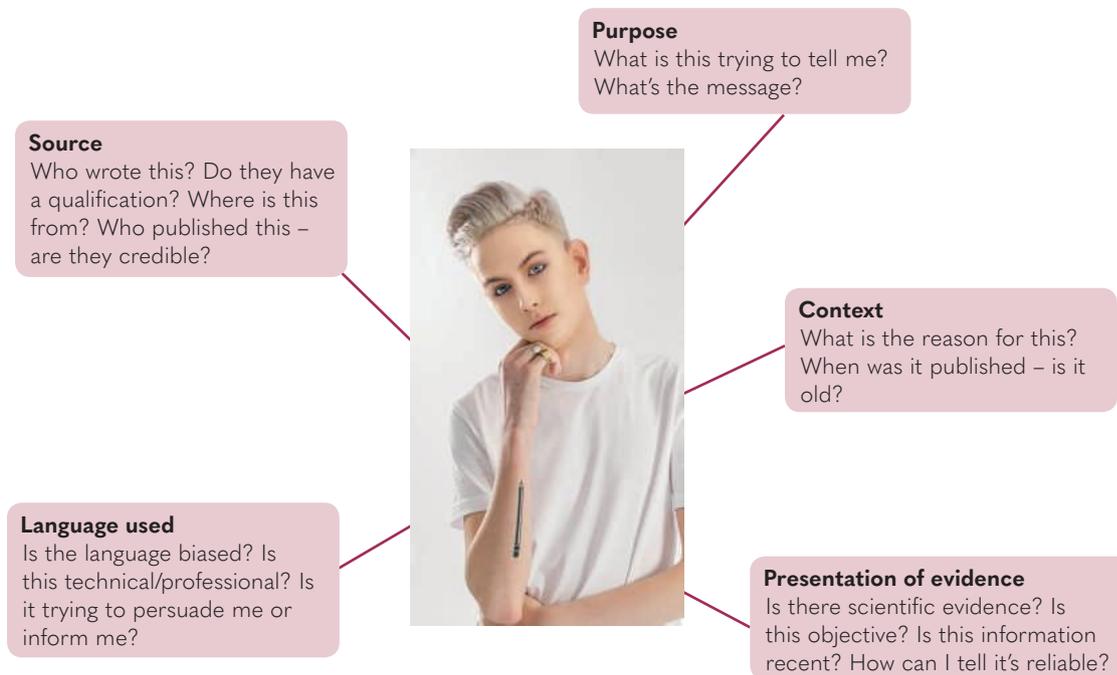


### Let's talk

Brainstorm all of the different diets and weight-loss products you have heard about.

Do any of them seem too good to be true?

Write down all the specific information that you know about each one. Is there anything on your list that you think supports or reflects any of the five criteria used to assess the validity of food information?



**Figure 9.18:** One approach when assessing the validity of food information is to ask questions about what is presented to you.

## Assessing claims made by weight-loss and nutrient supplement companies

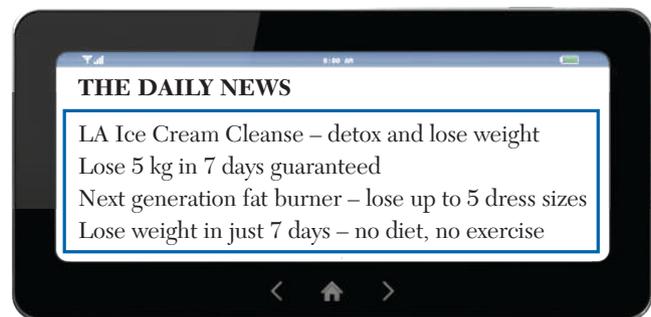
Have you ever seen a celebrity promoting a weight-loss product, diet or nutrient supplement? Weight-loss products and nutrient supplements are big business. Often the claims made mislead consumers, resulting in them wasting money on a product that fails to deliver what is promised.

Companies often present misinformation in order to entice consumers into purchasing their products. If consumers lack the food literacy skills to assess the information and draw evidence-based conclusions, they may be persuaded into purchasing products with little to no benefit.

Some companies claim that a pill, a nutrient supplement, can 'change your life'. The Australian Dietary Guidelines recommend that, to achieve and maintain a healthy weight, you should be physically active and choose

amounts of nutritious foods and drinks to meet your energy needs. Can both be correct? We know the Australian Dietary Guidelines are evidence-based. Let's look at the evidence base of some claims made by weight-loss and nutrient supplement companies to see if they stand up when we assess their validity.

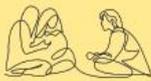
## Promises, promises, promises! How many weight-loss claims are valid and reliable?



**Figure 9.19:** It is time to interrogate these claims for the truth.



**Figure 9.20:** The best advice is to follow the recommendations of the Australian Dietary Guidelines. Food is always the best choice for a healthy diet and the best source of nutritional needs over supplements, unless recommended by your doctor.



**Let's talk**

How many examples of weight-loss products and diets can you think of? How could you determine if the promises these products make are reliable and true?

product as a way to look trustworthy and appealing. However, when you look deeper and start to assess the information provided, you find the celebrity is being paid to promote the product and may not be consuming it at all.

**Commercial gain**

Commercial gain is about making a profit. The more a company is able to sell the product, the more profit it can make. Is the company more focused on making a profit or improving the health and wellbeing of its customers? If the marketing of a product sounds too good to be true, it usually is. It has been marketed to be appealing, ensuring a profit. Often companies use celebrities to endorse their

**Ethics**

Ethics refers to being morally correct, or the right thing to do. Consider the terminology being used in the food information. Emotive language draws your attention, as can promises that we know can't be true. If a claim is not backed up with evidence, is it ethical to make factual statements about a product that cannot be substantiated? Language can often be vague or misleading. A product claims to be 'lite', but that could be light in colour, not energy.



**Figure 9.21:** The three criteria used to assess claims made by weight-loss and nutrient supplement companies

Be wary of people's product testimonials. Have they actually used the product or are they being paid to promote the product? Can the results be verified? When you look closely, you might observe that someone may not have been overweight or obese to begin with. There is often an implication that if you use a product you will end up looking like the celebrity or person who is sharing the success claim of the product.

### Effectiveness of the product

Is the claim true? This criterion refers to the credible evidence provided proving that statements made about the product are factual. Does the product work as it claims?

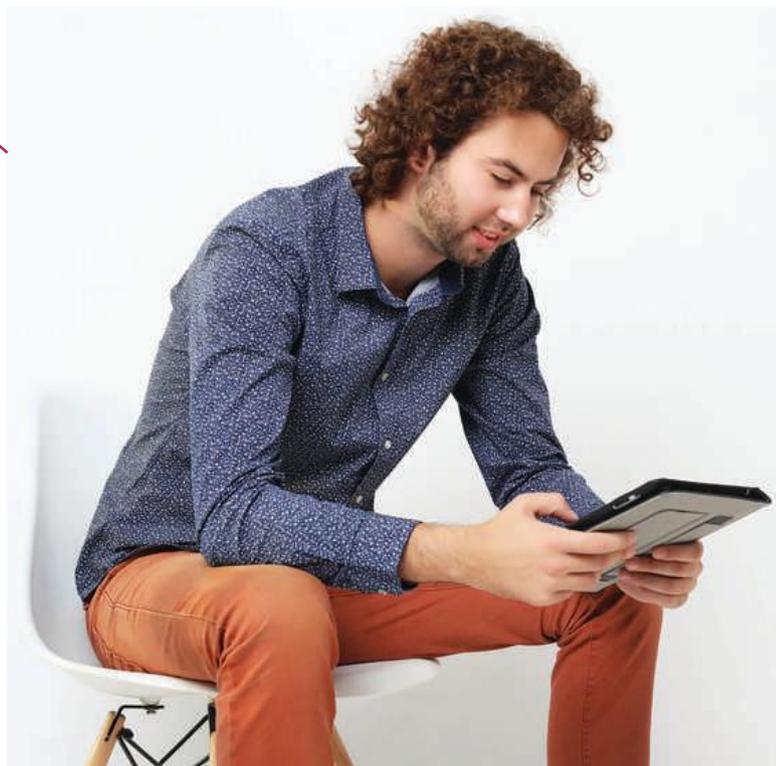
What are the short-term benefits compared to long-term benefits? It is often observed that a weight-loss product or plan may show some changes in weight initially, but that these changes are superficial, and not only does the weight return in the long term, but further weight is also added. This is due to unsustainable eating patterns that do not reflect the recommendations of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating. An effective product would follow the evidence-based Australian Dietary Guidelines research, consuming a wide variety of nutritious foods and not excluding or replacing any of the five food groups with nutrient supplements.

#### Commercial gain

Who is this product targeting? Who is making a profit from this product? Are there any techniques to encourage me to purchase this?

#### Ethics

Is the information provided correct? Is this morally right? What is the product implying? Is it true? Is anything misleading?



#### Effectiveness of the product

What are the short-term benefits? What are the long-term benefits? Is there evidence to back this up?

**Figure 9.22:** One approach when assessing the validity of food information is to ask questions about what is presented to you.

**Activity 9.5 (Inquiry): Assessing health claims**

Kim Kardashian has faced scrutiny with her endorsement of a weight-loss suppressant product, Flat Tummy Lollipops. Research her Instagram post and the affiliated product. Consider the following:

- why celebrity endorsements such as these are misleading
- the strategies used by the company to increase their commercial gain
- the effectiveness of appetite suppressant products
- why it could be considered unethical to have celebrities promote these products to a young fan base.

**Nutrient supplements**

Nutrient supplements are a growing market. Every day most people will be exposed to an advertisement or information encouraging them to meet the nutritional needs of their diet by popping a pill. Nutrient supplements are products designed to give you nutrients that you perceive are missing or needed in

your diet. While supplements are very popular in Australia, they are really only required at the recommendation of your doctor to address a chronic health condition or address a temporary need. Most Australians are able to easily consume the nutrients they require by simply following the evidence-based Australian Dietary Guidelines.

**Activity 9.6 (Case study): Apple Cider Vinegar Diet**

Research the Apple Cider Vinegar Diet and supplements, then answer the questions.

**Questions**

- 1 Investigate the weight-loss claims made about the Apple Cider Vinegar Diet and tablets.
- 2 Apply criteria to assess the validity of claims about the Apple Cider Vinegar Diet and tablets.

## Activity 9.7 (Media analysis): Promotion and marketing of nutrient supplements



### ***Fears of 'borderline unethical' advertising after 75% of older Australians found to be taking supplements***

Researchers have raised concerns about the promotion and marketing of nutrient supplements in Australia after a new study found almost 75% of older Australians take at least one type of dietary supplement.

The study, published in the *Medical Journal of Australia* on Monday, found that 44.5% of people over the age of 70 were taking fish oil either daily or occasionally, 33.8% of people were taking vitamin D, 26.7% of people were taking glucosamine, and 24.7% were taking calcium supplements.

The data was drawn from the ASPREE longitudinal study of older persons where more than 14,000 healthy adults over the age of 70 were surveyed.

Monash University senior research fellow Dr Alice Owen, an author on the study, said all the supplements were approved by the Therapeutic Goods Administration (TGA) as safe for normal use in Australia, but they did not have to prove that the product was effective.

'They don't necessarily regulate how well they work,' she said. 'They are definitely very safe, there are no safety concerns about taking complementary medicine, but they may not be very effective.'

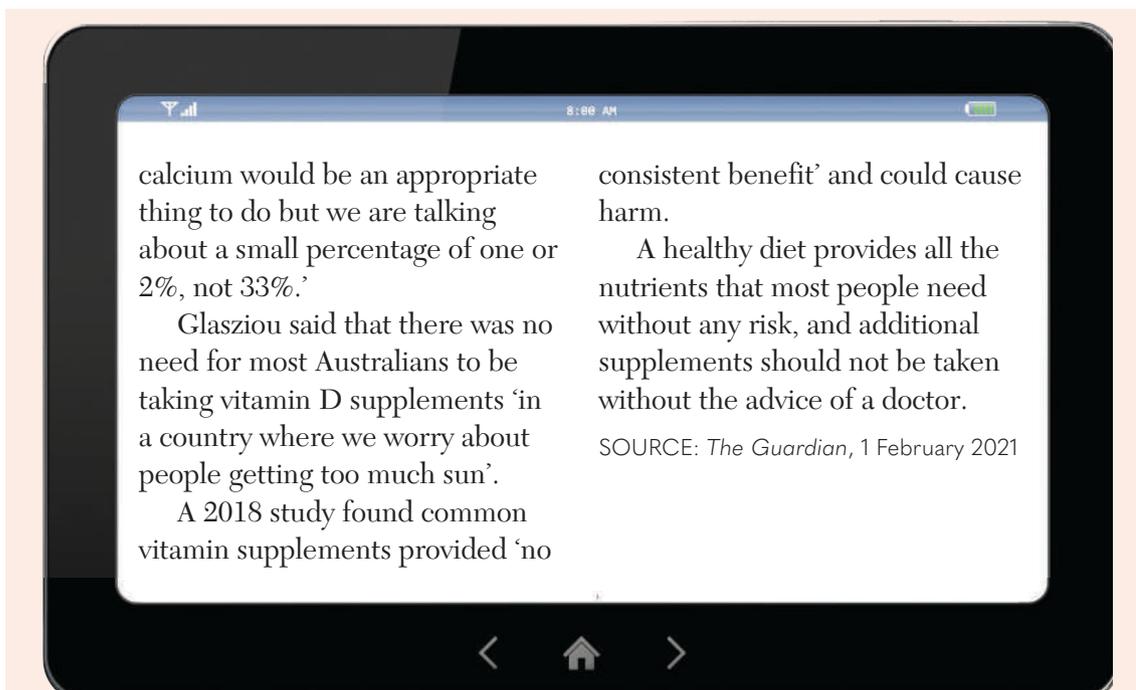
Owen said the high rates of nutrient supplement use in this age group raised concerns that older Australians, who may be living on a fixed or low income, may be buying ineffective complementary medicine at the expense of evidence-based treatment options.

Owen said that supplements may be beneficial for a person who has been diagnosed as deficient in a particular vitamin or mineral. Even in those cases, she said, the health benefits of eating a vitamin tablet is considerably lower than the benefits of eating whole foods which contain those particular substances.

The Complementary Medicines Association stated that in 2019 approximately 73% of Australians reported taking nutrient supplements, with the industry valued at \$5.6 billion.

Professor Paul Glasziou, the director of the Institute for Evidence-Based Healthcare at Bond University, said that the promotion of these nutrient supplements is 'borderline unethical' as people are getting 'no benefit from it but are paying for it'.

'There are a small percentage of people where these things will benefit. For people with osteoporosis taking vitamin D and



**Figure 9.23:** Article extract from *The Guardian*

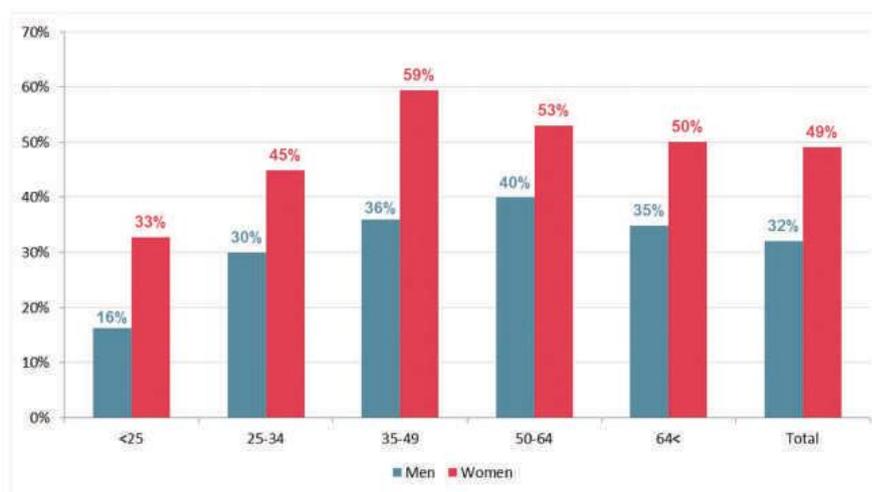
#### Analysis questions

- 1 Identify the five criteria used when assessing the validity of food information (see Figure 9.14). Use the criteria to assess the validity of the information provided in the article.
- 2 Referring to the article, apply criteria that consumers could utilise when assessing the validity of claims made by the nutrient supplement companies.

### Activity 9.8 (Data analysis): Purchasing nutrient supplements



**Purchased vitamins in the last 6 months: Women cf. men by age**



Source: Roy Morgan Single Source (Australia), January 2018 – December 2018 (n=14,913).

**Figure 9.24:** Purchased vitamins in the last six months: women compared with men by age

Source: Roy Morgan Research

Michele Levine, CEO, Roy Morgan says:

'Despite ongoing medical debate about whether vitamins actually work, a large proportion of Australians are still buying them, with pharmacies and chemists their favourite place of purchase. Chemists have long been the most popular place to buy vitamins, minerals and supplements, with supermarkets being the next most popular option, offering customers higher convenience but at the cost of a smaller range than that offered by chemists.

'Growth in this market has stagnated in recent years, trailing behind population growth as pharmaceutical companies struggle to find larger demand in the domestic market.

'Whether recent developments surrounding 'Australian Made' packaging rights for Australian vitamin manufacturers such as Blackmores and Swisse can improve local sales remains to be seen, however demand does appear to be holding steadily in the vitamin, minerals and supplements industry with women aged 35–49 years old and older a key market.

'In fact the Roy Morgan data shows that women are far more likely than men to buy these products across all age groups. Brands wanting to target these key markets need to know more about potential customers than just their age and gender.

'Factors such as attitudes to health and diet, family circumstances and socio-economic status, exercise participation and education all contribute to a consumer's vitamin-purchasing decisions, and any brand that tailors its marketing campaigns accordingly will be better placed for success. This level of consumer insight can only be offered by Roy Morgan.'

**Figure 9.25:** 'Over 8.3 million Australians buy vitamins, minerals and supplements'

Source: Roy Morgan, 'Over 8.3 million Australians buy vitamins, minerals and supplements', 26 April 2019

Use the data above to answer the following questions:

- 1 According to the data, identify who purchased the highest amount of vitamins.
- 2 Michele Levine states some factors at the end of the article contributing to a person's vitamin purchasing decisions. Choose one of these identified factors and explain how this could impact a person's ability to assess the validity of claims made by nutrient supplement companies.
- 3 Design a meme encouraging Australians to make the shift from nutrient supplements to consuming a wide variety of nutritious foods from the five food groups.

# Chapter revision

- Food fads, trends and diets can be restrictive in nature. Cutting out key foods and/or food groups does not align with the healthy eating recommendations of the Australian Dietary Guidelines. Restrictive diets such as these can be considered to have low nutritional efficacy.
- The principles of research used in the formation of the Australian Dietary Guidelines refer to:
  - **Recognition of credible sources**
    - National Health and Medical Research Council
    - The Dietary Guidelines Working Committee
    - Dietitians Association of Australia
  - **Evidence-based information**
    - Evidence Report containing approximately 55 000 peer-reviewed journal articles
    - 2003 Guidelines and their support documentation
    - Key authoritative reports
  - **Accurate analysis of data**
    - Rigorous research methodology used in the systematic literature reviews
    - Evidence graded using NHMRC protocols
    - Methodologist employed to oversee the process.
- The principles of research should be applied to food fads, trends and diets to assess their value. When assessing diets, look for:
  - **Recognition of credible sources**
    - Trustworthy, unbiased, independent sources
      - Experts in their field
      - Peer-reviewed journal articles
      - Government bodies and educational institutions
  - **Evidence-based information**
    - Well researched
    - Large sample size and study duration
    - Reliable and up to date
    - Statistically significant
  - **Accurate analysis of data**
    - Unbiased and objective analysis
    - Assessment of all relevant data.
- The five criteria used to assess the validity of food information are:
  - **Source**
    - Where the information has come from, the author, the publisher and their qualifications
  - **Purpose**
    - What is the aim or message of the food information?
  - **Context**
    - What is the reason for the food information provided and the date of publication?
  - **Presentation of evidence**
    - Has scientific, evidence-based, objective and reliable data been used?
    - Has the data/evidence been tested?

- **Language use**
  - Does the food information use technical and professional language or emotive, persuasive language?
- Criteria used when assessing claims made by weight-loss and nutrient supplement companies include:
  - **Commercial gain**
    - Making a profit from the product. The more the company sells the product, the more profit the company will make.
  - **Ethics**
    - Being morally right – telling the truth.
  - **Effectiveness of the product**
    - Showing credible evidence of whether the product works.

### Apply your knowledge

- 1 When analysing the nutritional efficacy of a diet, outline factors that you should consider.
- 2 Explain why peer-reviewed journal articles are considered credible sources.
- 3 Outline the principles of research used in the development of the Australian Dietary Guidelines.
- 4 List five sources of food information.
- 5 Suggest why companies may mislead consumers with their claims about nutrient supplements.
- 6 Identify and describe the criteria used to assess the validity of food information.
- 7 Suggest how you can determine if food information is evidence-based.
- 8 Explain why restrictive diets do not align with the recommendations of the Australian Dietary Guidelines.
- 9 A new weight-loss plan is being promoted on social media. It claims that anyone can lose up to three dress sizes in three weeks following their plan, which includes only drinking water before midday.
  - a List the criteria you would use to assess the validity of this product.
  - b Describe how you would use these criteria to assess the validity of these claims.

## Practice exam questions



### Question 1 Multiple choice

Which of the following is an example of a criterion that could be used to assess the validity of claims made by weight-loss companies?

- A Context
- B Purpose
- C Commercial gain
- D Recognition of credible sources

1 mark

### Question 2

**No Carb Army**  
**Subscribe NOW to get 50% off our meal plans.**  
 Are you sick of that stubborn fat?  
 Are you always feeling tired?  
 By joining the 'No Carb Army' you can ditch the weight and  
 regain your lease on life!  
 We need to get back to basics. Removing grains from the diet and  
 increasing our meat and vegetable consumption is linked to many health  
 benefits. Real food, real simple.  
 Health experts from around the world agree, all people will benefit from  
 this diet.  
 Here is how you do it:  
 The hope is that by removing carbs such as bread, pasta or rice from  
 a meal, you will fill up on fresh vegetables, good-quality protein and  
 healthy fats instead. All grains must be avoided.  
 Our meal plans provide step-by-step recipe instructions to help you  
 achieve your goals. Here is a sneak peek into the range of tantalising  
 recipes you can enjoy by subscribing today:

- Breakfast: bacon and egg omelette with beef sausages and mushrooms
- Snack: mixed nuts
- Lunch: ham and bean bowl with mixed vegetables
- Dinner: Pepperoni pizza with a cauliflower base

**Don't wait - join NOW!**  
<http://www.nocarbarmy.com/>

Figure 9.26: 'No Carb Army' advertisement

- a** Use two criteria to assess the validity of the information provided in the ‘No Carb Army’ advertisement. **6 marks**
- b** Analyse the nutritional efficacy of the ‘No Carb Army’ diet by demonstrating an understanding of the Australian Guide to Healthy Eating. **6 marks**
- c** Apply the principles of research used in the development of the Australian Dietary Guidelines to the ‘No Carb Army’ diet. **6 marks**

# Chapter 10

## *Becoming an informed consumer*

### Key knowledge

- The key elements of regulatory food standards relating to nutrition content claims and health claims on food labels and in food advertisements.
- Practical ways to apply healthy eating recommendations of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating to everyday food behaviours and habits, with particular attention to maintaining a healthy weight.

### Key skills

- Describe standards relating to advertisement claims and analyse marketing terms on food packaging and in food advertising.
- Use food labels appropriately to compare, select and prepare food.
- Demonstrate understanding of the healthy eating recommendations of the Australian Guide to Healthy Eating by applying them to food selection, planning and preparation.
- Participate in practical activities to assess and reflect on issues related to navigating food information.

VCE Food Studies Study Design extracts © VCAA; reproduced by permission



**Video 10.1** Chapter Overview

A food label is created by a food manufacturer and is an effective way to communicate product information to the consumer. While laws in Australia govern what is on a food label, food selection skills are made easier when you know how to interpret food label claims and interrogate advertising and marketing terms on food packaging. Having these skills helps you to become an informed consumer.

Other skills that can also help you to become an informed consumer include understanding the Australian Dietary Guidelines and the Australian Guide to Healthy Eating and applying these recommendations to everyday food behaviours and habits.

### Get knowledge ready



- 1 Why does food need to be labelled? Discuss what you see on a food label.
- 2 Why do food manufacturers need to follow laws and standards when creating a food label?
- 3 Brainstorm a range of healthy habits that can be applied to everyday food behaviours and explain why they are healthy. How will they aid in maintaining a healthy weight?



# FOOD LABELS

## WHAT DO THEY MEAN?

**1 Nutrition information panel**  
This panel shows the average amount of energy, protein, fat, saturated fat, carbohydrate, sugars and sodium in a serve and in 100 g (or 100 ml) of the food. The amount of any other nutrient or substance about which a nutrition content or health claim is made must also be shown (e.g. the amount of calcium must be shown if a claim about calcium is made).

**2 Percentage labelling**  
Food labels must show the percentage of the key or characterising ingredients or components in the food. This allows similar foods to be compared. The characterising ingredient for this strawberry yoghurt is strawberry and the ingredient list states that it contains 7% strawberries.

**4 Information for people with food allergies or intolerances**  
Some food ingredients and substances can cause severe allergic reactions and must be declared when present in a food. These ingredients are peanuts, tree nuts (e.g. cashews, almonds, and walnuts), crustacea, fish, milk, eggs, sesame, soybeans, wheat and lupin. Sulphites (if added at 10 mg or more per kg of food) and cereals containing gluten (e.g. wheat, oats, barley, rye and spelt) also need to be declared.

**3 Food identification**  
To help identify a food, food labels must show:  

- the name of the food
- the name and business address in Australia or New Zealand of the supplier of the food
- the lot identification of the food.

 The name or description of the food must reflect its true nature (e.g. strawberry yoghurt must contain strawberries). If the yoghurt contained strawberry flavouring rather than real fruit, then the name would need to indicate that it is strawberry-flavoured yoghurt.

**5 Date marking**  
Foods that should be eaten before a certain date for health or safety reasons must be labelled with a use-by date. Otherwise a best-before date is required if the food has a shelf life of less than two years. Although it may be safe to eat a food after its best-before date, it may have lost quality and some nutritional value.

**12 Nutrition and health claims**  
Nutrition content claims are claims about the content of certain nutrients or substances in a food, (e.g. 'contains calcium'). Health claims refer to a relationship between a food and health. There are rules for when nutrition content or health claims are made on food labels.

**6 Ingredient list**  
Ingredients must be listed in descending order (by ingoing weight). So if an ingredient is listed near the start of the list, then the food contains more of this ingredient than others lower down the list.

**11 Country of origin**  
Australia and New Zealand have different country of origin labelling requirements.  
 In Australia, the country of origin of packaged and some unpackaged foods must be stated on the label. Read more about country of origin labelling on the Australian Competition and Consumer Commission website at [www.accc.gov.au](http://www.accc.gov.au)  
 In New Zealand, country of origin labelling is required on wine only. Further information is available on the Ministry for Primary Industries website at [www.mpi.govt.nz](http://www.mpi.govt.nz)

**7 Labels must tell the truth**  
Under Australian and New Zealand consumer laws, labels must not be false, misleading or deceptive. Suppliers must also label foods with accurate weights and measures information. The National Measurement Institute in Australia ([www.measurement.gov.au](http://www.measurement.gov.au)) and the Ministry of Consumer Affairs in New Zealand ([www.consumerprotection.govt.nz](http://www.consumerprotection.govt.nz)) ensure that correct weight and measurement information is used on food labels.

**10 Legibility requirements**  
Any labelling requirements must be in English, be legible and prominent so as to contrast distinctly with the background on the label.

**8 Food additives**  
Food additives must be identified in the ingredient list, usually by their class name (e.g. 'thickener' or 'colour') followed by the food additive name or number. A thickener has been used in this yoghurt and it is labelled as 'thickener (1442)'. A full list of food additive names and numbers is available from [www.foodstandards.gov.au](http://www.foodstandards.gov.au)

**9 Directions for use and storage**  
Where specific storage conditions are required for a food to keep until its best-before or use-by date, those conditions must be included on the label. If the food must be used in accordance with certain directions for health or safety reasons, those directions must be included on the label.



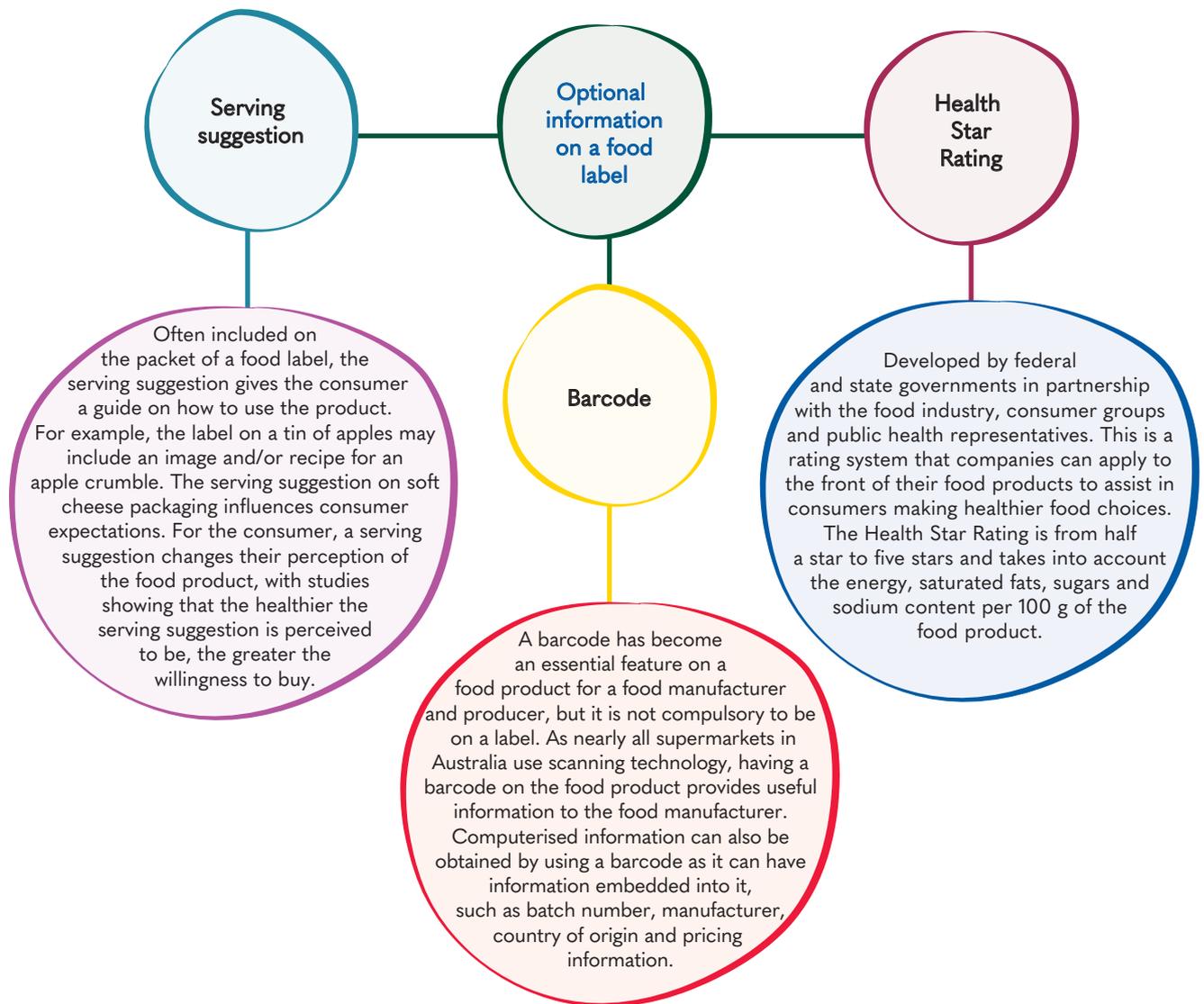
For more information on food labelling

visit [www.foodstandards.gov.au/foodlabelling](http://www.foodstandards.gov.au/foodlabelling)

Or follow us on [www.facebook.com/FoodStandards](https://www.facebook.com/FoodStandards) [www.twitter.com/FSANZnews](https://www.twitter.com/FSANZnews) and [@foodstandardsnz](https://www.instagram.com/foodstandardsnz)

Disclaimer: This poster has been produced as a guide to consumers only. Industry and enforcement agencies should refer to the Food Standards Code.

**Figure 10.2:** Food labels – what do they mean?  
Source: Food Standards Australia New Zealand (FSANZ)



**Figure 10.3:** Examples of optional information that can be contained on a food label

Not all foods in Australia require a food label. The following are some of the exceptions to the rule:

- single-ingredient foods such as fresh fruit and vegetables, and nuts and seeds, water and vinegar
- food made and packaged at the point of sale (for example, at a butcher or delicatessen)
- takeaway foods delivered and packaged to order (for example, home-delivered Thai curry)
- individual serves of food, though in this instance the outer package must contain the compulsory labelling information
- very small packages and foods like herbs, spices, salt, tea and coffee.



**Figure 10.4:** Food manufacturers are governed by law in Australia as to what they can and cannot include on a food label. It is very clear what information must not be included on a label.

**Activity 10.1 (Inquiry): Fame and shame**



Did you know that there is such a thing as the Fame and Shame Awards? These annual awards call out food marketing campaigns promoting unhealthy products for children, and celebrate those promoting healthy food and lifestyles to children. The aim of the awards is to raise awareness of the persuasive and misleading techniques that advertisers use to promote unhealthy food.

Not all labelling and packaging has the health and wellbeing of the consumer at heart. Parents Voice, an online movement of parents who aim to improve the food and physical activity environments of Australian children, conducts the Fame and Shame Awards each year to highlight food companies that falsely advertise and use 'shameful' techniques to sell their products.

Visit the Parents Choice website and find three examples of either fame or shame awards where companies have used their food label in a helpful or hindering way, then copy and complete the table.

Food product or company	Fame or shame	Outline how the label was used in a fame or shame way	Discuss the impacts of this marketing on a food label to the consumer

Nutrition Information	
Servings per package – 16	
Serving size – 30 g (2/3 cup)	
Per serve	Per 100 g

It is important to know that a 'serving size' of a food product is determined by the food manufacturer and will often vary among products. A food manufacturer does not have to reflect the amount you may typically eat in one sitting, as this can make a product appear less unhealthy.

The 'per serve' information is useful in estimating how much of a nutrient you're eating. For example, if you're watching your fat intake, use the 'per serve' amount to work out how much fat is in a serving of the food.

Per 100 g or 100 mL is a great comparison tool you can use when comparing similar products.

**Figure 10.5:** The nutrition information panel must be included on a food label in Australia.

### The nutrition information panel

One way to use food labels to help make healthier choices is to understand the nutrition information panel (NIP). The NIP is a compulsory component of a food label in Australia that provides information on the quantity of various nutrients a food contains per serve, as well as per 100 g or 100 mL.

### Regulatory Food Standards in Australia

The Food Standards Code developed by FSANZ outlines the legal requirements for information relating to food labelling. In the code, Standard 1.2.7 – nutrition, health and related claims contains information about nutritional or health benefits of food that may be stated on the label and in advertising. All food businesses must comply with this Food Standard.

**Let's talk**



Think about two similar food products that you eat. Before consuming these, would you compare the 'per serve' or 'per 100 g' on the nutrition information panel? Why or why not?



**Figure 10.6:** Australia New Zealand Food Standards Code – Standard 1.2.7 – Nutrition, health and related claims  
 Source: Australia New Zealand Food Standards Code – Standard 1.2.7 – Nutrition, health and related claims (legislation.gov.au)

**Activity 10.2 (Practical): Pizza**



For many households, pizza is a popular dinner choice. How many times have you made pizza in your house? Using the basic dough recipe on page 254 of this book, make a pizza by choosing your topping ingredients based on research of food label components.

- 1 Plan and shop for your pizza by selecting ingredients of your choice. Practise reading a food label:
  - a For each of the packaged food items on your pizza, write down all compulsory components of a food label that you can identify on the package.
  - b Go to the Coles or Woolworths online shopping service, find a similar product and compare the labelling information. Copy and complete the table to indicate what is the same and what is different.

Same	Different

- c If you were to make this pizza, which products would you choose? Justify your response.
- 2 For each ingredient in the pizza that has a food label, copy and complete the table to record:
  - the cost
  - the compulsory information displayed
  - other optional information displayed
  - any nutrition content claims and/or health claims
  - a comparison between the two options of each food type and an explanation of which product you would choose to use when making your pizza.

Ingredient	Cost (\$)	Compulsory information displayed	Optional information displayed	Any nutrition content claims and/or health claims	Comparison and reasoning for your choice
Yeast-based pizza base (see basic dough recipe)					
Wholemeal large pita bread					
Passata					
Pizza sauce					
Ham					
Salami					
Chicken					

Ingredient	Cost (\$)	Compulsory information displayed	Optional information displayed	Any nutrition content claims and/or health claims	Comparison and reasoning for your choice
Pizza cheese blend					
Mozzarella cheese					
Fresh mushroom					
Tinned champignon					
Fresh pineapple					
Frozen pineapple					
Fresh capsicum					
Pickled capsicum in jar					
Fresh herbs					
Dried herbs					

**3** Make the pizza and create a photo analysis of your production.

# Basic dough Ingredients



100 mL warm water



1 teaspoon dried yeast (½ sachet)



½ teaspoon salt



1 teaspoon olive oil



½ teaspoon sugar



1 cup plain flour



1 teaspoon olive oil (extra)

## Method

- 1 Combine the warm water, sugar and dried yeast. Stir and stand in a warm place until the mixture is frothy.
- 2 Combine the dry ingredients (flour and salt) in a warm bowl.
- 3 Add the oil to the dry ingredients.
- 4 Combine the yeast mixture and the flour mixture using a wooden spoon until the dough forms a ball.
- 5 Transfer the dough to a lightly floured surface and knead for 5 minutes until smooth.
- 6 Place in a well-oiled bowl, turn to coat with oil, cover and stand in a warm place for about 30 minutes.
- 7 Prepare the toppings.



### Evaluation questions

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- 1 According to FSANZ, which food items in the recipe require labelling?
- 2 According to FSANZ, which food items do not need labelling?
- 3 Explain the reasons why different food items have different information on their label.
- 4 A number of food items that you have used to prepare your pizza did not have a food label or labelling information. Discuss the reason why this is 'allowed'.
- 5 When making a pizza, it is important to consider peoples' food preferences, their individual choice and possible food intolerances or allergies. Outline the ingredients in your recipe that might need to be reconsidered if you were producing the pizzas for friends at a party.

## Nutrition content claims

A **nutrition content claim** refers to the presence or absence of a food component (for example, fat, calcium, sugar or salt). It is the intention of a nutrition content claim to describe to consumers the presence or absence of this component. This is a voluntary statement made by a food business when advertising its product or for use on the foods label. The claim must be approved by FSANZ.

The food label may make a number of nutrition claims, such as 'gluten free', 'low GI', 'low fat', 'reduced salt' or 'high fibre'. Such claims mean that the product meets strict criteria set by the government in the Food Standards Code. Where claims are made about the content of a food (for example, reduced salt), the component is legally required to be listed on the nutrition information panel.

### nutrition content claim

a statement made by a manufacturer about the amount of a nutrient, energy or a

**biologically active substance** in the food

### biologically active substance

'a substance, other than a nutrient, with which health effects are associated' (FSANZ, Standard 1.2.8).



### Let's talk

Discuss the reasons why the inclusion of a nutrition content claim could be useful to a consumer.

What benefits might this have for a food manufacturer?



### Let's talk

One brand's reduced fat product could still contain more fat than another brand's regular product. Discuss how this is possible. Explain how you could compare products to ensure that you were aware of this.

### Activity 10.3 (Inquiry): The tricks of the trade: food marketing



Research online the Natural Confectionery Company. Look at its various packaging and choose three items. With a partner, discuss the following:

- 1 What nutrition content claims can you see?
- 2 Where do these products fit into the Australian Guide to Healthy Eating?
- 3 For a consumer who does not have skills in reading food labels, what would they think these products are telling them?
- 4 How could you best assess the nutritional value of these items?

### Activity 10.4 (Discussion): Labelling truths



Labelling can be tricky and deceptive if you are not aware of clever marketing techniques used to sell a product. What you think the label should mean and what it actually means can be two very different things. Consider the nutrition content claims in Table 10.1 and state if the claims are true or false. As a class, discuss your answers and come up with solutions that consumers can use to ensure that they are educated in reading a label correctly.

**Table 10.1:** Nutrition content claims.

Nutrition content claim	True	False
<b>Low fat or low in fat</b> – the food product must not contain more than 3 g of total fat for every 100 g of food		
<b>Fat free</b> – the food product must contain more than 0.15 g of total fat for every 100 g of food		
<b>94% fat free</b> – this means the product has a fat content of 6%		

Nutrition content claim	True	False
<b>Low in cholesterol or cholesterol free</b> – this means that cholesterol does not need to be included on the nutrition information panel		
<b>Light or lite</b> – it may just mean that the food product is light in colour, taste or texture		
<b>Reduced in or less than</b> – to make this claim, the product must contain at least 25% more of a particular nutrient or kilojoules, compared to the brand's regular product		
<b>Baked not fried</b> – is always a healthier option as it contains much less fat than the fried option		
<b>Free, without, zero, no</b> – the food must not contain the substance, or must contain it only in negligible amounts (for example, 'no sugar')		
<b>Light</b> – can be used to describe properties of the food, such as colour or texture, and must be clearly illustrated on the label (for example, 'light brown sugar')		
<b>Low</b> – may be used to describe the product's nutrition content, but must not exceed the recommended dietary guidelines (for example, low cholesterol: < 20 mg per serving; low sodium: < 140 mg per serving)		
<b>Lean</b> – usually used on a food label to describe the fat content of foods such as poultry, meat and seafood. A serving must have more than 10 g fat, 4.5 g saturated fat, and 95 mg cholesterol.		
<b>Healthy</b> – to claim the product as healthy, it must contain less than 3 g fat and 60 mg cholesterol per serving		
<b>Good source of ...</b> – this refers to foods that contain 10–19% of the daily recommended value of a particular nutrient (for example, 'good source of calcium')		
<b>High</b> – the food must contain at least 20% of the daily requirement for the nutrient (for example, 'high in protein')		
<b>Fresh</b> – this may only mean foods that have not been preserved, processed, cooked or frozen. A fresh food that is quickly frozen can be labelled as 'fresh frozen', not just 'fresh', even though it has spent time in processing and transport.		
<b>Images of real fruit</b> – if a product contains an image of a real piece of fruit (for example, a banana), it may contain banana or banana flavouring		
<b>No added sugar</b> – the product must not contain added sugar but may contain natural sugars		

## Activity 10.5 (Media analysis): Claims made on food packaging



### Monday's medical myth: light or 'lite' food is healthy



How much can you believe about claims made on food packaging? For any mention of the word 'light' or 'lite', feel free to add your own definition – that will have about as much credibility as any claim made by the food manufacturer.

Front-of-package labelling is a powerful marketing tool used by food manufacturers to help trigger the purchasing reflex of consumers.

But before we examine the marketing claims, let's take a step back.

Australian regulations provide a good level of consumer protection in mandating information on food labels. Products must display an ingredient list, country of origin, use-by date and a list of food additives.

There are even requirements about legibility of text and font size.

The nutrient reference panel is another requirement. All product labels must contain information on at least seven key nutrients (energy, total fat, saturated fat,

protein, carbohydrate, sugar, and sodium) and additional information where key food label claims are made.

Where claims are made about the cholesterol content of a food, for example, cholesterol then needs to be listed on the nutrient information panel.

So what types of claims can you believe on a food label?

When it comes to claims about fat, the Code of Practice for Nutrient Claims developed by Food Standards Australia New Zealand states:

- For foods labelled as ‘Low fat’ or ‘Low in fat’, they must not contain more than three grams of total fat for every 100 grams of food,
- For foods labelled as ‘Fat free’, they must not contain more than 0.15 grams of total fat for every 100 grams of food.

Where things start to get murky is when words are used that imply a particular characteristic of the food, but in reality have no defined meaning.

If you see foods promoted as ‘light’ or ‘lite’, you could be forgiven for thinking that the food must be low in fat and kilojoules. Wrong.

‘Light’ can mean light in colour (such as some varieties of vegetable oil), light in texture, lighter in salt, lighter in weight, lower in kilojoules, or lower in fat than a comparable product.

Consumer research by Food Standards Australia New Zealand (FSANZ) has found consumers often respond negatively to claims products are ‘light’ or ‘lite’.

Participants in the FSANZ study viewed the claims as ambiguous, misleading, confusing and outright ‘trickery’.

Most consumers didn’t know which characteristic or nutrient the claim related to, and by default assumed they referred to the nutrient in the food that most needed reducing – in most cases, fat.

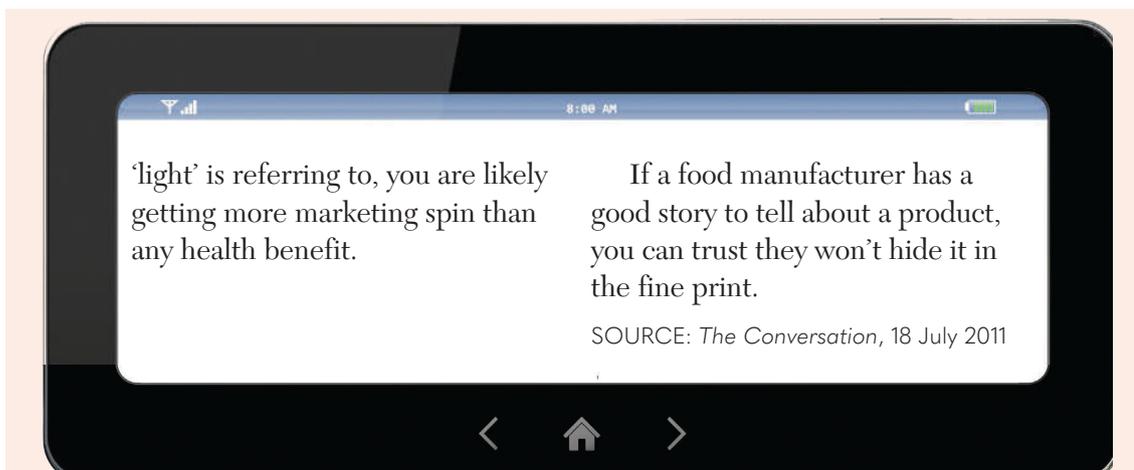
Even when labels are clear and truthful, and adhere to the ‘low in fat’ definition, consumers still need to be aware.

Australian research into ‘low fat’ food options found that while these products were much lower in fat than the ‘full fat’ equivalent, the types of foods in this category were higher in kilojoules than foods in a typical Australian diet.

So having a quarter less fat in your peanut butter still means it’s a high-fat food.

Heavy marketing of reduced-fat claims has led many consumers to perceive that these products are ‘guilt free’ and can be consumed without risk of weight gain.

So back to the issue of ‘light’ food. Unless a food clearly and transparently states on the label exactly what any claim about



**Figure 10.7:** 'Monday's medical myth: light or "lite" food is healthy'

### Analysis questions

- 1 Describe how front-of-label packaging is a powerful marketing tool.
- 2 State what information must be contained in the nutrition information panel.
- 3 Discuss the types of claims you can believe on a food label and give examples in your response.
- 4 Is there a difference between 'light' and 'lite'? What does this term actually mean?
- 5 'If a food manufacturer has a good story to tell about a product, you can trust they won't hide it in the fine print.' Explain what is meant by this statement.

## Halo effect

Have you heard of the 'health halo effect'? When we apply this concept to food, we are referring to the way we overestimate the

healthfulness of an item based on a single factor or claim, ignoring other relevant information.

### Activity 10.6 (Inquiry): The health halo



Consider how nutrition claims can be useful marketing tools for a food manufacturer, but for a consumer, skill or knowledge in reading a food label is needed so they are not misled when purchasing a food product. Nutrition claims are designed to grab a consumer's attention, but are they always what they seem?

- 1 It's always a good idea to look at the nutrition information panel of a food product. Explain why this is a good idea.
- 2 If a food product states it is 'sugar free', does this mean it is healthy? If you look at a nutrition information panel, what would you be looking for to assess the nutritional benefits of the product?
- 3
  - a Describe the difference between a 'lite' or 'light' nutrition claim.
  - b Provide an example of a product that claims to be 'lite' and a product that claims to be 'light'.
  - c For each product, interpret the label and justify if the food product is healthy.
- 4 How does the 'health halo effect' concept influence a consumer? Consider positive and negative impacts in your response.
- 5 State the advice you would give a food consumer who might be misled by a statement on a food product.

## ***Nutrition content claims and health claims***

Nutrition content claims and health claims are voluntary statements made by food businesses on labels and in food advertising.

Standard 1.2.7 sets out requirements for making these claims.

### **Nutrition content claims**

Nutrition content claims are about the content of certain nutrients or substances in a food, such as 'low in fat' or 'good source of calcium'. These claims need to meet certain criteria. For example, food with a 'good source of calcium' claim needs to contain at least the amount of calcium specified in the Standard.

### **Health claims**

Health claims are about the relationship between a food and health effects.

All health claims must be supported by scientific evidence.

Health claims are only permitted on foods that meet the Nutrient Profiling Scoring Criterion (NPSC). For example, the Standard doesn't allow health claims on foods higher in saturated fat, sugar or salt.

There are 2 types of health claims – general and high level.

General level health claims are about a nutrient or substance in a food, or the food itself, and its effect on health. For example: 'calcium for healthy bones and teeth'.

These claims are either based on one of the more than 200 pre-approved food-health relationships in the Standard, or a food-health relationship self-substantiated by the food business using the scientific method set out in the Standard. FSANZ must be notified of self-substantiated general level health claims.

High level health claims are about a nutrient or substance in a food and its relationship to a serious disease or to a **biomarker** of a serious disease. For example: 'Diets high in calcium may reduce the risk of osteoporosis in people 65 years and over'. An example of a biomarker health claim is: 'Phytosterols may reduce blood cholesterol'.

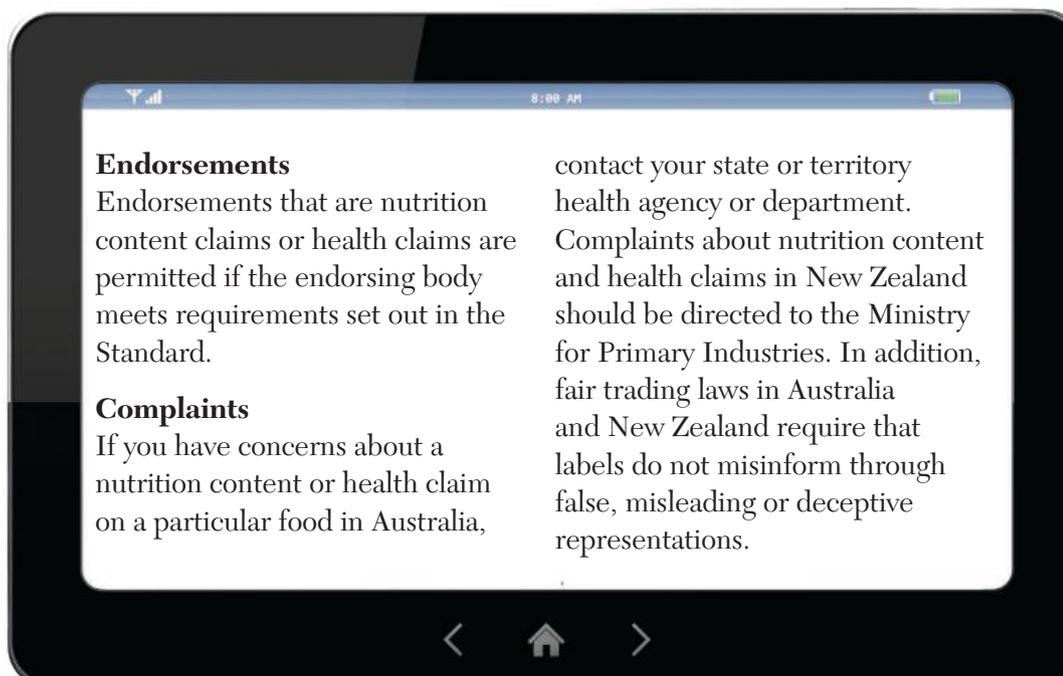
High level health claims must be based on pre-approved food-health relationships. There are currently 13 pre-approved food-health relationships for high level health claims listed in Schedule 4 of the Australia New Zealand Food Standards Code.

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### **biomarker**

'a biological molecule found in blood, other body fluids, or tissues that is a sign of a normal or abnormal process, or of a condition or disease' (National Cancer Institute)

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**Figure 10.8:** FSA NZ information on nutrition content claims and health claims

Source: Food Standards Australia New Zealand, April 2021

#### health benefit

the positive effect on one's health gained when an action is taken (for example, food, treatment or activity)

#### high level health claim

'High level health claims reference a serious disease, or a biomarker of a serious disease' (FSANZ). A high level health claim refers to the presence of a nutrient or substance in a food and its relationship to a serious disease or condition

## Health claims

Claiming that a food product has a **health benefit** is a serious claim and one that needs to be backed up by scientific proof. A health claim informs consumers of a relationship between a food and a health effect. For a manufacturer of a food item to make a health claim on a food label, they must make sure the claim is supported by scientific evidence. Health claims are voluntary and can be used on the food's label or in advertising. There are two levels of health claims: general level health claims and **high level health claims**.

General level health claims on food labels refer to the presence of a nutrient or substance in a food and the effect that this nutrient will have on health. Under the standard, these claims must not refer to a

contact your state or territory health agency or department. Complaints about nutrition content and health claims in New Zealand should be directed to the Ministry for Primary Industries. In addition, fair trading laws in Australia and New Zealand require that labels do not misinform through false, misleading or deceptive representations.

serious disease or condition and these claims cannot be made on alcohol or infant formula.

#### Example:

'Calcium for healthy bones and teeth'

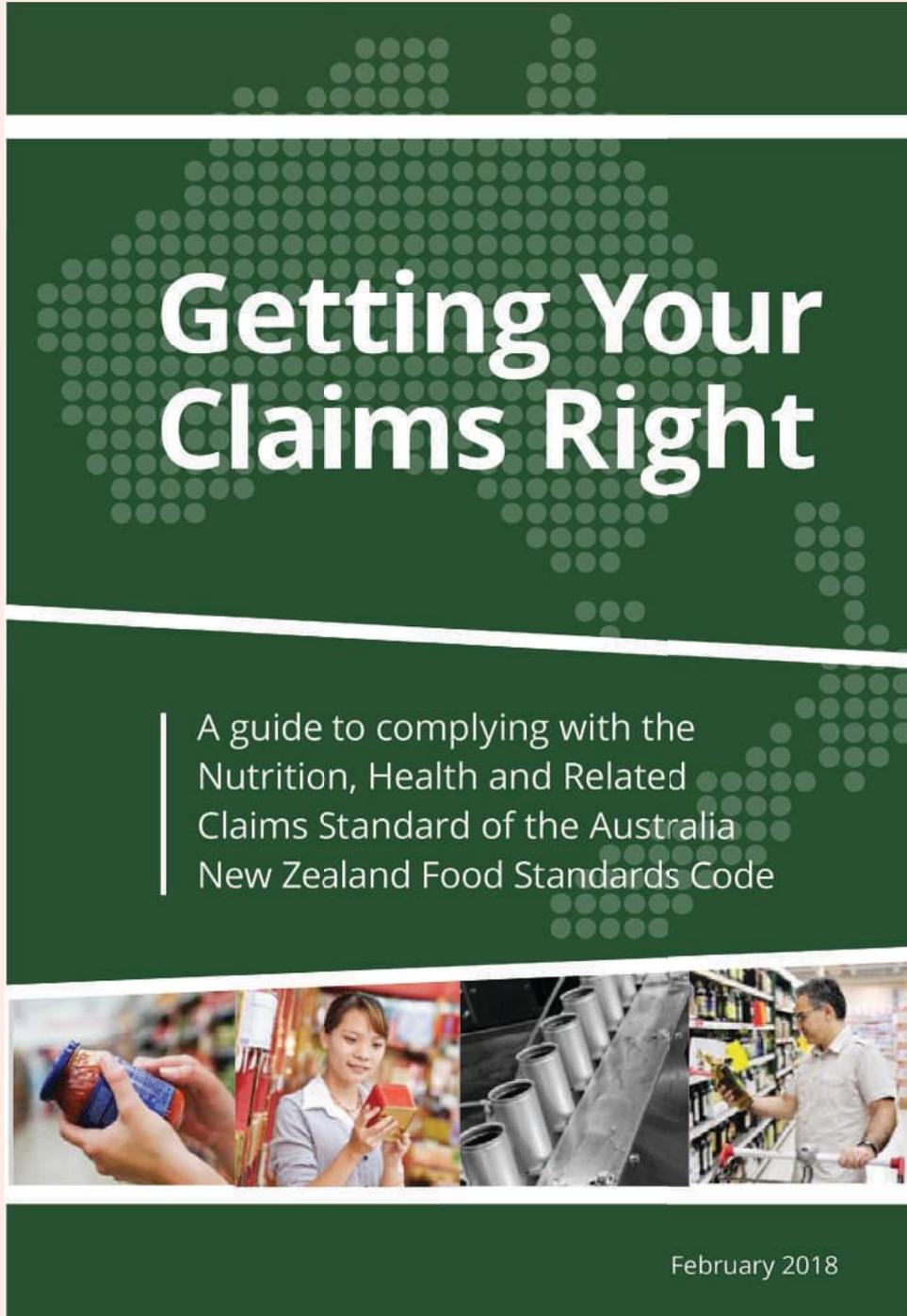
High level health claims on food labels refer to the presence of a nutrient or substance in a food and its relationship to a serious disease or condition. Just like general level health claims, these claims cannot be made on alcohol or infant formula. The purpose of a high level health claim is to alert the consumer to the fact that the food may have a health effect in relation to a serious disease.

#### Example:

'Folic acid reduces the risk of foetal neural tube defects'

**Activity 10.7 (Media analysis): Nutrition and health related claims**

Visit the FSANZ website and investigate Standard 1.2.7 – Nutrition, health and related claims. Find examples in the pantry at your school or home of nutrition claims or health claims. You could also find examples in food magazines or in other food advertising media. Complete the following questions.



**Figure 10.9:** FSANZ has compiled information for food manufacturers, such as this booklet that helps businesses understand the law and comply with the standard relating to nutrition, health and related claims.

Source: *Food Standards Australia New Zealand (FSANZ)*

- 1 Describe the standard relating to advertisement claims.
- 2 Analyse marketing terms on food packaging and in food advertising. List positive, negative and interesting information you notice.
- 3 Suggest why it is important in Australia that we have laws that govern nutrition and health related claims and how they are used on labels and marketed and advertised to consumers.
- 4 Describe potential consequences for individuals if such laws did not exist.



### Let's talk

Why are general level health claims and high level health claims not to be made on alcohol or infant formula?

It is now time to put your knowledge about food information into practice. We use our food information every day, but being able to confidently and competently navigate food information can ensure that we are making the best food choices.

## Marketing and advertising on food labels

Standard 1.2.7 – Nutrition, health and related claims in the Food Standards Code (the Code) explicitly states the requirements for making nutrition content and health claims about food. In food marketing, the identification of consumer needs is obtained by the company, which then determines how best to meet those needs. Advertising promotes the products or services through paid channels. Nutrition and health related claims are used to market and advertise a product and help to sell the product.

## Applying knowledge to everyday food behaviours

We all need to eat food every day. In order to maintain good health and a healthy weight, decisions about food selection should be based on the Australian Dietary Guidelines and the Australian Guide to Healthy Eating.

For many, decisions about food selection are guided by social factors such as those discussed in Chapter 5. By being able to navigate food information and having a repertoire of healthy, nutritious meals, individuals are better able to plan and prepare foods to support their everyday food behaviours and habits.



### Let's talk

How can you ensure that you have incorporated five serves of vegetables into your daily diet? Come up with a list of suggestions.

## Activity 10.8 (Inquiry): Everyday food behaviours and habits



Create an infographic to show young people examples of what everyday food behaviours and habits should be, based on the recommendations of the Australian Dietary Guidelines.

Examples: *remember to eat two fruits, five vegetables, wholegrains, dairy or dairy alternatives, consume water, limit salt.*

## Under an alias

Using food labels appropriately to compare, select and prepare food is a skill that we, as consumers, need to develop. To make healthier choices, knowing what to look for on the nutrition information panel will assist in making better decisions. If you're keeping an eye out for sugar, fat and salt, also look at the ingredients list and be mindful of how these ingredients may be listed.

**Activity 10.9 (Practical): Recipe design task**

Create a class repertoire of healthy meal recipes that apply the recommendations of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating that could be used by individuals or groups in meal preparation. Recipes should be quick and easy family favourites that can be on the table in 30 minutes. Incorporate everyday ingredients and, where time permits, make from scratch.

- 1** Discuss how your recipe reflects the recommendations of the Australian Dietary Guidelines.
- 2** Assess the nutritional quality of your recipe for the population group of adolescents aged 14–18 with reference to the Australian Guide to Healthy Eating.
- 3** Create a nutrition information panel for your recipe.
- 4** Evaluate how your meal is a good choice for maintaining a healthy weight.
- 5** Suggest a reason why this repertoire of recipes can support the development of a healthy gut microbiota.

**Table 10.2:** Food labels

Nutrient	What to look for on the nutrition information panel	What to look for in the ingredients list
Total fat	Look for products with 5–10 g fat per 100 g. Choose the food product with the lowest saturated fat.	Margarine, butter, palm oil, shortening, coconut oil, cream, dripping, lard, ghee, mayonnaise, sour cream, vegetable oils and fats, hydrogenated oils, full cream milk powder, mono-triglyceride, di-triglyceride, triglycerides, full cream milk powder
Sugar	Find the product that has less than 10 g per 100 g in the serve.	Sugar, sucrose, brown sugar, raw sugar, corn syrup, dextrose, disaccharides, fructose (or fruit juice concentrate), glucose, golden syrup, honey, lactose, malt, maltose, maple syrup, molasses, sorbitol, xylitol, monosaccharides, fruit syrup
Sodium (salt)	Look for products with less than 120 mg per 100 g. Choose the product with the lowest amount of sodium.	Sodium, sodium chloride, baking powder, vegetable salt, celery salt, garlic salt, MSG, rock salt, onion salt, sodium bicarbonate, sodium metabisulphite, sodium nitrate, stock cubes, meat or yeast extract, soy sauce

Nutrient	What to look for on the nutrition information panel	What to look for in the ingredients list
Fibre	<p>Try to find products with 3 g per 100 g of fibre per serve, or choose the product with the highest amount.</p> <p>Does not need to be included on the panel unless a nutrition claim is made on the label about fibre (for example, 'high in fibre').</p>	Hi-maize, fibre, wholegrain or look for any fruit or vegetables listed

Source: Adapted from Raising Children, 'Food labels: nutritional information and ingredients', 23 September 2020

### Activity 10.10 (Practical): Two-minute noodle design task



An iconic food in Australia, the packet of two-minute noodles, has been consumed as a snack or quick meal for many years. It is quick to prepare, only requiring dried noodles to be softened in boiled water and a flavour sachet mixed in. Your task is to design a meal, using a packet of two-minute noodles, that reflects the nutritional rationale of the Australian Guide to Healthy Eating.

- 1 Start by writing your design brief to put your product into context.
- 2 Create 3–4 evaluation questions to answer at the end of the task.
- 3 Generate ideas and justify your chosen meal design.
- 4 Complete a food order and plan for your practical cooking session.
- 5 Cook your chosen meal and photograph your final product.
- 6 Answer your evaluation questions.



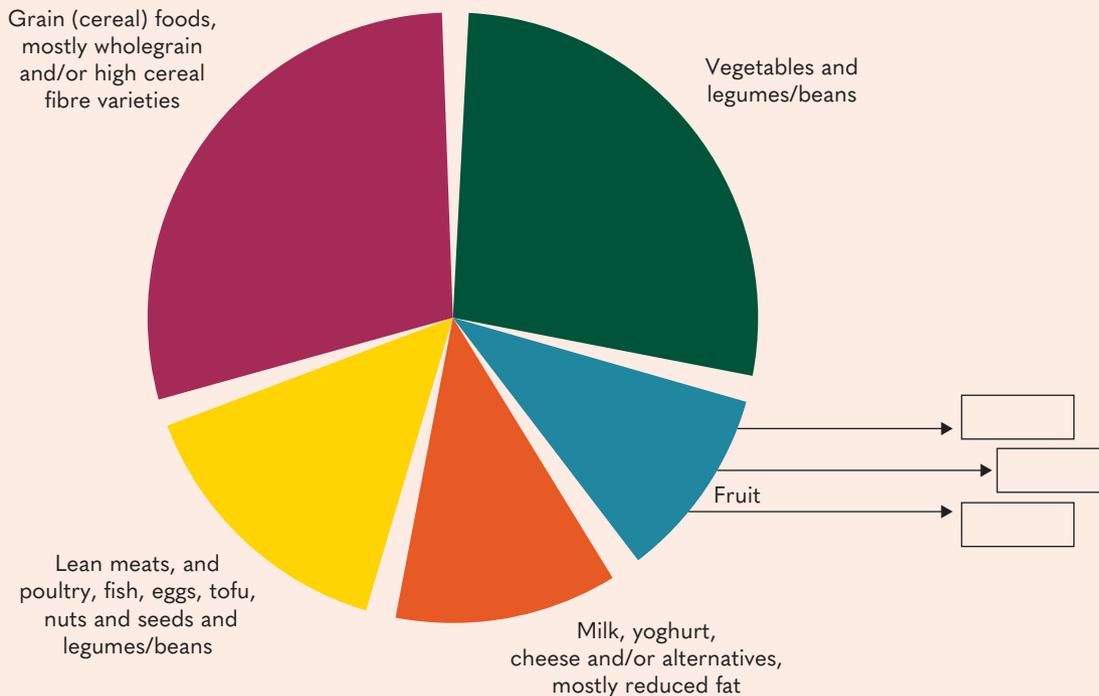
**Figure 10.10:** Two-minute noodles



**Activity 10.11 (Data analysis): Becoming an informed consumer**



Compare and contrast three different labels for similar products from each food group of the Australian Guide to Healthy Eating. For example, from the fruit group compare three types of tinned fruits (or any labelled fruit product that would fit in this food group). For each product type, decide which one you would buy, based on what you learn from the label and the importance of maintaining a healthy weight. Be sure to justify your choice and share your findings with the class.



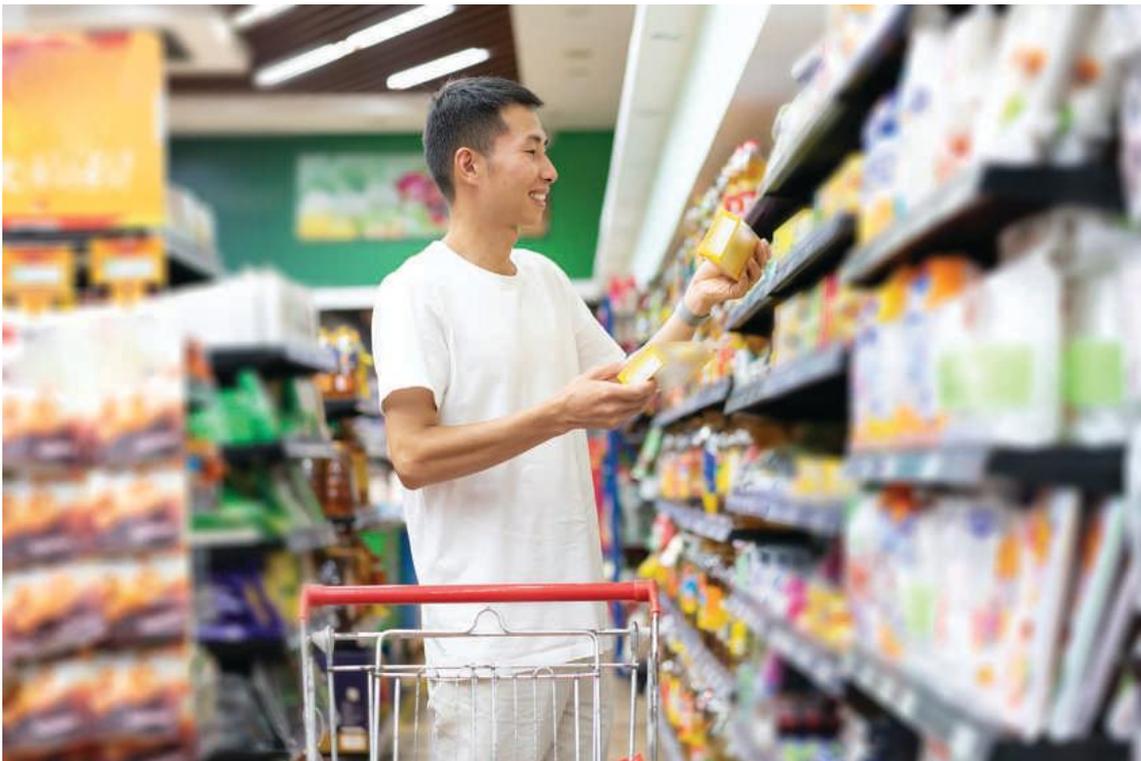
**Figure 10.11:** Example of three different products in the same food group

**Apply your skills**

Take a trip to your local supermarket or visit online and use food labels to find appropriate food items that meet the profiles given in the following table. Choose two products for each profile. Copy and complete the table to compare the products.

- 1 Prepare your chosen options and complete a sensory analysis and taste test.
- 2 Select the suitable option, justifying your choice using the evidence-based principles of the Australian Dietary Guidelines.

Use food labelling appropriately to source:	Products	Sensory analysis and taste test results	Justification using the evidence-based principles of the Australian Dietary Guidelines
A healthy snack for a 14–18-year-old	Product 1		
	Product 2		
A breakfast for a woman 70+ years old	Product 1		
	Product 2		
Lunch on the run for a man 19–30 years old with high activity	Product 1		
	Product 2		



## Chapter revision

- Food Standards in Australia regulate nutrition content claims and health claims on food labels and in advertisements. Nutrition content claims tell us about the amount of a certain nutrient or substance in a food. Health claims are about the relationship between a food and health effects and must be supported by scientific evidence.
- By reviewing advertisement claims and analysing marketing terms on food packaging and in food advertising, we can ensure that we are navigating food information to make the best choices.
- An example of one way we can reflect on issues relating to navigating food information is that we can use food labels to compare, select and prepare food to meet our dietary requirements.
- Recommendations of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating assist in providing evidence-based advice on everyday food behaviours and habits. They can be used to assist in maintaining a healthy weight.
- We can apply the principles of the Australian Guide to Healthy Eating to practical food selection, planning and preparation, and participate in practical activities to reflect on issues related to navigating food information.

### Apply your knowledge

- 1 Outline the purpose of a food label.
- 2 Create a summary table of information that must appear on a food label. For each component of the label, state its purpose.
- 3 State what must not appear on a food label.
- 4 Define 'nutrition content claim' and give two examples.
- 5 State the benefit of a nutrition content claim being included on a label for the consumer and the manufacturer.
- 6 Describe the difference between a general level health claim and a high level health claim, providing an example of each in your response.
- 7 Explain the impact of food misinformation when consumers lack skills and knowledge in navigating and evaluating food information.
- 8 In Australia, all food businesses must comply with Food Standard 1.2.7 relating to nutrition, health and related claims. Explain this standard to a new food business owner.
- 9 List examples of where we can access food information.
- 10 Explain how we can use the recommendations of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating to assist in maintaining a healthy weight.

## Practice exam questions



### Question 1

Identify and describe a compulsory component of a food label that works to protect consumer safety.

**3 marks**

### Question 2

Describe the purpose of a general level health claim and give an example in your response.

**3 marks**

### Question 3

‘When it comes to choosing fruit and vegetables in our diet, a popular message is to “eat the rainbow each day”.’

Analyse how this message reinforces the recommendations of the Australian Dietary Guidelines and how it can assist in maintaining a healthy weight.

**6 marks**

# Area of Study 1:

## Extended response question

### Question 1

TCJDP presents

## The Clean Juice Detox Program



**Lose 5 kg in 10 days\***

Drink just 5 juices a day to feel the benefits.  
(\*based on following the program for 10 days)

**Made with all natural ingredients and no artificial colours.**

**Vegan. Gluten Free. Low Sugar. Low Fat.**

**The Ultimate Fat Burner.**

Each juice is specially blended using organic, imported fruits and vegetables to keep you looking good and feeling great.

**Sign up today!**

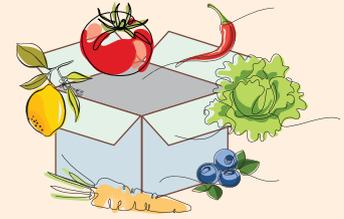
**Figure 10.12:** 'The Clean Juice Detox Program' advertisement

Evaluate the issues around the advertisement promoting the Clean Juice Detox Program (TCJDP). In your response include:

- the nutritional efficacy of this diet
- the validity of the information provided and the claims made by the weight-loss company.

**10 marks**

# Let's unpack it



Refer to 'How to unpack exam questions' on pages xv–xvi as a guide to the following question breakdown.

## Question 1

Evaluate the issues around the advertisement promoting the Clean Juice Detox Program (TCJDP). In your response include:

- the **nutritional efficacy** of this diet
- the **validity of the information** provided and the **claims made by the weight-loss company**.

**10 marks**

**A Annotate the command word:** This question is asking you to **evaluate**. To evaluate means to make a judgement using the information supplied and/or your own knowledge and understanding to consider a logical argument and/or supporting evidence for and against different points, arguments, opinions or other information.

### B Parts of question

**C Count the marks** – holistically marked

### D Determine key words to use

- Nutritional efficacy
- Scientific evidence (Australian Dietary Guidelines)
- Commercial gain
- Ethics
- Effectiveness of product

### E Evidence

**TCJDP presents**  
**The Clean Juice Detox Program**

**Lose 5 kg in 10 days\***

Drink just 5 juices a day to feel the benefits.  
(\*based on following the program for 10 days)

Made with **all natural ingredients and no artificial colours.**

**Vegan. Gluten Free. Low Sugar. Low Fat.**

**The Ultimate Fat Burner.**

Each juice is specially blended using **organic, imported fruits and vegetables** to keep you looking good and feeling great.

**Sign up today!**

**Nutritional efficacy** – low efficacy; is not representative of the five food groups that make up the Australian Dietary Guidelines

**Effectiveness of product** – where is the scientific evidence to support this claim?

**Commercial gain** – to entice customers to purchase

**Ethics** – uses emotive language not backed by evidence; there is no truth to this statement presented

**Commercial gain** – this product could possibly contain the same nutrients found in fresh, locally produced foods

**Figure 10.13:** Analysis of 'The Clean Juice Detox Program' advertisement





## Unit 4

# Food issues, challenges and futures

## Area of Study 2: Environment and ethics

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In this area of study students address debates concerning Australian and global food systems, relating to issues on the environment, ethics, innovations and technologies, food access, food safety, and the use of agricultural resources. Students explore a range of debates through identifying issues, forming an understanding of current situations and considering possible futures. They research one selected debate in depth, seeking clarity on disparate points of view, considering proposed solutions and analysing work undertaken to solve problems and support sustainable futures. Students will consider environmental and ethical issues relating to the selected debate and apply their responses in practical ways.

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# Chapter 11

## *Feeding the world*

### Key knowledge

- The key issues of the challenge of adequately feeding a rising world population, with particular focus on proposed solutions to global food insecurity, including the potential contribution of innovations and technologies and improved equity in food access and distribution.

### Key skills

- Evaluate contributions of innovations and technologies to food security in terms of ethics and sustainability.
- Describe global food security and explain possible pathways to achieving food security.

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#### food insecurity

a lack of 'regular access to enough safe and nutritious food for normal growth and development and an active and healthy life. This may be due to unavailability of food and/or lack of resources to obtain food. Food insecurity can be experienced at different levels of severity' (FAO)

#### food security

'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' (Prime Minister's Science, Engineering and Innovation Council)

Have you ever considered a world that does not have enough food to feed its own people? Or a world with equally distributed food that is in abundance for all to fairly access? In Australia and throughout the world, a major concern is how to adequately feed a rising population. Global **food insecurity** rates are rising and we are now, more than ever, working against the clock to address **food security** issues for future generations.

In this chapter, we will explore global food insecurity and consider a range of possible pathways and proposed solutions, including the potential contribution of innovations and technologies and improved equity in food access and distribution, in achieving food security.

### Get knowledge ready

- 1 What are the challenges in feeding a rising global population?
- 2 Explain what it means to be 'food secure'.
- 3 Suggest reasons why food access is not equally distributed in Australia.

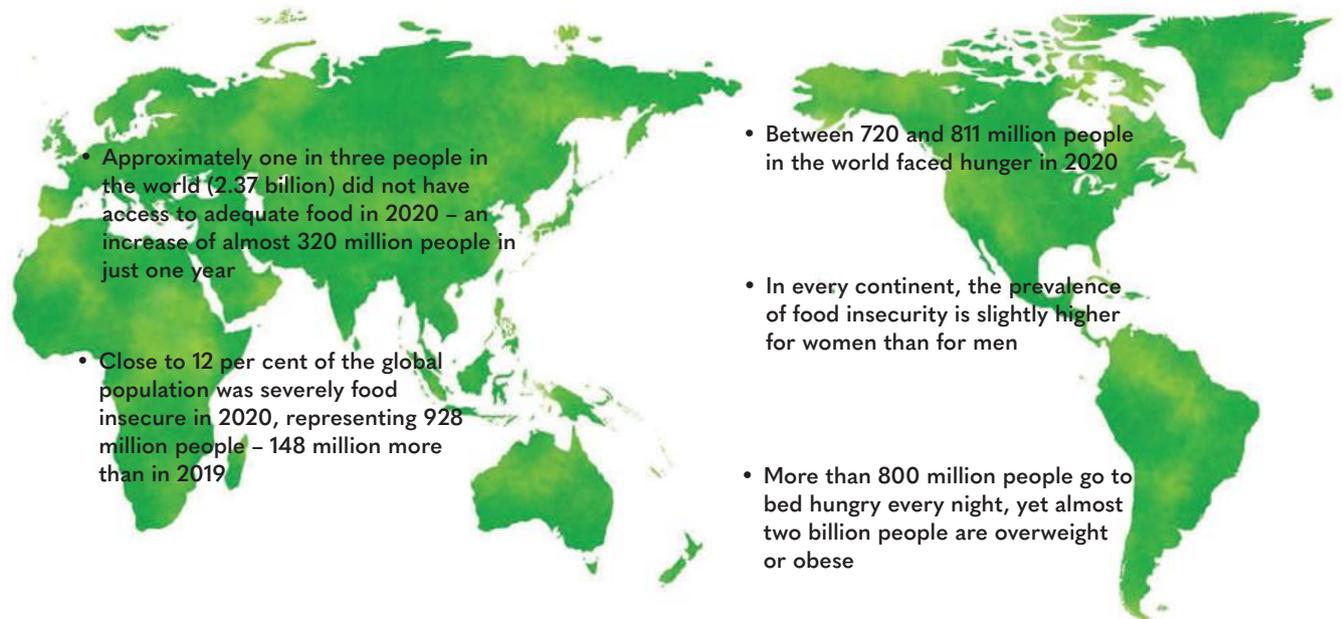


Video 11.1 Chapter Overview



## Feeding a rising world population

### Know the facts: world food insecurity



**Figure 11.1:** Data sourced from FAO, *The State of Food Security and Nutrition in the World, 2021*  
Source: FAO, *The State of Food Security and Nutrition in the World, 2021*



#### Let's talk

Describe the state of food security and nutrition in the world. Why is food security a global issue?

How do we adequately feed a rising world population and ensure that everyone has access to sufficient, nutritionally adequate and safe food that is needed to lead a healthy life?

This is a challenge faced not only here in Australia but also around the world. Factors that impact on food security and our efforts to feed a rising world population are discussed in this section.

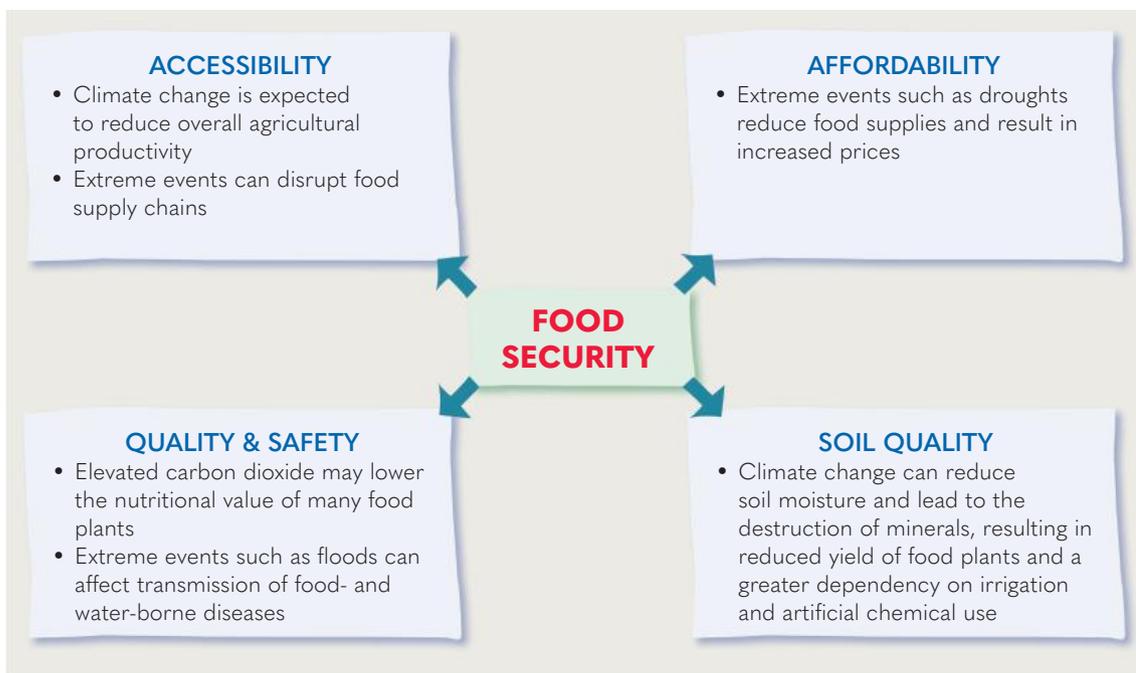
### Climate change: challenges and solutions

According to the Commonwealth Scientific and Industrial Research Organisation (CSIRO), 'climate change' refers to any long-term trends or shifts in climate over many decades' (CSIRO, 'What is climate change?', 2021). Many countries are prone to drought and other extreme weather conditions or events. These all reduce the amount of food available. Australia is no exception, being often exposed to a variety of weather events, including bushfires, floods, drought, cyclones and heatwaves.

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**climate change**  
'any long-term trends or shifts in climate over many decades' (CSIRO)

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**Figure 11.2:** The impacts of climate change on food security



**Let's talk**

Have you noticed any changes to the climate in Australia over the past few years? How do changes in the climate affect food security?

**Challenge**

Australian farmers face many challenges because of the changing climate. The challenges include:

- impact of extreme weather events
- soil erosion
- changes in the seasonal availability of foods
- whole crops being destroyed
- farming land wiped out due to weather
- reduction in foods available for sale and for export, resulting in lower profit margins.

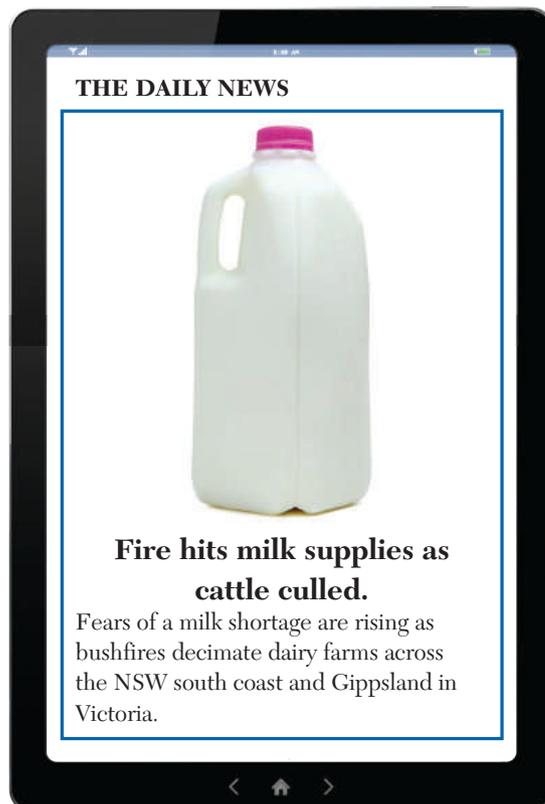
**Solution**

Adaptation to climate change by farmers and those in agriculture is crucial. Providing support, frameworks and education about why adaptation is needed and how to adapt plays a key role in ensuring that our agriculture and farming can prepare for the changes to come. Potential solutions include:

- selective breeding of livestock
- heat-tolerant livestock
- changing crop varieties to more resource-efficient ones
- focusing on how we can still maintain successful agricultural systems within a changing climate.



**Figure 11.3:** The Millennium Drought pushed Victoria's water storage dams, such as Lake Eildon, to a fraction of their capacity.



**Figure 11.4:** Whenever an extreme weather event hits, our food systems are affected. Fires that ravaged the NSW south coast and Gippsland in Victoria saw whole dairy farms destroyed, causing demand for milk from other dairy farms in the country.



**Figure 11.5:** Potential adaptations in agriculture to reduce impact of climate change

### Activity 11.1 (Debate): Rice farming in Australia



Rice farming has been around for over 100 years in Australia. Rice farming has huge impacts on the environment, especially water use. With the impacts of climate change, is it time we rethink growing rice in Australia? Are we doing enough to adapt to climate change and ensure the sustainability of our resources and land to farm rice efficiently?

Form a debate and consider the challenges and solutions to rice farming in the face of climate change in Australia.

## Population growth: challenges and solutions

In 2020, the world's population reached 7.7 billion people, with projections estimating the world's population to reach 9.7 billion people by the year 2050. Continual growth in the world's population puts huge demands on the global food systems. Food is a basic human need and provides the nutrients we require to grow and develop.

Many of us currently eat the same food. Imagine if we had different types of diets. Population growth would then not be so concerning as we would be relying on broad-ranging food systems.

Concern lies with the types of foods and diet choices that we are making, which include:

- increasing meat and dairy consumption
- increases in frozen and prepared food

- year-round consumption of fresh fruits and vegetables, regardless of their seasonality
- increasing food imports.

These consumption trends result in, but are not limited to, increasing long-distance refrigerated transport, including air transport, increasing the energy use related to food. If we are eating more prepared and frozen foods, these also have to be stored in a fridge or freezer, which also leads to more energy consumption relating to food storage.



### Let's talk

Think about rice. How many people throughout the world eat rice? How do we encourage different food habits and cultures to resolve the challenge of pressure on food systems due to population growth?

### Challenge



Population growth puts pressure on the food systems and results in the loss of farmland to urbanisation.

### Solution

- Invest in sustainable food systems so that future generations have an abundant food supply that caters for all people and their nutrition needs.
- Improve food distribution to rural and remote population groups so that food is more accessible for all.
- Consider population growth patterns and begin to develop new food traditions and cultures.
- Prepare for future population growth by using technology to create sustainable farming methods.
- Develop population awareness of the food crisis and promote alternative diets.

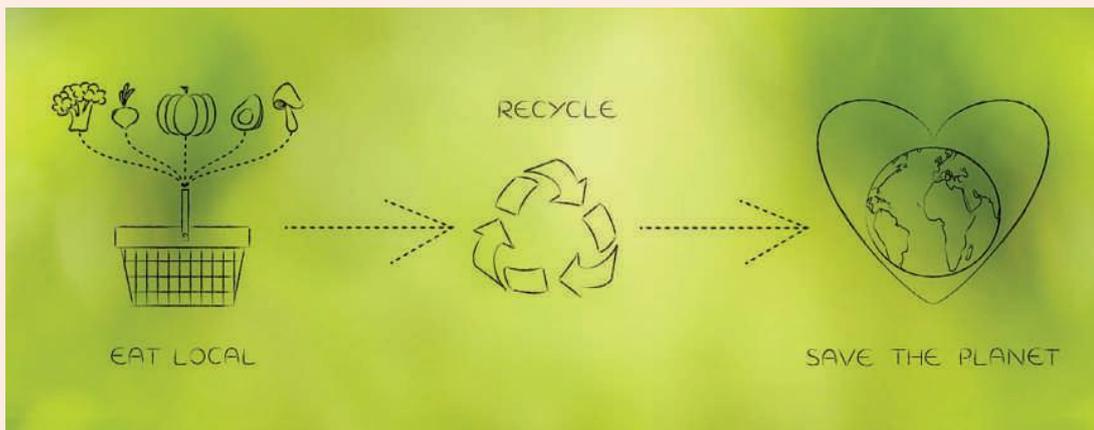
**Activity 11.2 (Inquiry): Food choices and climate change** ?

Investigate the food choices people are making around the world and how they are impacting climate change.

Describe three links that food choice has to climate change and use examples from around the world.

List two concerns that you have for future food systems and the impacts of climate change.

Suggest one dietary choice and/or pattern that individuals could adopt to ensure a sustainable food supply for future generations.

**Activity 11.3 (Inquiry): Feed the world** ?

**Mission: Feed the world.**

You have been employed to 'feed the world' by the Future Generations.

Your mission, should you choose to accept it, is to investigate the challenges faced here in Australia of how we can act to adequately feed a rising world population.

To complete this mission, you will need to suggest three solutions and discuss the possible threats and opportunities for each solution to ensure that we have an adequate food supply for future generations.

Good luck. Our food future is in your hands.

—

# Flat bread with hummus

Makes 3–4 flat breads

## Ingredients

### Flat bread



1 cup plain flour



1/2 teaspoon salt



1 teaspoon dried yeast



1 teaspoon butter, softened



75 mL warm water (approx.)

### Hummus



200 g chickpeas, rinsed



1/2 clove garlic, crushed



1 teaspoon tahini



1/4 lemon, juice only



2 tablespoons olive oil



1–2 tablespoons water, adjust if needed



1 pinch salt  
1 pinch pepper



1 pinch ground cumin

## Method

### Flat bread

Resting time: 1 hour 10 minutes

- 1 In a medium mixing bowl, add the flour, salt and yeast.
- 2 Make a well in the centre and add the butter and half the water. Mix by hand until the mixture comes together. Keep adding water until you form a dough.
- 3 Place the dough onto a lightly floured benchtop and knead for 4–5 minutes until smooth. Place the dough back into the mixing bowl, cover with cling wrap and set aside in a warm place to prove until the dough has doubled in size.
- 4 Once proven, tip the dough onto a floured work surface and knock back to get the air out. Divide the dough into 3–4 portions and roll into balls.

- 5 Roll out into ovals about ½ cm thick. Transfer to a lightly oiled baking tray and set aside for 10–15 minutes.
- 6 Preheat a frying pan to medium-high and lightly grease with oil.
- 7 Place the flat breads into the frying pan and cook for 3–4 minutes on each side, until browned and blistered. Serve immediately.

## Hummus

Combine all ingredients in a food processor, except the oil. Slowly add the oil until a smooth consistency is achieved. Drizzle a little extra olive oil on top to serve.



### Evaluation questions

- 1 Why is bread a staple food in countries around the world?
- 2 Explain the benefits and challenges of chickpeas being consumed as a nutritious alternative protein source.
- 3 Discuss the importance of chickpeas in satiety. Why could these help to 'feed the world'?
- 4 Chickpeas could be the new meat. Why would a chickpea product be a solution to environmental issues related to meat production?
- 5 Investigate the cost of chickpeas and evaluate their affordability as an alternative protein source.

### Activity 11.4 (Practical): Sustainable Sundays design task



In September 2021, the United Nations Food Systems Summit was held in New York. Part of this summit was a call to action. How will you continue to act for better food systems?



## #GOODFOOD4ALL

Building on the enthusiasm of the Global Shared Meal that took place ahead of the first-ever UN Food Systems Summit, we are even more motivated to keep the momentum going.

Join us for “Sustainable Sundays” to encourage others to take small but meaningful action to ensure food is good for our local communities as well as the planet. All you have to do is post a picture of a healthy, climate-friendly meal you’re eating using #GoodFood4All.

Climate-friendly or sustainable eating meets the needs of the present without compromising the ability of future generations to meet their own needs. It enables all people to be nourished and healthy while limiting negative environmental impacts and improving socio-economic welfare.

It involves a global shift toward healthy and balanced plates that celebrate local and seasonal ingredients. Why is it important to eat sustainable or climate-friendly meals? The future of the world depends on good food. It’s that simple. Good food keeps us healthy. It helps us reach our potential. It strengthens our communities, powers our economies, and protects our planet.

But not everyone gets good food every day – and the way we produce and market food is harming our environment. This has to change.

Good Food For All recognizes the emotional and cultural connection we have to food as a source of love and livelihoods while reflecting food’s impact on all areas of our lives.

SUSTAINABLE SUNDAYS

2

**Figure 11.6:** Extract from the UN’s #GoodFood4All #SustainableSundays downloadable guide

Source: United Nations Publications, *Sustainable Sundays Step-By-Step Guide*.

- 1 Read the extract from the United Nations Sustainable Sundays action booklet (Figure 11.6).
- 2 Design and cook a shared meal for Sustainable Sundays. The future of the world depends on good food. Your task is to design a meal for #SustainableSundays – a dish you could share by gathering with your friends and family for a healthy climate-friendly meal. You may choose to share this dish with your class or invite guests from the school community to share in this meal together. You will need to research ingredients and foods that are ‘climate friendly’ and follow the recommendations of the Australian Dietary Guidelines.

**Evaluation**

- 1 Outline the health benefits of your #SustainableSundays meal.
- 2 Discuss the environmental benefits of your #SustainableSundays meal.
- 3 Explain what it means to cook foods that are ‘climate friendly’.
- 4 How has social media changed patterns of eating?
- 5 Suggest tips to share with your school community about how they can eat healthy, climate-friendly meals.

**Global food insecurity**

According to the Food and Agriculture Organization (FAO) of the United Nations, nearly one in three people in the world did not

have access to adequate food in 2020 – an increase of 320 million people in just one year, from 2.05 to 2.37 billion (FAO, *Sustainable Development Goals, 2022*). Food insecurity exists whenever the availability of nutritionally adequate and safe foods, or the availability to acquire acceptable food in socially acceptable ways, is limited or uncertain.

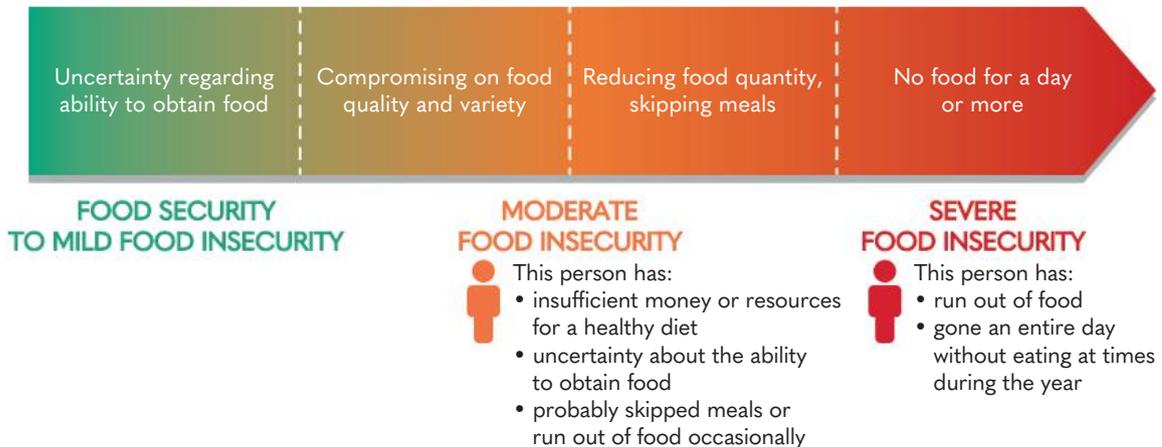
**Let's talk**



Often we think of food insecure people as being underweight. However, malnourishment can take many forms. How can an obese person who has regular food intake still be considered food insecure?

According to the FAO, ‘A person is food insecure when they lack regular access to enough safe and nutritious food for normal growth and development and an active and

**FOOD INSECURITY BASED ON THE FIES: WHAT DOES IT MEAN?**



**Figure 11.7:** The Food Insecurity Experience Scale (FIES) is a scale used by the FAO to measure food insecurity. The scale depicts that food insecurity can be experienced at different levels of severity. Data is collected via interviews and then compiled to give a percentage of a country’s population facing difficulty in accessing enough safe and nutritious food for normal growth and development and an active and healthy life. Source: © FAO, “Hunger and food insecurity”

healthy life. This may be due to unavailability of food and/or lack of resources to obtain food. Food insecurity can be experienced at different levels of severity' (FAO, *Sustainable Development Goals*, 2022). When measuring food insecurity around the world, the FAO uses the Food Insecurity Experience Scale (FIES).



### Let's talk

In Australia, the prevalence of moderate or severe food insecurity during 2018–20 was 10.5 per cent for males and 11.21 per cent for females (FAO, *Sustainable Development Goals*, 2022).

Can you explain why there is a difference in the data for males and females?

### Solutions to food insecurity



The issue of food insecurity is seen all over the world. Australia is a food secure nation, but food insecurity is prevalent in our society. Governments and organisations such as Foodbank, Oz Harvest, FareShare and local community groups work together to reduce the burden of food insecurity for individuals and help work towards food security for all.

### Activity 11.5 (Case study): Fighting food insecurity at a local level



According to the Cardinia Shire Household Food Security Survey 2021, at least 40 per cent of families in the Cardinia Shire are on the brink of food insecurity.

Beaconhills College have been nominated for an award for their Beacon of Hope Community Garden at the Pakenham campus. The garden was established in collaboration with Sustain: The Australian Food Network, Flourish and the Cardinia Food Movement to grow fresh produce to help fight food insecurity in their local region.

Flourish is a leadership group that teaches young people about the food systems, how to cultivate garden spaces and campaign for new ways of living. It was founded by five youth leaders from Cardinia Shire who believe the community can solve food insecurity through education, action and advocacy.

Find out more about Flourish, its partner schools and its youth leaders on the Cardinia Food Movement website at <https://www.cardiniafoodmovement.org/flourish-youth-food-network>

#### Questions

- 1 Explain how the collaboration between Beaconhills College and Flourish, a youth community group, addresses food insecurity and, in turn, promotes food security in the local area.
- 2 Outline how this program improves equal access to food for the local community.
- 3 This program improves equity in food distribution for the local community. Explain how this is possible.
- 4 Investigate a local community group or project near you that is working towards supporting food insecurity.
- 5 Describe the who, what, when, where and why about the project/group/organisation.

*'Legumes provide a valuable and cost effective source of protein, iron, some essential fatty acids, soluble and insoluble fibre and micronutrients. They are valuable inclusions in the diet.'* (Australian Dietary Guidelines, 2013)

Legumes are cheap to produce, and farming them has less impact on the land than

farming cattle or sheep, which provide similar nutrients such as proteins and iron. Legumes, a nutrient-dense product, can also produce more product per square metre output than cattle or sheep – a huge benefit for sustainably farming nutritious foods to feed a rising world population.

# Dhal

Serves 2

## Ingredients



½ onion, finely  
diced



2 cloves garlic,  
crushed



2 teaspoons  
grated ginger



1 bay leaf



1 tablespoon  
olive oil



½ cup red  
lentils



¼ red capsicum,  
diced



1 teaspoon  
curry powder



½ teaspoon  
turmeric



½ cup sweet  
potato, roughly  
diced



¼ cup coconut  
milk



1 cup baby  
spinach, chopped



1½ cups  
vegetable stock

## Method

- 1 Heat the olive oil. Sauté the onion, garlic, ginger and bay leaf.
- 2 Add the lentils, curry powder and turmeric. Fry for 2 minutes, stirring constantly.
- 3 Pour in the stock. Add the sweet potato, capsicum and coconut milk. Cook on a low heat for 20 minutes, stirring occasionally to make sure the dhal doesn't stick to the bottom of the saucepan. Add water or stock if required.
- 4 Add chopped spinach and stir through for about 2 minutes, until wilted. Serve.



### Evaluation questions

- 1 Discuss why dhal is a possible example of a staple meal solution for feeding a rising world population.
- 2 Legumes are grown all over the world. Outline how this recipe reflects Indian culture.
- 3 Outline how legumes are used in other countries around the world.
- 4 Legume consumption in Australia is much lower than in other parts of the world. Suggest why this is the case.

## Equity versus equality



### Let's talk

Everybody in Australia has enough to eat, don't they? What's the big deal?

Equity is the absence of avoidable, unfair or correctable differences among groups of people, whether those groups are defined socially, economically, demographically, geographically or by some other means of stratification. Access to a safe, affordable food supply that is evenly distributed throughout the world is the ideal – a world where everyone has a fair opportunity to attain their full potential and where no one is disadvantaged from achieving this potential.

We must work together as a community to find ways to create food systems where everyone is treated equitably. This would ensure that those who require greater assistance have sufficient resources to consume foods that meet their nutritional needs.

## Global food security

Around the world, countries aim to provide an environment that ensures food security can be achieved for all.

Food security exists 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 lifestyle.

Food security is defined 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.' (Prime Minister's Science, Engineering and Innovation Council, *Australia and Food Security in a Changing World*, p. 1)

The definition of food security above can be further explored by understanding the five dimensions of food security shown in Figure 11.8.



### Let's talk

Looking at the 'Equality versus Equity' image below, describe what you see. Talk with your partner about how this image reflects possible pathways to food security.



Availability	Accessibility	Acceptability	Adequacy	Stability
<ul style="list-style-type: none"> <li>Sufficient supply of food for all people at all times</li> </ul>	<ul style="list-style-type: none"> <li>Physical and economic access to food at all times, which means equity of access to food</li> </ul>	<ul style="list-style-type: none"> <li>Access to culturally acceptable food that is produced and obtained in ways that do not compromise people's dignity, self-respect or human rights</li> </ul>	<ul style="list-style-type: none"> <li>Access to food that is nutritious, safe and produced in environmentally sustainable ways</li> </ul>	<ul style="list-style-type: none"> <li>Reliability of food supply</li> </ul>

**Figure 11.8:** Food security has five dimensions. Food security seeks to address these dimensions through current food practices.



### Let's talk

Discuss how the five dimensions of food security shown in Figure 11.8 might work to contribute to food security in Australia.

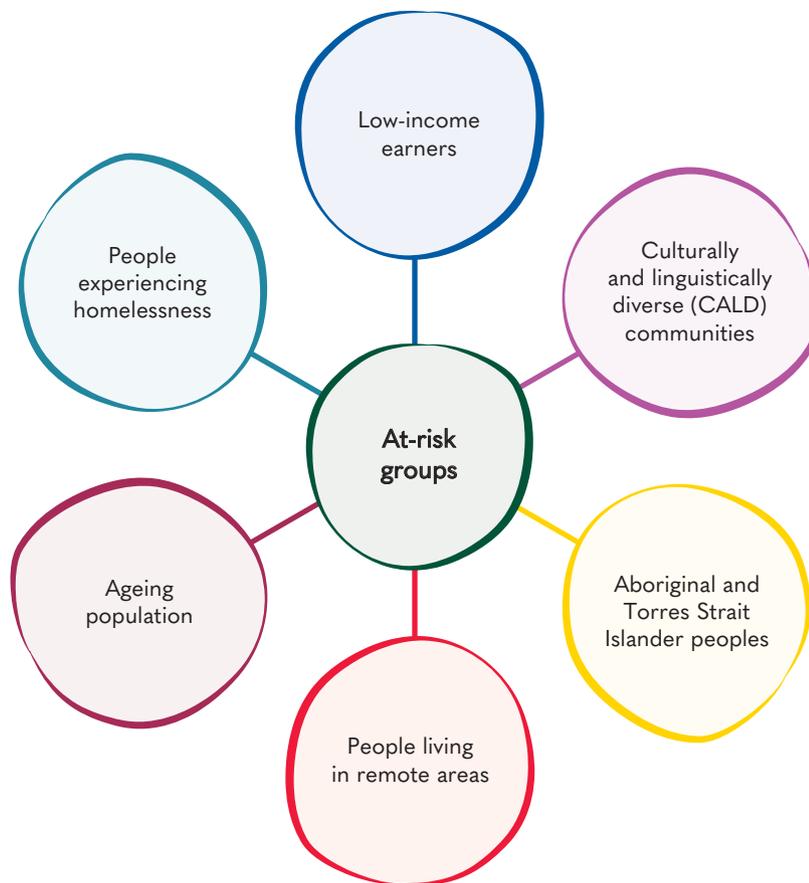
Obesity rates have been found to be higher in those who experience mild to moderate food insecurity. The reason for this is the tendency of food insecure people to purchase cheaper foods that are of a nutritionally poor quality, that is, foods that are high in salt, fat and sugar, ultra-processed and often high in refined carbohydrates. Unfortunately, these types of processed foods are often perceived to be cheaper and easier to obtain than fresh fruits and vegetables.

A diet high in these foods means the individual is often missing out on essential nutrients to keep their body functioning well. In addition to this, for a food insecure individual, the worry and stress of the uncertainty around accessing food can also contribute to overweight and obesity. In many countries, undernutrition and obesity coexist, and both can be consequences of food insecurity.

## Groups in Australia at risk of food insecurity

Food insecurity affects certain at-risk groups in Australia. Increasingly prevalent and visible in Australia are issues attributed to this, including:

- obesity
- hunger
- access to sustainable food sources
- vulnerability to natural disasters caused by climate change
- lack of resources (financial, transport, cooking facility and so on)
- inability to access nutritious food at affordable prices
- lack of motivation or knowledge about a nutritious diet.



**Figure 11.9:** There are many vulnerable groups in Australia at risk of food insecurity.

### Low-income earners

Challenges experienced by low-income earners include purchasing adequate quantities of food. Often, families and individuals face a lack of public and private transport to and from supermarkets, making it difficult to get grocery shopping home. Lack of adequate refrigeration can also be an issue that impacts on a family's ability to maintain the quality of fresh foods. Buying in bulk can be a great way to save money, but the initial outlay of doing this is not always feasible.

### Culturally and linguistically diverse (CALD) communities

Australia is a multicultural country with many migrants settling in Australia. However, this can have challenges, including language barriers, unemployment, difficulty in finding culturally appropriate foods, unfamiliarity with the Australian food systems and restricted access to financial support.

### Aboriginal and Torres Strait Islander peoples

Another at-risk group for food insecurity Australia's First Nations peoples, the Aboriginal and Torres Strait Islander population. Issues faced include low income, household infrastructure, lack of access to transport, storage and cooking facilities. They are also challenged by the availability and access to culturally significant foods.

### People living in remote areas

Food outlets and public transport are sparse in rural and remote Australia. Transportation and logistics costs to get fresh foods to these areas increase the price of food. The price of healthy staple foods, such as fresh fruit and vegetables, can be 30 per cent higher in remote communities than in cities (Climate Council of Australia, *Feeding a Hungry Nation*, 2015). The range of food is often limited in regional and remote areas.

### Ageing population

We are becoming an ageing population, with Australians living longer than they have ever lived before. Many people in this population group are facing food insecurity challenges. These challenges can include poorer living conditions, reliance on government financial assistance, social isolation, access and mobility issues.

### People experiencing homelessness

The homeless population in Australia suffers food insecurity on a daily basis. Lack of financial resources makes purchasing food difficult. This community often relies on food relief services for meals. They can also be faced with lack of access to facilities and equipment that are required for meal preparation and storage.

#### Activity 11.6 (Case study): FareShare – Melbourne’s response to food insecurity



**FareShare**  
Rescue.Cook.Feed.

**Figure 11.10:** Read more about FareShare at [www.fareshare.net.au](http://www.fareshare.net.au).

Source: Reproduced with permission of FareShare Australia

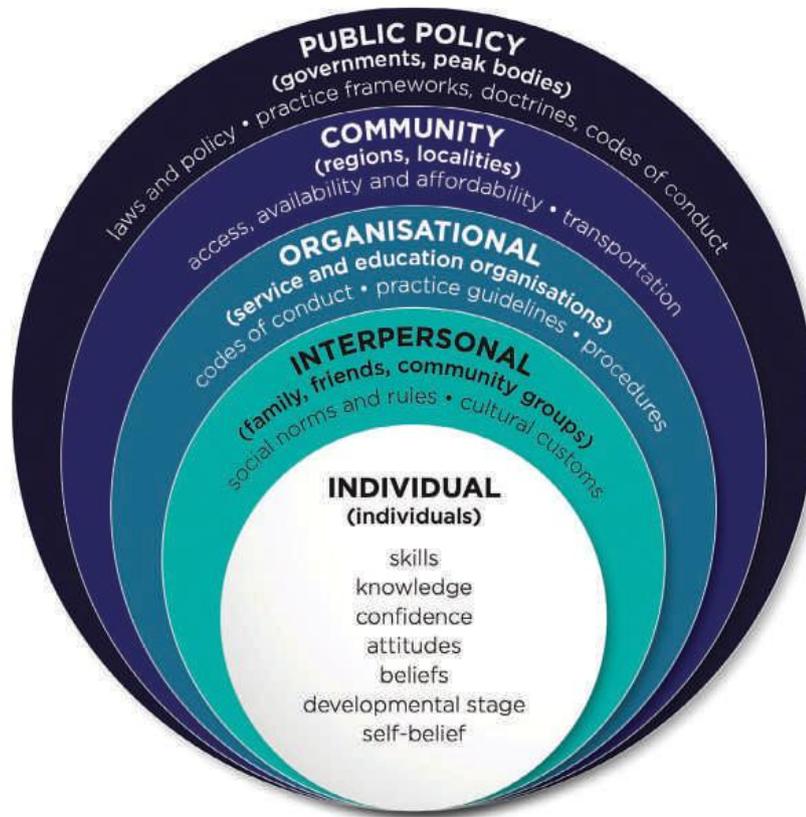
#### Questions

- 1 What is FareShare?
- 2 Explain how FareShare is working towards achieving food security for all.
- 3 Explain who FareShare works with and what it does to help achieve this.
- 4 Discuss how FareShare can carry out this important role in our community. Include an explanation of how we can all contribute to the FareShare goal.
- 5 ‘Nutritious free meals can help to change lives.’ Discuss this statement.

### *How to improve equity in food access and distribution*

Addressing and dismantling inequities in the food systems is critical in ensuring that the food systems are accessible, inclusive and sustainable. Ideally, everyone should have a fair opportunity to attain their full potential

and no one should be disadvantaged in ways that prevent them achieving this potential. Food security is impacted by many factors that are often outside an individual’s control. As shown in Figure 11.11, intervention must come from all levels of society to effectively address food security.



**Figure 11.11:** Support and interventions are necessary at all levels in order to effectively address and support food security.

Source: Child Family Community Australia Paper No. 55; Based on McLeroy, Bibeau, Steckler, & Glanz (1988)



**Figure 11.12:** Examples of possible pathways to improve equity in food access and distribution  
 ISBN 978-1-009-10524-8 Sally Lasslett et al. © Cambridge University Press & Assessment 2022  
 Photocopying is restricted under law and this material must not be transferred to another party.

**Activity 11.7 (Inquiry): At-risk groups**

Copy and complete the table. For each at-risk group, determine the best pathway to improve food security. Justify your response.

At-risk group	Pathway
Low-income earners	
Culturally and linguistically diverse (CALD) communities	
Aboriginal and Torres Strait Islander peoples	
People living in remote areas	
Ageing population	
People experiencing homelessness	

Other examples of improving equity in food access and distribution in Australia include:

- educating people with skills and knowledge to cook cheaper, healthy nutritious meals
- working with local town planning, especially in new housing developments, to provide suitable locations for food outlets and supermarkets
- providing community support and engagement for food relief programs such as Food Rescue, Soup Van and FareShare programs
- providing subsidies on certain foods
- upskilling new arrivals on local ingredients, preparation methods and food literacy skills
- providing opportunity for provisions to be given for the transport of food for both access to transport to and from supermarkets and enough money to purchase nutritious foods to meet basic needs.

### *Pathways to achieving food security: innovation and technology*

The role of technology is key in achieving global food security. Science, technology and innovation can play a critical role in producing more food by:

- creating plant and animal varieties with improved traits
- reducing food loss and waste
- optimising inputs to improve productivity
- furthering soil and water management systems
- increasing shelf life
- enhancing nutritional quality
- monitoring and controlling weed, pest and disease concerns.

## Activity 11.8 (Inquiry): #foodsecurity



Summarise this diagram into a 240-character tweet. Don't forget to hashtag #foodsecurity.



**Figure 11.13:** How to feed 10 billion people sustainably by 2050

Source: World Resources Institute, "How to Sustainably Feed 10 Billion People by 2050, in 21 Charts"

Examples of innovation and technology currently being developed to address food insecurity and assist in creating sustainable

and ethical food systems are shown in Figure 11.14.



**Figure 11.14:** Innovations and technology can assist in helping to achieve global food security.

### Genetic modification

Meeting food production goals in the face of climate change requires innovation and new thinking around farming, agriculture and land management practices. Genetic modification (GM) can be used to improve food production capacity and have a positive impact on crop production, helping to achieve global food security. The process involves altering the genetic material of a plant or animal by duplicating, removing or

inserting a specific gene in order to improve its characteristics.

Crops can be genetically modified to improve their tolerance to extreme weather conditions, such as drought, increase yield and improve nutrient density. This impacts on food security as it increases productivity, reduces food wastage and improves the stability of agricultural outputs, increasing production and availability of food.



**Figure 11.15:** Altering the genetic material of a plant can improve its characteristics and provide crop certainty for farmers.

### Activity 11.9 (Media analysis): Is GM the solution to global food insecurity?



Read the article 'From this week, every mainland Australian state will allow genetically modified crops. Here's why that's nothing to fear', published 28 June 2021 on *The Conversation*. Use this as a starting point for sourcing other articles online that explore the issue of feeding a rising global population.

- 1 Research the benefits and criticisms surrounding genetic modification of food as a means to achieving global food security.
- 2 Evaluate the contribution of GM to food security in terms of ethics and sustainability.
- 3 Explain if GM is the solution to achieving global food security.
- 4 The Food and Agriculture Organization (FAO) is a specialised agency of the United Nations with the goal of achieving food security for all. Visit the FAO website and search for articles on genetic modification. Divide into groups for a classroom discussion or debate on this issue.

## Chapter revision

- Factors that impact on food security and our efforts to feed a rising world population include climate change and population growth.
- Food security has five dimensions: availability, accessibility, acceptability, adequacy and stability. Food security seeks to address these dimensions through current food practices.
- Australia has a number of at-risk groups that are food insecure.
- Pathways to achieving global food security must be equitable and sustainable.
- The role of technology is key in achieving global food security. Science, technology and innovation can play a critical role in producing more food. GM technology is one example of this.

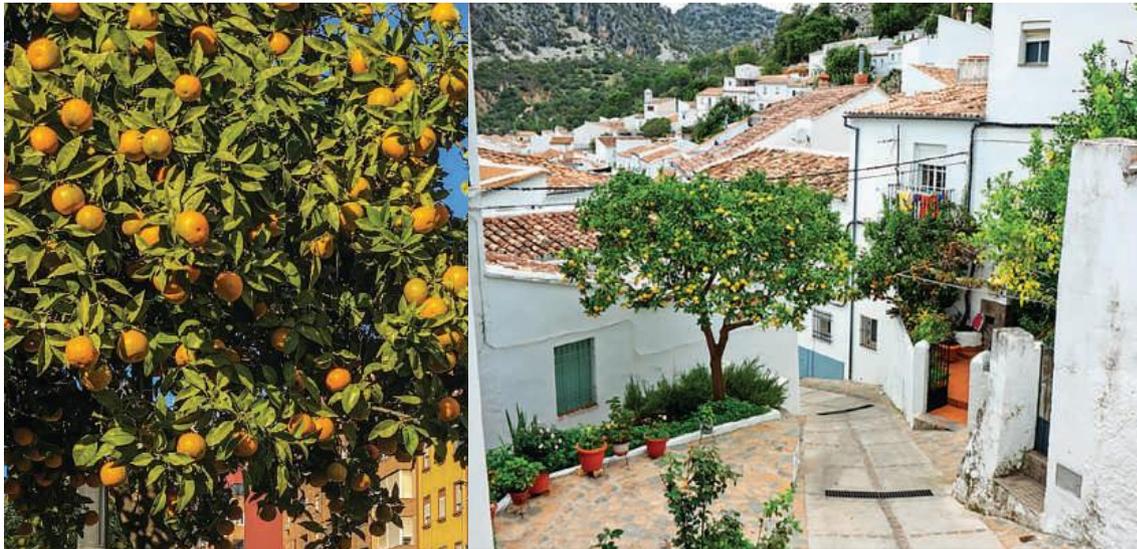
### Apply your knowledge

- 1 Outline key issues in the challenge of adequately feeding a rising world population.
- 2 Discuss the impacts of climate change on food security.
- 3 Define global food security.
- 4 List the dimensions of food security and provide a challenge and solution for each.
- 5 Choose a group at risk of food insecurity and outline possible pathways to achieve food security. Consider equity of access and distribution in your response.
- 6 Discuss how innovations in biotechnology may impact future food production.

## Practice exam questions



### Question 1



We should **plant** various **fruit trees** on city **footpaths** so everyone, **including the homeless**, could eat all year.

**Figure 11.16:** Would this work?

Discuss reasons why reducing our reliance on the food systems (or supermarkets) works to improve food security.

**4 marks**

### Question 2

**a** Describe food security.

**2 marks**

**b** Explain a possible pathway to achieving food security for low-income groups in Australia.

**3 marks**

### Question 3

Suggest one example of a technology or innovation that could be used to help achieve global food security and evaluate its contribution to food security in terms of ethics and sustainability.

**6 marks**

# Chapter 12

## *Food sovereignty and citizenship*

### Key knowledge

- The relationship between food security, food sovereignty and food citizenship.
- The role of food citizenship to ensure both an optimal diet for people and the health of the planet.

### Key skills

- Debate relationships between food security, food sovereignty and food citizenship including roles of food citizenship and its relationship to food security and food sovereignty.

VCE Food Studies Study Design extracts © VCAA; reproduced by permission



People have the right to be active participants in the food systems. They also have the right to define their own food and agriculture practices. In order to support environmental sustainability and increase food security, we must work together to develop democratic, socially and economically just systems.

#### Video 12.1

Chapter Overview

In this chapter we will debate relationships between food security, food sovereignty and **food citizenship** and highlight the importance of viewing ourselves as food citizens, rather than consumers, in order to foster fair and resilient food systems for all.



### Get knowledge ready

- 1 Provide examples of how we interact with the food systems.
- 2 Explain why food security is more than just the physical access to a sufficient food supply.
- 3 Describe ways in which you can make conscious and considered food choices when you shop for food.

**food citizenship**  
the practice of encouraging food-related behaviours that support the development of democratic, socially and economically just, and environmentally sustainable, food systems

## Global food systems

The current state of the global food systems is threatening both people and the planet. Industrial farming and the stronghold of multinational corporations are contributing to a number of concerns that are placing negative pressures on food security. These negative pressures include:

- environmental stress
- climate change
- land degradation
- damage to ecosystems
- social justice issues.

If these issues are not addressed, the global food systems will be unable to meet the nutritional demands of the growing population without irreversible damage to the planet.

Citizens, communities, governments and corporations all must take an active role in transforming the food systems to ensure that an optimal diet for people can be achieved that is both ethical and sustainable. Multinational corporations are buying or pushing out

small-scale companies and producers. This means that they can dictate global prices and influence agricultural practices. These big businesses then promote intensive agriculture, as the increased rates of production result in increases in their overall profit margins.

Consumers are often unaware of the implications of their food choices and the origins of their food. Supermarkets within Australia provide year-round access to seasonal and exotic foods. This impacts consumer behaviour, as it normalises the ability to access this produce all year round. Little to no consideration is given to the implications of these choices, creating a disconnect between the consumer and the producer.

Without the knowledge and skills of how food is grown and prepared, the value of food and the impact of our decisions on food producers can be lost. Consumers can become detached from the system and be **passive consumers** in their consumption.

---

**passive consumers**  
consumers who don't actively consider the impact of their food choices or challenge issues within the food systems

---



### Let's talk

Discuss the advantages and limitations of having access to seasonal and exotic produce all year round.



## Food security

Food security is a global concern. If we consider the current state of the food systems, it is unlikely that as a society we will be able to adequately feed 9.7 billion people by the year 2050. If we continue in the way that we currently are, we will jeopardise the health of our planet. If food security is viewed through a narrow lens, we are only concentrating on food systems that produce food in an abundance. We are focusing on the product, and disregarding the process.

In order to achieve food security, we need to consider physical and economic access to food, but we must not ignore the environmental ramifications and social justice issues related to food. Global industrial food systems are labour- and land-intensive. These systems view food as a market commodity rather than a fundamental human right. Traditional custodians of the land and small-scale farmers are dismissed or exploited.



### Let's talk

Does the end ever justify the means? Discuss the potential social, ethical and environmental impacts of the food systems only focusing on creating rapid output.



**Agribusiness corporations** can flourish as they are supported by subsidies and policies, creating passive consumers who are focused on price and convenience.

To achieve food security in a sustainable and socially just fashion, we must create food systems that are designed to help both people and the planet. Sustainable food systems work to provide safe and nutritious food while upholding social values and an equitable economy, considering animal health and safety, and being governed fairly and responsibly. This works to protect the world and all those who reside in it.

By creating a collective responsibility and critical awareness of equity, social justice and environmental sustainability in the food systems, we can work towards achieving food

security in a manner that is beneficial to all. Sustainable and ethical food security must be supported by food sovereignty and citizenship.

## Food sovereignty

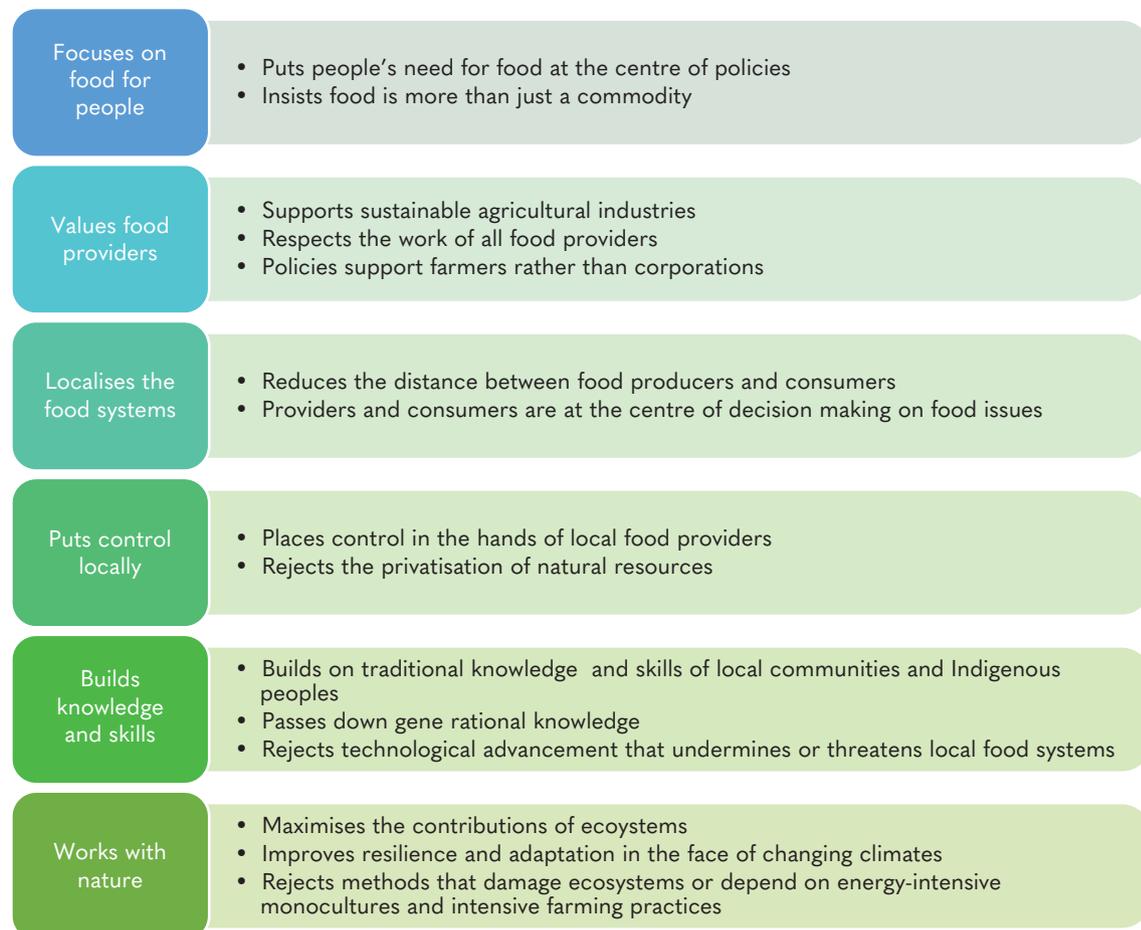
Food sovereignty is a food system that supports traditional landowners, farmers and local producers, communities and citizens. These food systems produce food through **ecologically** sound and sustainable methods. The idea of food sovereignty is to challenge the inequalities of power within the food systems that occur as a result of the dominance of multinational organisations and industrial agricultural practices. As a society, if we support food sovereignty systems, we can work together to better the health of both the people and the planet.

### agribusiness corporations

large-scale agricultural businesses

### ecology

study of the relationship between living organisms and their interaction with their environment



**Figure 12.1:** Six pillars of food sovereignty

**Activity 12.1 (Inquiry): Agroecology** ?

Food sovereignty promotes **agroecology**, a holistic and integrated approach that optimises the interactions between plants, animals, people and their environment. The Food and Agriculture Organization of the United Nations developed the '10 Elements of Agroecology'. Search online for the 10 Elements of Agroecology.

- 1 Identify and describe each element.
- 2 Explain the importance of having a holistic and integrated approach to agroecology.
- 3 Create an infographic of the 10 Elements of Agroecology.

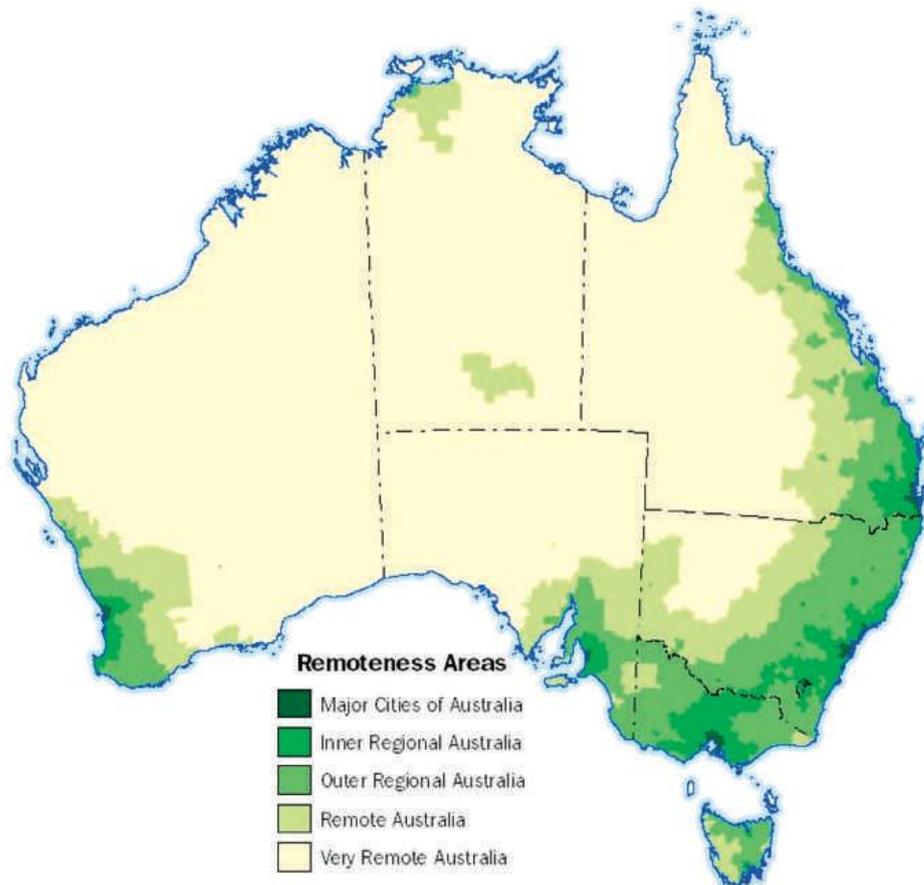
**agroecology** studies ecological processes applied in agricultural production systems

disconnect between consumers and the origins of their food. There are a number of government projects and independent organisations working to address food security issues through food sovereignty initiatives.

The Australian Food Sovereignty Alliance (AFSA) is an independent organisation that seeks to empower individuals and communities to view food as more than a market commodity. AFSA encourages individuals to play an active role in selecting, creating and managing their food supply. Organisations such as this work towards achieving food security through sustainable and socially just means.

**Food sovereignty in Australia**

Australia is a large country with the vast majority of citizens living in major cities. In this urban context there is a growing



**Figure 12.2:** Classification of the remoteness of the areas of Australia

## Activity 12.2 (Inquiry): Australian Food Sovereignty Alliance



**Figure 12.3:** Food sovereignty asserts the right of peoples to have access to nourishing and culturally appropriate food, produced and distributed in ecologically sound and ethical ways, as well as their right to collectively determine their own food and agriculture systems.

Visit the Australian Food Sovereignty Alliance website and answer the following questions:

- 1 Describe the organisation.
- 2 Outline the objectives of AFSA.
- 3 Explain what led to the formation of AFSA.
- 4 Explain how AFSA works to support the sovereignty and rights of First Nations peoples.

### Urban food production

Major cities within Australia are adapting landscapes and redesigning infrastructure to create urban agricultural systems. Localising food production and engaging communities with agricultural practices presents an opportunity to support domestic food security and build knowledge around food production.



#### Let's talk

If you were the city planner for a major metropolitan area, what initiatives and infrastructure would you establish to support food sovereignty systems?



**Figure 12.4:** Rooftop gardens and city farms are helping to localise the urban food systems.

**Activity 12.3 (Case study): CERES Community Environment Park**

CERES Community Environment Park is a not-for-profit educational organisation located on Wurundjeri Country in Melbourne. The central park in Brunswick East was established on four hectares of rehabilitated landfill.

- 1 What does CERES stand for?
- 2 Outline CERES' social enterprises, education and training and community engagement strategies.
- 3 Explain how this urban agricultural environmental park aligns with the six pillars of food sovereignty shown earlier in Figure 12.1.

Urban agriculture provides a pathway forward in engaging citizens to actively connect with their food systems and have a degree of autonomy and sovereignty over their immediate food production systems and choices. Participating in urban food production helps to build a collective understanding of what the growing of food entails. By generating greater awareness of the food systems, people are more likely to make critical and conscious food choices and consider their impact on foreign food landscapes outside of their urban context.

The volume of food produced within urban landscapes is unlikely to be sufficient to feed the growing population of metropolitan areas. Although food security cannot be achieved through the volume of food produced within these settings, the skills and knowledge developed can work towards a greater environmental, social and political understanding of the food systems. Rather than seeking to become independent of the wider food systems, urban consumers should recognise their dependency on food products from rural farming regions. Supporting environmentally sustainable food systems and considering one's food choices create food citizens, rather than food consumers.

**Let's talk**

Describe the difference between a food citizen and a food consumer.

**Community gardens**

Community gardens exist within urban, regional and remote areas across Australia. These gardens can be established by individuals, community groups, schools or organisations and often require approval from local government. Participation in community gardens promotes an active and engaged lifestyle that builds connections among like-minded people.

These spaces offer a learning environment where people can actively participate in elements of the food systems, such as production, harvesting, distribution, consumption and recycling of waste products. Sharing knowledge and experiences with community members develops a collective insight into what local sustainable food production can look like.

Similar to urban agriculture, these gardens are not intended to produce a food supply that would sustain the local community. Engaging in these alternative food systems builds capacity of people and can work to support vulnerable community groups.

**Let's talk**

Discuss how urban agriculture and community gardens offer ecologically sound and sustainable methods to support food security for vulnerable community members.



**Figure 12.5:** Community gardens provide a space for people to establish their own food systems while building their knowledge and skills.

### Supporting local enterprises

In order to promote sustainable and ecologically sound food systems, we need to think local. Supporting our local agricultural industry enables consumers to connect with farmers, releasing the stronghold that multinational corporations have on small-scale business owners. Farmer support networks such as farmers' markets, food hubs and

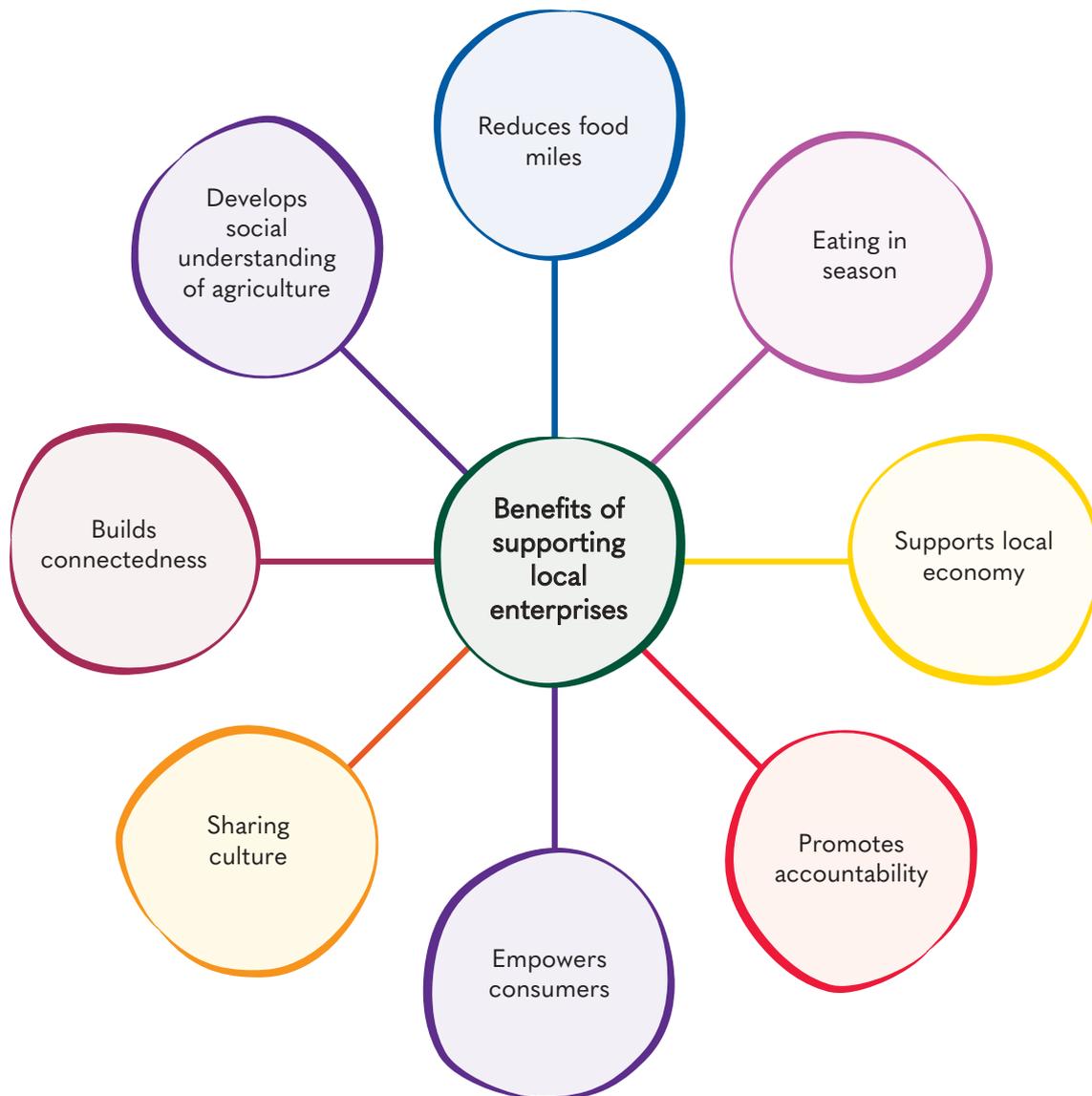
food cooperatives are examples of local enterprises. Strengthening the connection between consumer and farmer supports the local food economy and enables the growth and production of sustainable food systems. Successful local food systems unite all key stakeholders to ensure that they have genuine influence over their food systems and are able to grow and flourish together.

### Activity 12.4 (Inquiry): Farmers' markets and food hubs



Research farmers' markets and local food hubs in your area. Create a promotional visual presentation for a market or food hub. Include the following information:

- time and location
- description
- benefits of buying local
- recipe that utilises seasonal produce from the market or food hub.



**Figure 12.6:** The benefits of supporting local enterprises

### Aboriginal and Torres Strait Islander peoples' food systems

Food sovereignty acknowledges the issues faced by Indigenous peoples impacted by industrial food systems and works towards enabling Indigenous populations to regain their rights, control and access to traditional food sources. Aboriginal and Torres Strait Islander peoples are the first peoples of

Australia. Traditional Owners had cultivated and managed food in ecologically sound ways for tens of thousands of years prior to colonisation. Indigenous Knowledge has been colonised and commercialised by non-Indigenous businesses and companies without their consent, stripping Traditional Owners of their rightful food sovereignty.

### Activity 12.5 (Case study): Victorian Traditional Owner Native Foods and Botanicals Strategy



Traditional Owners have released the Victorian Traditional Owner Native Foods and Botanicals Strategy (the Strategy) with support from the Victorian Government. The Strategy aims to recover and reclaim Traditional Owners' custodianship of their knowledge and practices associated with native species. By restoring their leadership over the native foods and botanicals industry, Traditional Owners can ensure that the sector remains culturally safe and appropriate, provides benefits to custodians and their communities, and reflects their inherent rights and sovereignty.

The Strategy works to create a strong, authentic and sustainable bushfood industry through the leadership of Traditional Owners, utilising their Indigenous Ecological Knowledge and protecting their Indigenous Cultural and Intellectual Property (ICIP). The strategy is directed by four guiding principles: culture, country, community and commercial. These principles strengthen the social, cultural and economic connections that Traditional Owners have with the lands and resources.

Our Indigenous Knowledge, plants and animals have ended up in supermarkets, databases and research projects without our consent or participation.

Culture and country have been exploited by the food, pharmaceutical, cosmetic and agricultural industry, research institutions and universities. We reclaim our cultural heritage, rights to water and country and our right to ethical, principled engagement with us.

We have the right to pass on this knowledge to our children in accordance with our Indigenous Knowledge systems, including the requirements for privacy and secrecy required by those ancient systems.

This is a key pathway to economic independence and equality. We assert our rights to continue to develop our pre-existing Indigenous economies, carry them forward in accordance with our Knowledge systems, caring for country and creating intergenerational wealth, locally and in international markets.

**Figure 12.7:** Extract from Victorian Traditional Owner Native Foods and Botanicals Strategy by the Federation of Victorian Traditional Owner Corporations  
Source: Federation of Victorian Traditional Owner Corporations

#### Questions

- 1 Create a list of native foods and botanicals.
- 2 Explain the reasons for the establishment of the Victorian Traditional Owner Native Foods and Botanicals Strategy.
- 3 Explain how the Strategy reflects food sovereignty.
- 4 Suggest ways in which you can support Indigenous food sovereignty systems.

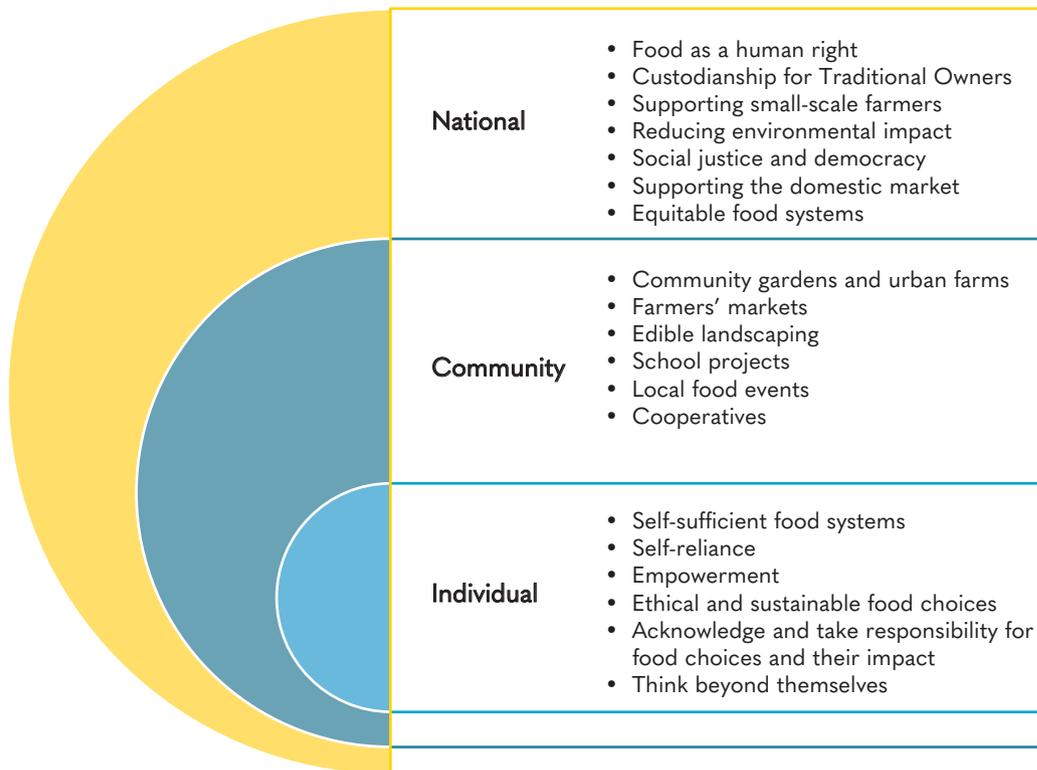
First Nations peoples have the right to restore and reclaim custodianship of food knowledge and practices. Acknowledging, supporting and utilising Indigenous food knowledge and land management systems is paramount in promoting agroecology. Food sovereignty

promotes everyone's rights to access culturally appropriate food grown and distributed in ethical and ecologically sound ways, clearly supporting the right of First Nations peoples to democratically determine their own food and agriculture systems.

**Activity 12.6 (Inquiry): AIATSIS map of Indigenous Australia**

Access the Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) map of Indigenous Australia.

- 1 Outline what the map represents.
- 2 Identify the Traditional Owners of the land in which you currently reside.
- 3 Consider the impact that colonisation and urbanisation have had on First Nations peoples' access to culturally appropriate and native foods.



**Figure 12.8:** Food sovereignty requires active participation and engagement from all areas of society.

### *Food citizenship*

In order for food sovereignty systems to work and effectively address food security, consumer transformation is required. Building consumer awareness and active engagement in the intricacies of the food systems will build people's knowledge of the social injustices and environmental harm that are inherent in the current industrialised food practices. Critical consciousness of the food systems sees the evolution of a food consumer to a food citizen.

Food citizens support systems that are democratic, socially and economically just and environmentally sustainable. They

acknowledge their responsibility within the system and modify their food behaviours accordingly. Ecological citizens are concerned about the implications of their actions in relation to both local and global systems.

When food citizens engage in local food systems, such as farmers' markets, community gardens and supporting Traditional Owners' food ventures, individuals can build their knowledge of agricultural practice, policy and social inequalities. Through understanding the political, ethical and environmental ramifications of food behaviours, ecological food citizenship develops. By taking an active

role in the food systems and thinking beyond themselves, food citizens promote food sovereignty systems, which work towards achieving food security in an ecologically sound, sustainable and socially just manner.



**Let's talk**

Are you a food consumer or a food citizen? Justify your response.



**Figure 12.9:** Food citizenship requires action in many different areas.

**Activity 12.7 (Inquiry): Food security, food sovereignty and food citizenship** ?

There is a complex interrelationship between food security, food sovereignty and food citizenship. Create a concept map to visually illustrate the similarities and differences between the three concepts. Can any exist without the others? Justify your response.

# Wattle seed and bush tomato risotto served with damper

Serves 2

## Ingredients



1 teaspoon oil



1 clove garlic, crushed



1/2 brown onion, diced



1/2 cup arborio rice



2 cups vegetable stock



1/2 teaspoon ground wattle seed



1/2 tablespoon ground bush tomato



1/4 diced tomato as garnish



5 basil leaves, shredded



1 teaspoon cream



20 g parmesan cheese, shaved

## Method

- 1 Place the oil into a saucepan and heat on medium. Add the onion and garlic and sauté until translucent.
- 2 Turn the heat to low. Add the rice and stir for a couple of minutes to seal the rice.
- 3 Add the vegetable stock, a quarter at a time. The rice should always be covered by liquid. Stir well after each amount of liquid.
- 4 When half the stock has been added, add the wattle seed and bush tomato. Stir well. Continue adding the stock.
- 5 Cook until the rice is just tender or al dente. Add the cream, diced tomato and basil leaves, mixing well.
- 6 Remove from the heat and garnish with the parmesan cheese before serving.



# Damper

## Ingredients



2 cups self-raising flour



1 tablespoon wattle seed



1 teaspoon salt bush



3 tablespoons butter



250 mL milk



1 tablespoon macadamia nut oil



Milk for brushing

## Method

- 1 Preheat the oven to 180°C.
- 2 Sift the flour and native flavourings into a bowl. Rub in the butter with your fingertips until the mixture resembles breadcrumbs. Make a well in the centre.
- 3 Slowly add the milk, combining the ingredients with a palette knife until a soft dough forms.
- 4 On a lightly floured board, bring the dough together with your hands. Be careful not to overwork the dough.
- 5 Shape the dough into a round and place it on a lined baking tray. Brush with milk. Bake for 40–50 minutes or until it sounds hollow when tapped on the base. Serve with the risotto.



### Evaluation questions

- 1 Describe the sensory properties of the dish.
- 2 Suggest a modification that could be made to the risotto to incorporate a greater range of seasonal produce.
- 3 Explain how a food citizen could source the ingredients for this recipe.
- 4 This recipe contains rice. Detail your understanding of the farming practices used to produce rice. As active and responsible food citizens, why is it important that we acknowledge the issues associated with rice production?
- 5 When practising food citizenship and sourcing native ingredients, outline reasons why it is important to consider the food systems and Traditional Owners.

## Chapter revision

- Our food choices and engagement with the food systems can have significant social and environmental repercussions.
- Food sovereignty systems work to provide food through ecologically sound and sustainable methods to ensure that food security can be achieved in an ethical and environmentally friendly manner.
- Active engagement in food sovereignty systems can occur in an urban context.
- Food citizens take an active role in their engagement with the food systems and advocate for the health of people and the planet.
- Supporting First Nations food ventures acknowledges and respects the rights Traditional Owners have to restore and reclaim their custodianship of food knowledge and practice.

### Apply your knowledge

- 1 Provide examples of local food systems.
- 2 Describe the difference between food consumers and food citizens.
- 3 Explain the importance of Indigenous land custodianship in supporting food sovereignty systems.
- 4 Outline how food sovereignty supports agroecology.
- 5 Discuss the potential environmental impact of achieving global food security.
- 6 Suggest how local food communities can work to support global food security.

## Practice exam questions



### Question 1

Describe the difference between food security and food sovereignty.

**4 marks**

### Question 2

Explain the role of food citizenship in supporting environmental sustainability.

**4 marks**

### Question 3

‘Food security cannot exist without food sovereignty.’

Analyse this statement.

**6 marks**

# Chapter 13

## *Sociocultural and ethical concerns*

### Key knowledge

- The key ethical principles and questions of concern to Australian food consumers, and the ways in which sociocultural and ethical concerns affect individual food choices and the range of foods available.

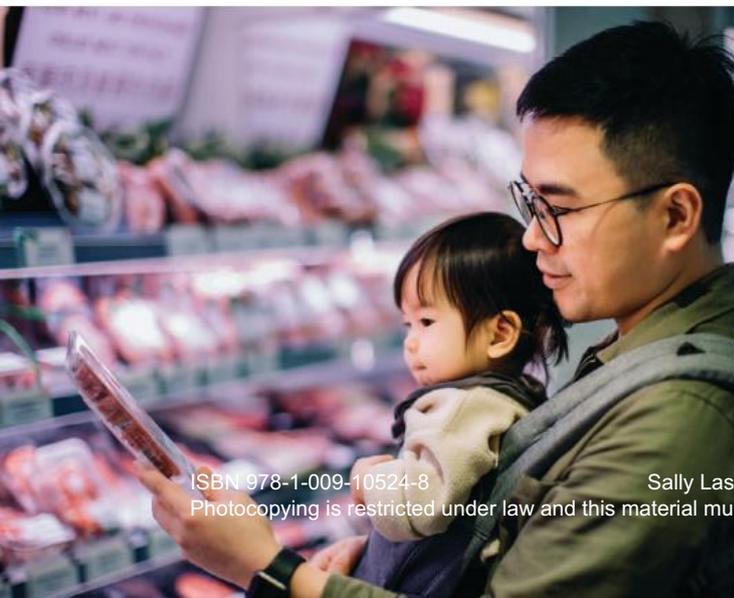
### Key skills

- Discuss sociocultural, sustainability and ethical questions and issues affecting food systems.
- Explain diverse points of view in a range of food systems debates.
- Apply a range of practical food skills to demonstrate understanding of sociocultural, sustainable and ethical food choices and preparation.

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Have you ever questioned the impact of your food choices, or considered factors that have shaped your attitudes and preferences to particular food products? Consumer purchasing power has a direct impact on the

**Figure 13.1:** When shopping for food, do you consider the impact of your choices?



food systems. Our choices and concerns influence the range of foods available and the methods in which they are produced. This chapter will explore **sociocultural** and **ethical concerns** affecting individual food choices and food availability.

**sociocultural** relates to the interaction of social and cultural elements, such as family, peers, identity, community, religion and traditions

**ethical concerns** thoughts, behaviours and decisions reflecting one's moral values in relation to what is considered right and wrong



### Let's talk

Describe what ethical food systems would look like to you.

There is growing public concern about the current state of the food systems. The increasing global population and demand on agriculture has led to **intensive farming practices**, animal welfare concerns and social justice issues. Industry and consumers must work together to make positive changes across the food systems to progress towards a more ethical supply chain.



**Get knowledge ready**

- 1 Suggest reasons why more consumers are reducing their meat consumption.
- 2 Describe cultural influences on our food choices.
- 3 Provide examples of plant-based meat alternatives.



Video 13.1 Chapter Overview

**Sociocultural concerns**

Food can be a symbol of our personal identity, social affiliations and cultural expression. Our food values, behaviours, perceptions, preferences, attitudes and practices are connected to our social and cultural identities, representing both our individuality and connection to others. These food practices often change throughout the lifespan as we are exposed to new knowledge, foods and experiences. Sociocultural food practices influence our interaction with the food systems, giving rise to specific dietary patterns, feelings and ideology.

**intensive farming practices**

removing animals from their natural habitats and social structures in order to house and confine them to small, restrictive environments



**Figure 13.2:** Consider the impact that culture and religion have on food choices and the availability of foods in Australia.



**Let's talk**

What foods have you consumed that have links to a certain culture or religion? Is there a special time of the year that these foods are eaten?



**Figure 13.3:** Sociocultural influences on food choices



### Let's talk

Consider the sociocultural influences that have shaped your food knowledge, values and identity. Have these changed over time? Discuss similarities and differences you have with your peers.

geographic region, cultural background or social group and are often formed through historical conventions and traditions. Sociocultural concerns and values can define what is considered ethical – the moral principles and meanings associated with food production and consumption. Food knowledge, movements and collective action are supported by sociocultural concerns, therefore influencing the food systems and consumer food choices.

Different cultures and social customs may encourage or oppose certain food practices, such as the consumption of particular foods. These can differ depending on

### *Ethical concerns*

Intensive food production systems can involve the exploitation of workers, cruelty to animals and damaging environmental impacts. Ethical food production considers the welfare of the people and animals within the food systems. Consumer purchasing and consumption behaviours have a direct

impact on the foods available. Depending on the action, food choices can either support ethical food production or put pressure on the food systems, which can encourage intensive agricultural practices. Ethical food consumption supports sustainable food production. This will be further explored in Chapter 14.



**Figure 13.4:** What do you think of when you consider intensive practices versus ethical food production?

## Social justice issues

Farmers and workers, both within Australia and around the world, are susceptible to human rights breaches. Labour-intensive food production systems can result in gruelling conditions for workers, inequality and unfair pay. Consumers have the power to influence the conditions that workers face, by developing their knowledge and changing their food behaviours in order to better support just food systems.

## Fairtrade

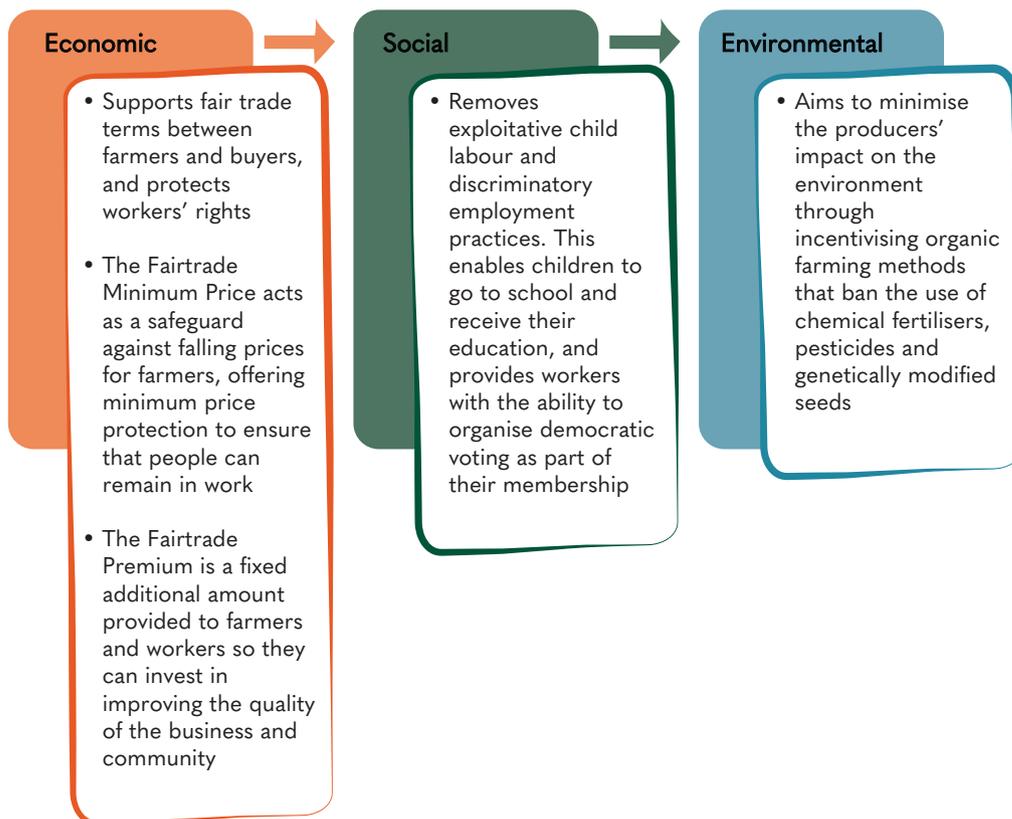
Buying Fairtrade-labelled products supports systems that meet social, economic and environmental standards. Fairtrade International aims to support small farmers in developing nations around the world. Many of these farming communities face social injustices such as unfair wages, poor working conditions and child labour.



**FAIRTRADE**  
AUSTRALIA  
NEW ZEALAND

**Figure 13.5:** The Fairtrade symbol represents a producer with their arm raised in celebration of human endeavour and empowerment, standing in front of a blue sky of potential, connected to the fresh green of new growth.

Source: Fairtrade International



**Figure 13.6:** Fairtrade Standards

Fairtrade aims to connect disadvantaged producers to fairer trading conditions. This can result in empowerment, combat poverty, remove children from labour and promote their education, grow communities and small businesses and work towards environmentally sustainable practices.

Small-scale farmers cannot compete with large multinational organisations that control several steps in the supply chain. These companies have the ability to purchase food and drink products when the market price is low, then store them until prices rise in order to make large profits. When consumers select products with the Fairtrade symbol, the small producer gets paid a fair price for their product.

The Fairtrade Minimum Price acts as a safeguard against falling prices for farmers, offering minimum price protection to ensure that people can remain in work. The Fairtrade Premium is a fixed additional amount provided to farmers and workers so they can invest in improving the quality of the business and community.

### **Intensive farming practices**

The growing population and consumer demand for meat has put a strain on the livestock industry. Meat is a global food

commodity that plays a major role in many cultural diets. Population growth is set to reach 9.7 billion by 2050; with this growth it is projected that the demand for meat could increase by 73 per cent.

Cheap meat and faster outputs result in poorer living conditions for animals. In order for intensive farming systems to meet the rising demand for meat, high-density stocking occurs, confining animals to smaller spaces as they are selectively bred to optimise growth rates.

The World Organisation for Animal Health provides guiding principles to outline society's expectations for the conditions animals should experience under human control. According to the World Organisation for Animal Health, animals should have:

- 'freedom from hunger, malnutrition and thirst;
- freedom from fear and distress;
- freedom from heat stress or physical discomfort;
- freedom from pain, injury and disease; and
- freedom to express normal patterns of behaviour' (World Organisation for Animal Health, 'Animal Welfare').

#### **Activity 13.1 (Inquiry): Antibiotic-resistant bacteria**

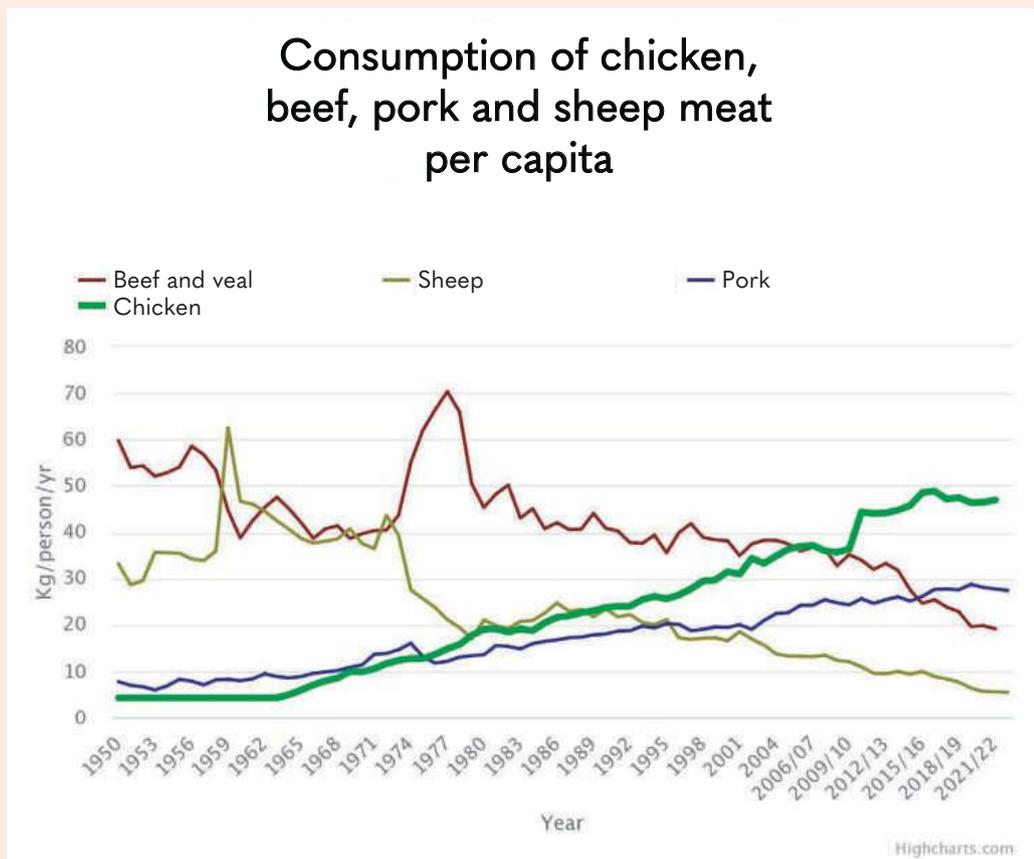


The potential overuse of antibiotics within intensive farming practices could lead to antibiotic-resistant bacteria. Research how this can occur and describe the health risks to humans and animals of antibiotic-resistant bacteria.



**Figure 13.7:** Intensive farming practices

Activity 13.2 (Data analysis): Per capita consumption of meat



**Figure 13.8:** Graph sourced from the Australian Chicken Meat Federation Inc. Source: The Australian Chicken Meat Federation Inc. (ACMF)

- 1 Approximately, how many kilograms per person did the average Australian consume in 1950 compared to 2021/22 of the following four meat varieties?
  - a Beef and veal
  - b Sheep
  - c Pork
  - d Chicken
- 2 Outline changes to meat consumption within the last 10 years.
- 3 Suggest reasons why red meat consumption is declining.
- 4 Discuss whether the data in Figure 13.8 reflects your own household’s meat consumption.

Intensive farming practices often do not align with these principles, putting the animals under undue stress. Animals are confined to small, restrictive environments and cannot express their normal social and physical behaviours.

### Poultry and egg production

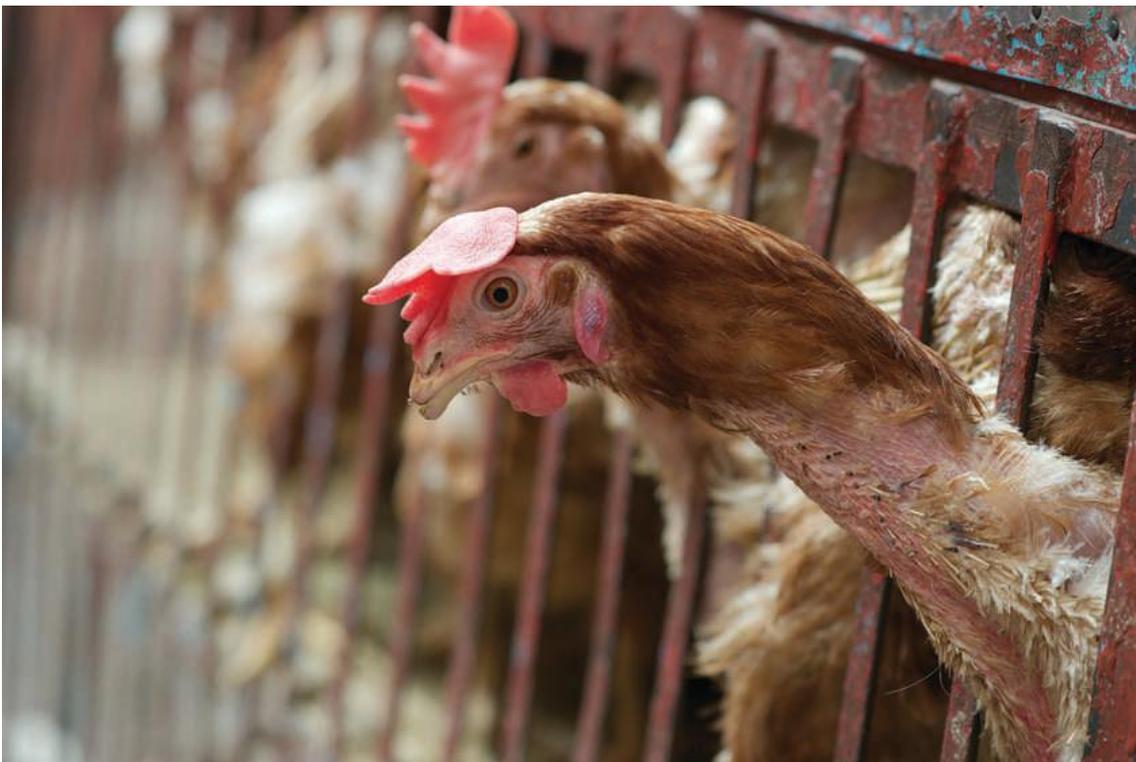
Australians love their poultry, with chicken meat being the most consumed animal product in Australia.

Egg consumption continues to rise. Australians consume approximately 17.3 million eggs every day, equating to 14.4 kilograms of egg per person, each year.

The living conditions for chickens and laying hens differ greatly depending on the type of agricultural production system they are in.



**Figure 13.9:** Chickens in battery cages



**Figure 13.10:** Debeaked chicken with loss of feathers



**Figure 13.11:** Chickens in a poultry barn

**Figure 13.12:** Free-range chickens



**Battery cages**

Chickens confined in battery cages have little physical movement. They are kept in crowded cages that prevent them from expressing their normal behaviour patterns, such as foraging, dust-bathing or nesting. They cannot stretch their wings or go outside. Due to extreme distress, chickens can peck at each other, causing skin and plumage damage. To mitigate this, their beaks are trimmed at hatcheries, which can cause acute and chronic pain. Caged eggs equate to approximately 40 per cent of supermarket egg purchases in Australia.

**Poultry barns**

Commercial chicken meat predominantly comes from large poultry barns. These farms are comprised of several barns that are used to house chickens. Barn-laid eggs, sometimes marketed as cage-free eggs, are produced in large-scale sheds. These practices allow chickens and hens to wander freely within the shed as they are not confined to cages.

The birds can roam freely, socialise and perch within the climate-controlled environment, but they cannot go outside and are still subjected to high-density housing.

Barn-laid eggs are more expensive than caged varieties due to the increase in land and veterinary care needed. There are greater occurrences of manure-borne disease in poultry barns due to density and housing conditions.

**Free-range**

Free-range poultry and egg farming enables the birds to access the outdoors during the day, and they are securely housed at night. To be classified as free-range, chickens must be allowed regular access to the outside during daylight hours. Free-range practices enable normal patterns of physical and social behaviours among the birds.

Federal legislation was enacted in 2018 to provide consistent modes of practice for what is considered 'free-range'. The voluntary standard must ensure that chickens and hens have easy access to open outdoor ranges for at least eight hours a day, and density limits cannot exceed 10 000 birds per hectare. Many producers, consumers and activist groups are against the density code due to the limited space it provides chickens. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) Model Code of Practice for the Welfare of Animals states guidelines should be set at 1500 hens per hectare, providing 6.6 square metres of space per bird.

**Let's talk**

Discuss reasons for and against altering the density limits for free-range farming. Identify ways consumers can determine the density limits of free-range eggs.

**Activity 13.3 (Case study):  
Honest Eggs Co.**

**- REGENERATIVE FARM EGGS -**

Moved weekly to fresh pastures.

Honest Eggs Co. is committed to providing eggs with 100 per cent transparency. Real farm, real chooks, real farmers. Located in Yandoit, near Daylesford in Victoria, the business aims to regenerate the land, support the local community and improve animal welfare standards.

Visit the Honest Eggs Co. website and summarise the dozen ways the company is changing egg farming for a more sustainable and ethical future.



**Figure 13.13:** Federal legislation ensures that free-range density limits do not exceed 10 000 birds per hectare. Some free-range farms operate on the CSIRO Model Code of Practice, with limits set to 1500 hens per hectare.

Source: *Free-Range Eggs: Making the Claim Meaningful*, 2015: CHOICE

**Organic**

Organic poultry meat and egg production must comply with guidelines set by Australian Certification Standards. These systems ensure that animals are raised in free-range environments, without the use of antibiotics, added growth hormones or growth promotants.

This promotes more natural systems where chickens have sufficient space to carry out

their normal behaviours, such as foraging, ground scratching, dust bathing and perching. Free-range and organic systems provide animals with greater space, but this comes at a cost. The price variation between intensive-farming and organic products differs greatly, therefore making it hard for consumers to align their values with their purchasing abilities.

**Activity 13.4 (Inquiry): Egg production systems**



There are advantages and limitations to each egg production system. This can relate to the animal, farmer and consumer. Copy and complete the table by describing the variety of eggs available.

	Description	Advantages	Limitations
Caged eggs			
Barn-laid eggs			
Free-range eggs			
Organic eggs			

**Pork production**

According to the Sustainable Table, over 90 per cent of pork production within Australia comes from intensive farming practices (Sustainable Table, 'All things ethical eating', 2022). These systems prevent pigs from expressing their normal behaviour patterns.

When pregnant sows are allowed to birth in natural environments, they seek a safe place to create a nest. In intensive farming practices, sows are forced into sow stalls or farrowing crates. These conditions can lead to stress, injury and abnormal behaviours among pigs.



**Let's talk**

Why do pigs have a reputation for being dirty when in fact they are considered to be very clean animals?

Pigs are social and intelligent animals, but when held in captivity they respond in aggressive ways such as grunting and neck biting. Teeth clipping and tail docking occur shortly after birth to minimise the damage caused by pigs biting in high-density farming systems.

**Figure 13.14:** An unnatural environment for this sow and her piglets



**Activity 13.5 (Inquiry): Sow stalls** ?

The Australian pig industry is committed to phasing out sow stalls and instead utilising farrowing crates. Complete an online investigation to discuss the reasons why sow stalls are considered an unethical practice.

Free-range pork production enables pigs to access outdoor paddocks, as well as providing shelter for the animals. Free-range farms enable natural social and physical behaviours. However, the pigs are at greater exposure to predators and environmental extremes such as weather conditions and sun damage.



**Figure 13.15:** Free-range pigs and piglets in a natural environment

### Feedlots

Australian cattle spend the majority of their lives on pasture. They feed on grass and hay bales throughout the day in open paddocks. A large proportion of cattle are sent to feedlots before slaughter. These are yarded areas where cattle are held in close confinement and are fed grains.

The purpose of feedlots is to accelerate growth in the final stages of agricultural production. These production systems can be beneficial in dry seasons, when pasture is unavailable. Farmers are still able to produce cattle, as they can feed them on a high-grain diet. Ethical concerns with feedlot systems surround the lack of shade, density limits and concerns about waste management and excessive methane production.



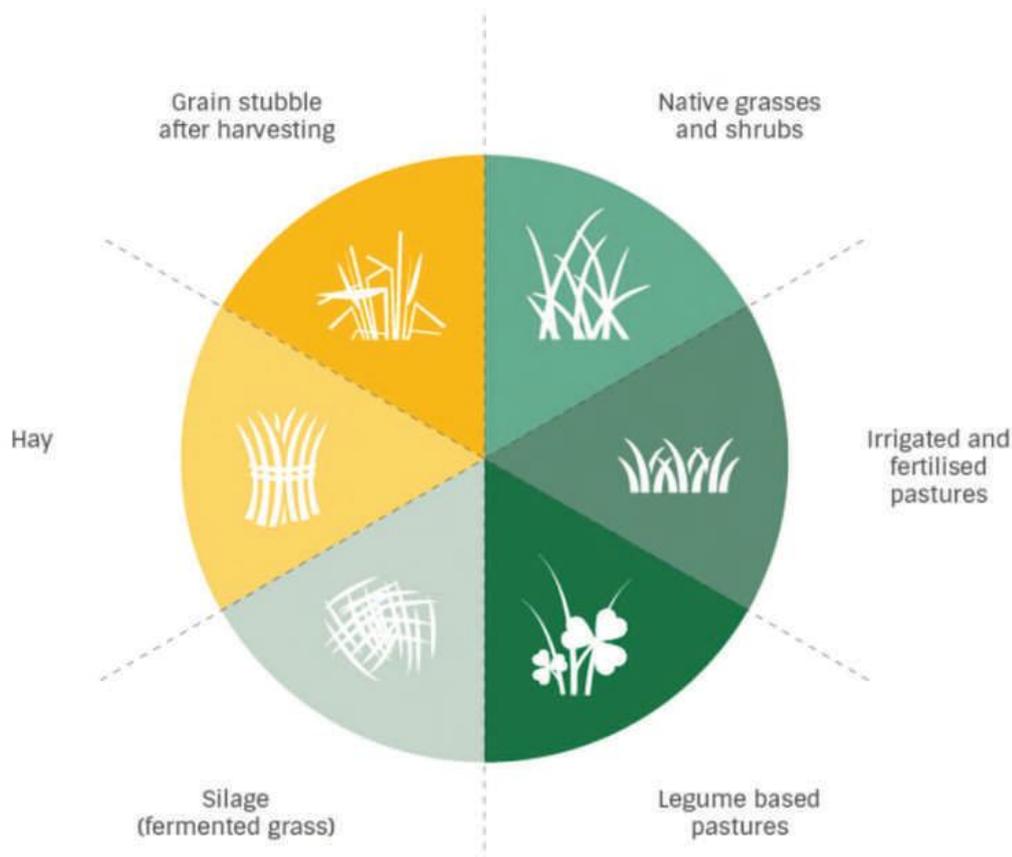
**Figure 13.16:** Cattle crowded into a feedlot

Pasture-fed cattle spend their entire life on grass and hay. They spend their life on open pastures and are not confined to intensive feeding systems before they are sent to slaughter. Growth rates tend to be slower in grass-fed cattle compared to grain-fed cattle.

Limitations of grass-fed agricultural systems include:

- reduced speed of production
- slower growth rate
- greater impact from environmental conditions such as drought and extreme weather.

## Types of grass feed in Australia



**Figure 13.17:** Types of grass feed in Australia

Source: Meat and Livestock Australia (MLA): "What is the difference between grassfed and grainfed meat?"

### Activity 13.6 (Case study): Braelands Beef & Lamb



Braelands Beef & Lamb is a family owned and operated business located in the Pentland Hills, an hour west of Melbourne. The family has been growing beef since 1878, and started selling beef and lamb direct to the public in 2009. The company strives to bring high-quality grass-fed, hormone-free, ethically raised beef and lamb to the consumer. Louise Abey is a fourth-generation beef farmer who manages the family farm and boxed meat delivery service.

The aim of the company is to provide a paddock-to-plate service of high-quality produce. They pride themselves on producing meat in an environmentally sound and ethical manner. There is now greater interest in knowing that livestock is treated well in an ethical and low-stress environment. The company believes the finest quality of meat comes from animals that are well cared for.

'When you purchase our product, you buy direct from the farmer who produced it, you can rest assured that your beef and lamb has been respected and had a happy, low stress life. You also support local farmers and small, family-run Australian business (us, our meat-works and butcher), and thus our local community.'

*Adapted from source: Braelands Beef & Lamb, 'The farm'*



**Figure 13.18:** Braelands Beef & Lamb has been raising beef in the Pentland Hills west of Melbourne since 1878.

*Source: The Farm – Braelands Beef*

### Questions

- 1 Describe the term 'paddock to plate'.
- 2 Outline the difference between grass-fed and grain-fed cattle.
- 3 State reasons why raising grass-fed and hormone-free livestock is considered more ethical than using intensive farming practices.

## *Innovations in meat alternatives*

Sociocultural concerns with the livestock industry, such as animal welfare, environmental impact and cost, have resulted

in the growing market of plant-based meat alternatives and cellular agriculture. Such products aim to satisfy cultural, social and economic drivers while aligning with consumers' values.



**Figure 13.19:** Meat alternatives come in many forms, just like meat.

### Plant-based meat alternatives

Plant-based meat products provide sustainable and ethical alternatives to livestock. Consumers still want to enjoy meat-style products, such as sausages, hamburgers, mince and schnitzel, but they want to do so in a manner that aligns with their concerns and values.

Consumer demand has resulted in a greater range of plant-based food products. It is projected that the sales of these meat alternatives could top \$3 billion annually by 2030. This could mean big business for the Australian food systems. Australia’s agricultural capacity and sociocultural influences could lead

**Figure 13.20:** Vegetarian steaks are popping up in supermarkets, but how do manufacturers replicate the taste of beef in products made with pea, soy, black bean, sweet potato or beetroot protein? Think about the processing that goes into products like these.



to the nation becoming an international leader in plant-based meat production and sales.

These meat alternatives reduce the amount of greenhouse gas emissions and carbon footprint compared to the livestock industry by roughly half. However, due to the high amount of processing that occurs to produce these products, their emissions are approximately five times higher than unprocessed vegetables. Processing of plant-based meat alternatives can also result in high sodium levels, as salt is used for preservation and flavour. Consumers should read the nutrition information panels on products to ensure that they are not consuming excessive amounts of salt.

Plant-based meat alternatives can come at a cost. Due to processing requirements and unique ingredients used to create a sensory profile similar to meat, they are often more expensive compared to their meat-based alternatives. The price difference can be upwards of 49 per cent more expensive than conventional meat. This price point may be inaccessible to some consumers. Purchasing whole foods and creating meat-alternative products at home with a range of vegetables can be a cheaper and healthier alternative that aligns with consumers' values.

### Activity 13.7 (Practical): Mince product analysis



Beef mince is a common product used in a variety of recipes. Agricultural practices can differ in cattle farming, from the use of feedlots to grass-fed cattle and organic farming. Alongside the beef options are a range of plant-based mince alternatives.

Complete a product comparison by researching the cost and nutritional properties of two beef mince and two plant-based mince alternatives per 100 g.

- 1 Identify the price difference between the four products.
- 2 Record the data of the four nutrition information panels per 100 g.
- 3 Analyse the nutrition information panels and evaluate which is the better choice for maintaining a healthy weight.
- 4 Discuss factors that may contribute to people purchasing the four mince products.
- 5 In pairs, design a practical activity comparing one plant-based alternative to one of the beef mince options.
  - a Identify which product took the longest to cook.
  - b Describe the sensory properties of the two mince products.
  - c Construct a star diagram to evaluate the characteristics of the two minces.
- 6 Design and create your own meat-alternative mince and compare your product to the store-bought varieties.

## Cellular agriculture

Innovations in technology have scientists, chefs and entrepreneurs from around the world cultivating meat from animal cells, without the need for farming. Cellular agriculture enables the growth of food from animal cells through a process that mimics the biological growth within an animal. These cultivated cells are identical to conventional animal products at a cellular level.

Cellular technology has seen the production of animal products such as beef, poultry, pork and seafood. Even KFC has jumped on board, partnering with a 3D bioprinting company with the intention to produce 3D printed chicken nuggets in its Russian franchises.

Cellular agriculture can also produce acellular products, which are composed of organic molecules rather than cells. Eggs, cheese and milk are examples of animal products that can be replicated using acellular agriculture.

**Activity 13.8 (Debate): Cellular agriculture**

There is great debate over the merits of lab-grown meat. There are conflicting views about the ethics of this scientific innovation as well as projected environmental costs.

Research and Discuss points for and against cellular agriculture.

**Let's talk**

The first cultured 'meat' burger took several years and approximately \$400 000 to produce. How much would you be willing to pay for a lab-grown burger?

## Activity 13.9 (Case study): Vow



Source: © 2020 Vow Group Pty Ltd

Vow is an Australian lab-based meat company located in Sydney. Its mission is to produce cellular meat that is not only sustainable, but is delicious. It only takes six weeks to develop cells into a plated product. The reduction in breeding and killing animals for human consumption can be a sustainable pathway to feed a growing population, preserve Earth's resources and protect animal welfare.

Vow's research aims to tap into previously unexplored food species, opening up new meat options beyond beef, pork, lamb and poultry. This cellular agriculture could 'domesticate' unconventional exotic animals such as tortoise, lion and zebra.

Are you ready for what the future holds?

Consumers' sociocultural and ethical concerns will influence their position on cellular agriculture. Discuss points for and against growing the meat of exotic animals.

## Activity 13.10 (Practical): Modified recipe design task



Your good friend is coming for dinner and you are excited to showcase your practical production skills. You have decided to make creamy pesto pasta for the main course and pavlova for dessert.

Before heading off to the shops, you text them to check they are happy with your choice. They call back to say they are very excited for dinner, but to your surprise they inform you that they are vegan.

Your challenge is to modify your original recipes to produce a similar product that can be consumed by your friend.

# Creamy pesto pasta

Serves 2

## Ingredients



1 cup fresh basil leaves



2 tablespoons pine nuts



¼ cup grated parmesan cheese



2 garlic cloves



¼ cup extra virgin olive oil



1 teaspoon olive oil



2 strips shortcut bacon, diced



1 brown onion, sliced



½ cup heavy cream



1 teaspoon salt



250 g pasta

## Method

- 1 In a food processor, pulse the basil, pine nuts, cheese and garlic. With the processor running, slowly add the extra virgin olive oil in a steady stream. Season with salt and pepper to taste and set the pesto aside.
- 2 Heat the olive oil in a frying pan over a medium heat. Add the bacon and onion. Cook until the onion is translucent and the bacon has lightly browned.
- 3 Reduce the heat to low and stir in the cream and pesto. Stir until the sauce is combined and thickens slightly.
- 4 Meanwhile, add the pasta to a large saucepan of boiling salted water. Cook the pasta in the boiling water until al dente.
- 5 Add the cooked spaghetti to the sauce and mix.
- 6 Serve the pasta and garnish with the basil leaves.



# Pavlova nests with cream and mixed berries

Makes 4 nests

## Ingredients

### Meringue



3 egg whites



¼ cup caster sugar

### Filling



¼ cup cream



1 tablespoon sugar



125 g fresh berries

## Method

- 1 Preheat the oven to 120°C.
- 2 Line 2 baking trays with baking paper.
- 3 Using a pen, draw two 10 cm circles onto each tray.
- 4 To make the meringue mixture, place the egg whites into a small, dry bowl.
- 5 Using an electric beater, beat the egg whites to form soft peaks.
- 6 Gradually add the sugar, beating well after each addition.
- 7 Continue beating until thick and glossy stiff peaks have formed. Be careful not to over-beat.
- 8 Place the meringue mixture into piping bags. Pipe the meringue over the base of the circle on the tray. Pipe the remaining mixture around the edge of the base to form a wall.
- 9 Bake for 30 minutes until crisp. Remove from the oven to cool.
- 10 Prepare the filling by beating the cream and sugar until a stiff peak has formed.
- 11 Wash and hull the berries.
- 12 To serve, divide the cream filling between the four nests and decorate with the berries.



### Evaluation questions

- 1 a Copy and complete the table by stating the modifications made to each ingredient.
- b Justify each modification with reference to the physical properties of the foods.

Original ingredient	Modification	Justification
Parmesan cheese		
Bacon		
Heavy cream: pasta		
Eggs		
Cream: pavlova		

- 2 Identify and describe sociocultural factors that may contribute to the popularity of pasta and pavlova in Australia.
- 3 Discuss sociocultural and ethical concerns that may influence a person in following a vegan diet.
- 4 Explain why the unmodified pasta recipe would be considered an 'only sometimes and in small amounts' food.
- 5 Analyse the nutrition information panels provided in the table and discuss reasons why plant-based foods are not necessarily always the better choice for maintaining a healthy weight.

	Plant-based bacon alternative – per 100 g	Shortcut bacon – per 100 g
Energy	987 kJ	607 kJ
Protein	14.1 g	16.1 g
Total fat	16.8 g	8.6 g
Saturated fat	3 g	4.1 g
Carbohydrates	7 g	<1 g
Sugars	1.2 g	<1 g
Sodium	530 mg	1010 mg

## Chapter revision

- Food is a symbol of our personal identity. Our food values and behaviours are connected to our social and cultural identities.
- Ethical concerns arise with regard to food production. Ethical food production considers the welfare of the people and animals within the food systems.
- Sociocultural and ethical concerns with the livestock industry, such as animal welfare, environmental impact and cost, have resulted in the growing market of plant-based meat alternatives and cellular agriculture.
- Innovations in technology have scientists, chefs and entrepreneurs from around the world cultivating meat from animal cells, without the need for farming.
- Purchasing whole foods and creating your own meat-alternative product at home with a range of vegetables can be a cheaper and healthier alternative while still aligning with consumers' values.

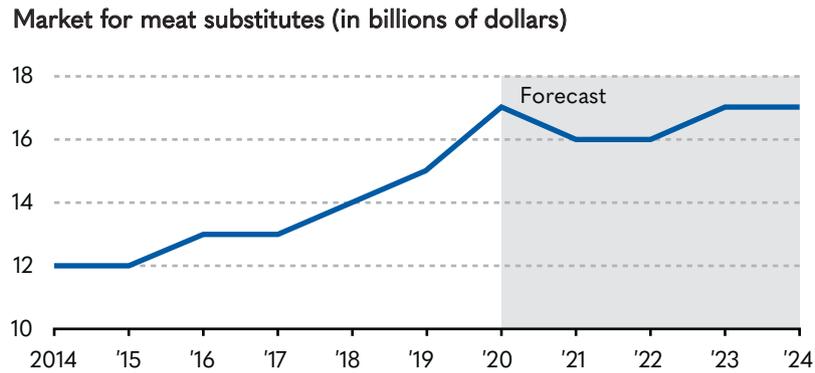
### Apply your knowledge

- 1 Explain how the Australian Guide to Healthy Eating is accessible for those who follow a vegan diet.
- 2 Suggest practical guidelines for consumers who wish to become more ethical in their food consumption.
- 3 Explain why plant-based meat alternatives may not be considered the better choice compared to whole foods.
- 4 Describe the difference between intensive farming and free-range practices.
- 5 Explain ethical concerns with cellular agriculture.
- 6 The types and amounts of animal products we purchase and consume are impacted by a range of sociocultural concerns. Supermarkets cater to a diverse range of consumers, offering plant-based alternatives, meat produced through intensive livestock production, free-range meat and organic products. Discuss how sociocultural concerns affect individual food choices when selecting the type of meat products and/or plant-based alternatives.

## Practice exam questions



### Question 1



**Figure 13.21:** Graph sourced from the *APAC alternative protein industry report 2021*, p. 013  
Source: Green Queen Media: APAC Alternative Protein Industry Report 2021

Explain how sociocultural concerns may have contributed to a trend in the data in Figure 13.21.

**4 marks**

### Question 2

Discuss the advantages and limitations of intensive farming practices.

**4 marks**

### Question 3

‘Cage-free eggs are the most ethical choice.’

Evaluate this statement.

**6 marks**

# Chapter 14

## *Environmental sustainability*

### Key knowledge

- The environmental sustainability of primary food production in Australia, including use of fertilisers, pesticides and water, choices of crops and animals for farming, and risks associated with biosecurity, climate change and loss of biodiversity.
- The environmental effects of food processing and manufacturing, retailing and consumption in Australia, including food packaging, food transportation, marketing, retailing, food service, and consumption and disposal or recycling and repurposing of food.

### Key skills

- Examine an array of issues and evaluate pathways to improve environmental sustainability within the food systems.
- Apply principles of research to clarify, analyse and draw conclusions on a selected food debate.

VCE Food Studies Study Design extracts © VCAA reproduced by permission

Our food supply needs to be available now and in the future. It is important that as food citizens we are critically aware of the food we are purchasing and consuming, being conscious of the implications our food production and consumption have for the environment. In order to have **sustainable** food systems, we need to ensure that farmers are utilising ecological agricultural practices and that we are supporting these actions by purchasing their products over others. By understanding the environmental issues of food production and supporting sustainable practice, we are making good food choices. By focusing on **environmental sustainability**, we are ensuring that these resources are available now and in the future.

### Get knowledge ready

- 1 State examples of how our food systems in Australia are sustainable.
- 2 Outline how food waste occurs in retailing and consumption.
- 3 Describe how food might be repurposed.

### **sustainable**

to be able to be continually used without depleting; something that can be ensured for both current and future generations

### **environmental sustainability**

concerned with whether environmental resources will be protected and maintained for future generations



Video 14.1 Chapter Overview

### Activity 14.1 (Inquiry): How aware are you?



- 1 Research issues relating to the environmental sustainability of primary food production and environmental effects of food processing and manufacturing, retailing and consumption in Australia.
- 2 Suggest any solutions or pathways you are aware of that improve environmental sustainability within our food systems.

## Primary food production

All of our primary food production relies on our environment. Crops, livestock, fish – they all need the nutrients the environment provides to be bountiful and ensure a continuous supply. Our methods of primary production have changed throughout the centuries, with some approaches causing environmental damage, and others being more sustainable.

#### pesticide

a chemical substance used in agriculture to kill pests

#### fertiliser

a substance that provides nutrients to help plants grow or improve soil and is used to produce more crops

#### soil acidification

a process where soil pH decreases to the detriment of many plants that best grow in a specific range

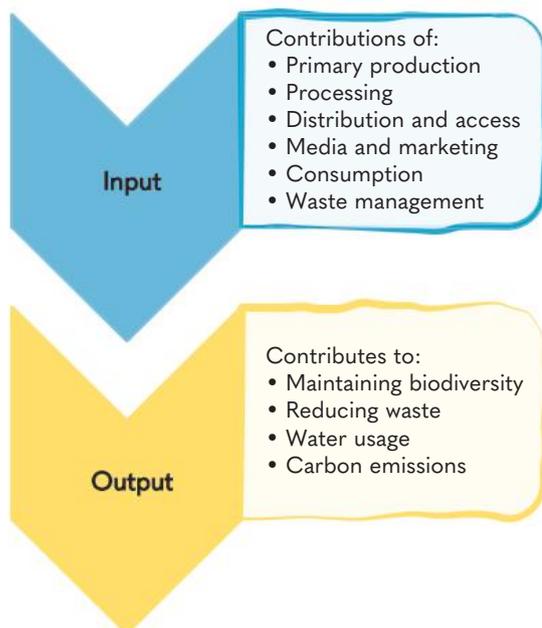


Figure 14.1: The focus of environmental sustainability

## Use of fertilisers and pesticides

Chemicals are commonly used in primary food production to control insects, moulds, fungi and weeds. While they are not always needed or used by some farmers, they maximise product yields, reduce waste and can increase profits for farmers.

Chemicals used in farming include **pesticides** and **fertilisers**. Poor management or overuse of chemicals such as fertilisers can increase **soil acidification**. If they are not carefully applied, they can cause spray drift, which can contaminate nearby crops and communities.

Overuse of chemicals or poor management of fertilisers and pesticides can lead to run-off into waterways or being washed off by rain, causing contamination, killing wildlife and encouraging the growth of algae.

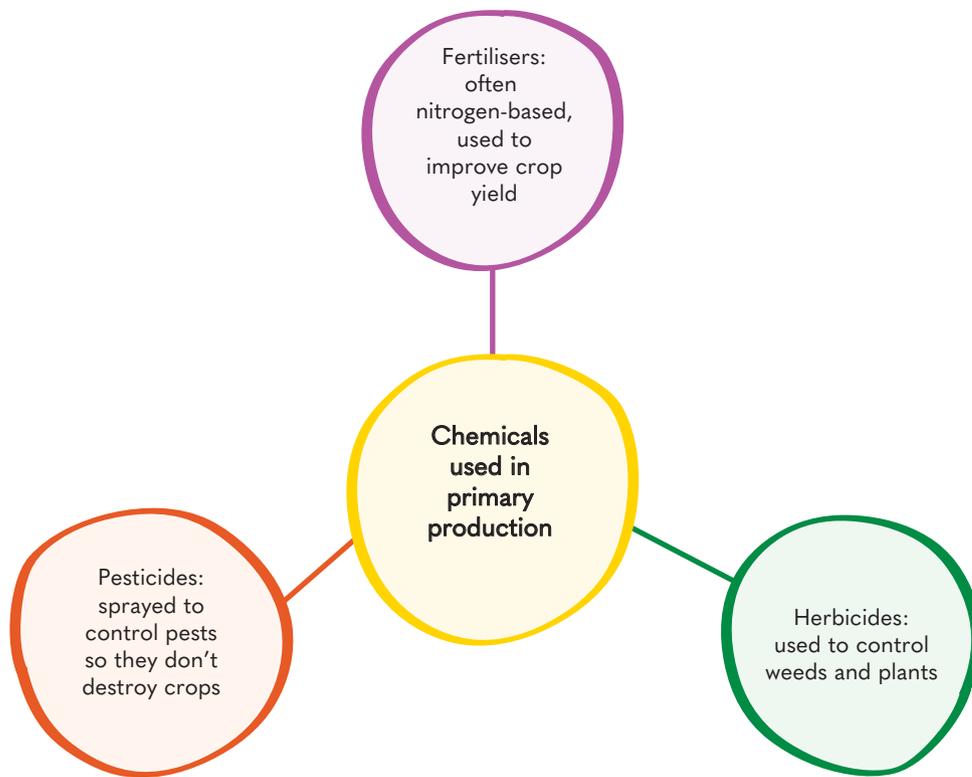


### Let's talk

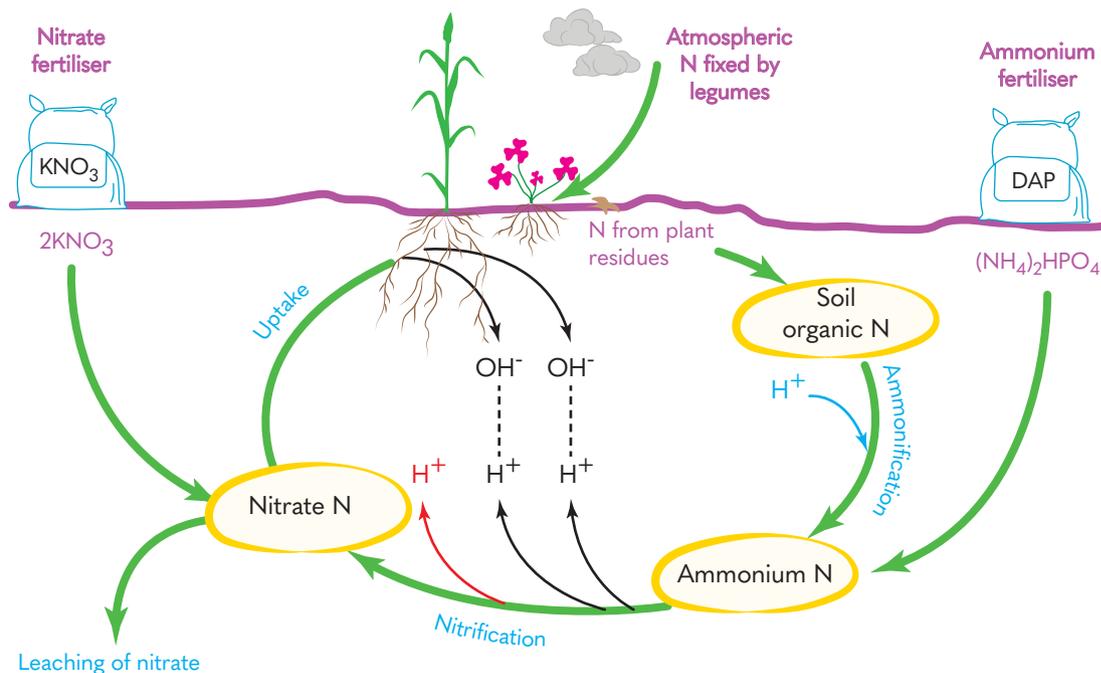
Discuss why many farmers use fertilisers. Why may they choose not to use fertilisers?

Discuss the reasons why you think consumers care about this issue.

The misuse of chemicals can have a significant impact for environmental sustainability. One of the most significant contributors to soil acidification is the use of fertilisers, especially as excess nitrogen is leached into the soil rather than taken up by plants, changing the pH of the soil. This process can affect both the surface soil and the subsoil. Acidic soils may lead to a dramatic decline in crop production and soil health.



**Figure 14.2:** Chemicals used in primary production



**Figure 14.3:** How fertilisers can lead to soil acidification. It is the  $\text{H}^+$  ions that are responsible for the decreasing pH.  
 Source: Government of Western Australia, Department of Primary Industries and Regional Development, Agriculture and Food division, "Causes of soil acidity"

**Figure 14.4:** Consequences to environmental sustainability of chemical overuse



**Figure 14.5:** Crops can be sprayed with fertilisers and herbicides using tractors and air-borne crop dusters. One challenge of using aerial spraying is the risk of spray drifting onto other crops or farms. One way to try to reduce this is to spray on days with very little to no wind.



**Figure 14.6:** Fertiliser and pesticide run-off into waterways causes algae outbreaks.



Strategies for reducing environmental impact from overuse of fertilisers and pesticides include:

- **Reducing overuse of chemicals (herbicides/pesticides)** – This reduces the damaging chemical run-off into waterways that kills fish or encourages the growth of algae. But how does a farmer just ‘use less’? Sustainable farming strategies need to be put in place that allow for a reduction in the use of chemicals. Such strategies could include using farm technology that employs new techniques allowing for the monitoring of soil and crop health. Robotics in agriculture is a new technology that has the potential for

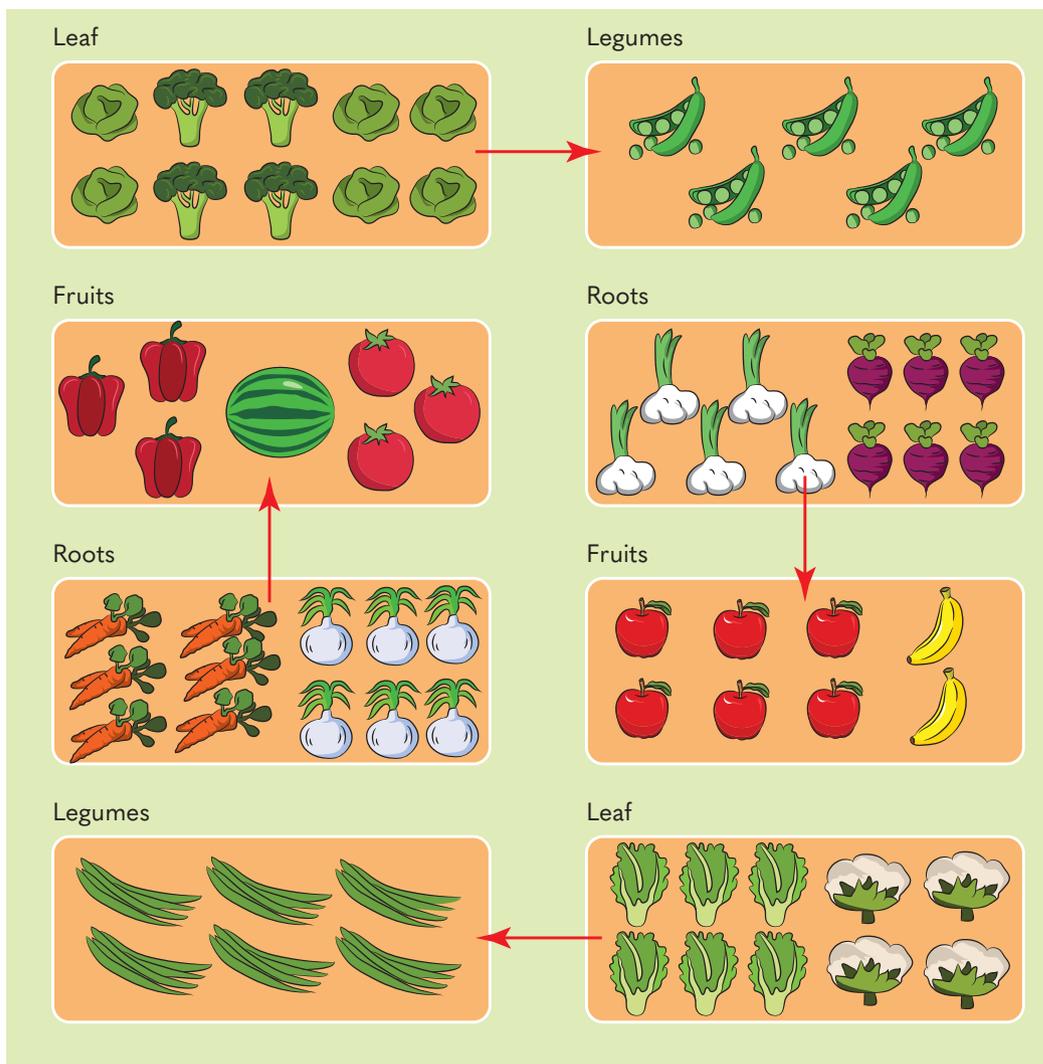
farmers to monitor crop growth at a rapid pace and detect weed formation, remove the weed and keep it under control.

- **Crop rotation** – Crop rotation involves growing different crops on the same land each year. This helps to improve soil fertility, because different crops use different nutrients from the soil, and others actually add nutrients. This also helps to control weeds, pests and diseases. This provides the soil with a chance to renew and avoids draining the natural nutrients from the soil, maintaining soil for future, sustainable, long-term use. This reduces the overuse or need for fertilisers, as soil health can naturally renew.

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**crop rotation**  
the growing of different crops on the same land each year, improving soil fertility and helping to control insects and diseases

---



**Figure 14.7:** Crop rotation is the practice of growing different types of crops in sequence across growing seasons.

- **Using land-based spraying methods –**  
These methods include hand or tractor spraying, which ensure that the spray makes direct contact with the plant, rather than aerial spraying, where the wind can carry the spray beyond the crop, contaminating nearby crops and land.

### Pathway for improvement: organic farming

**Organic farming** involves the growing, production and processing of foods without the use of any fertilisers, pesticides, antibiotics or genetic modification. Organic foods are becoming more popular with consumers. Farmers’ markets selling organic produce are held in many regions throughout Australia and the availability of organic products in supermarkets is increasing each week.

**organic farming**  
farming practices that produce food without the use of artificial chemicals



#### Let's talk

What organic foods have you eaten? Why might people prefer organic products?

**land degradation**  
a deterioration in the quality of the land until it may no longer be able to be used. This can be the result of water use, land clearing, soil erosion or overuse of land for cropping

### Activity 14.2 (Inquiry): What's the cost?



Compare the cost difference between an organic and a non-organic food product such as bananas.

Copy and complete the table to compare the two products, then answer the questions that follow.

Product	Cost per 100 g
Organic	
Non-organic	

- 1 State which product was the most expensive. Suggest why this is the case.
- 2 Outline two benefits of organic farming for producers.
- 3 List two disadvantages of organic farming for producers.
- 4 Evaluate organic farming methods as a pathway for environmental sustainability.

### Activity 14.3 (Inquiry): Organics



Evaluate organics as a pathway to improve environmental sustainability within the food systems.

- 1 Start by unpacking the strengths and limitations of this as a solution.
- 2 Make a final judgement or conclusion and justify your response with evidence.

There are a number of benefits of organic farming. These include:

- using no synthetic chemicals at all in primary production; there is no damaging run-off into waterways causing pollution, killing water life or encouraging the growth of algae
- minimising pollution
- encouraging natural pest control from birds and insects
- minimising the impact on biodiversity.

### Land degradation

**Land degradation** is when there is a deterioration in the quality of the land until it may no longer be able to be used. This can be the result of misuse of chemicals, water use, land clearing, soil erosion and overuse of land for cropping.

Land degradation can impact on environmental sustainability due to:

- the loss of nutrients in the soil and soil exhaustion from overuse of land and lack of crop rotation, leaving land unproductive. It is very challenging to get exhausted land to return to its former productive condition.
- soil erosion. When land is cleared to make space available for stock or crops, the soil, which is held in place by the roots of the plants and trees, loosens and topsoil is lost due to water and wind erosion.
- increased salt in the water table, bringing natural salts to the surface. The salt in the soil makes it very difficult to grow plants and creates unproductive land and a reduction in land available for farming.



**Figure 14.8:** Issues related to land degradation

A number of important strategies can be put in place to ensure the effective use of chemicals and reduce the environmental issues associated with land degradation.

These include:

- **Reducing the amount of chemicals (herbicides/pesticides)** – This reduces the damaging chemical run-off into waterways that kills fish or encourages the growth of algae.
- **Using land-based spraying methods** – These methods include hand or tractor spraying, which ensure that the spray

makes direct contact with the plant, rather than aerial spraying, where the wind can carry the spray beyond the crop, contaminating nearby crops and land.

### Use of water

Water usage is an issue affecting all Australians, but it is a significant problem for many involved in primary production. Crops and stock cannot be produced without the use of water, and for many farmers access to water is an increasing problem.



**Figure 14.9:** Water used in primary production can be supplied from a range of sources, including rivers, dams, channel and pipe systems, water tanks and groundwater supplies.

 **Let's talk**  
Why is drought an issue in Australia?

 **Let's talk**  
Most of the grain production in Australia uses dryland farming systems. Suggest what you think this is and then research to see if you were right.



**Figure 14.10:** Environmental consequences of the overuse of water

Farmers have to use irrigation to be able to water crops and provide water for their stock. However, the misuse of water can

cause damage to the environment and have long-term implications for the farmer and the viability of the land.

## Irrigation

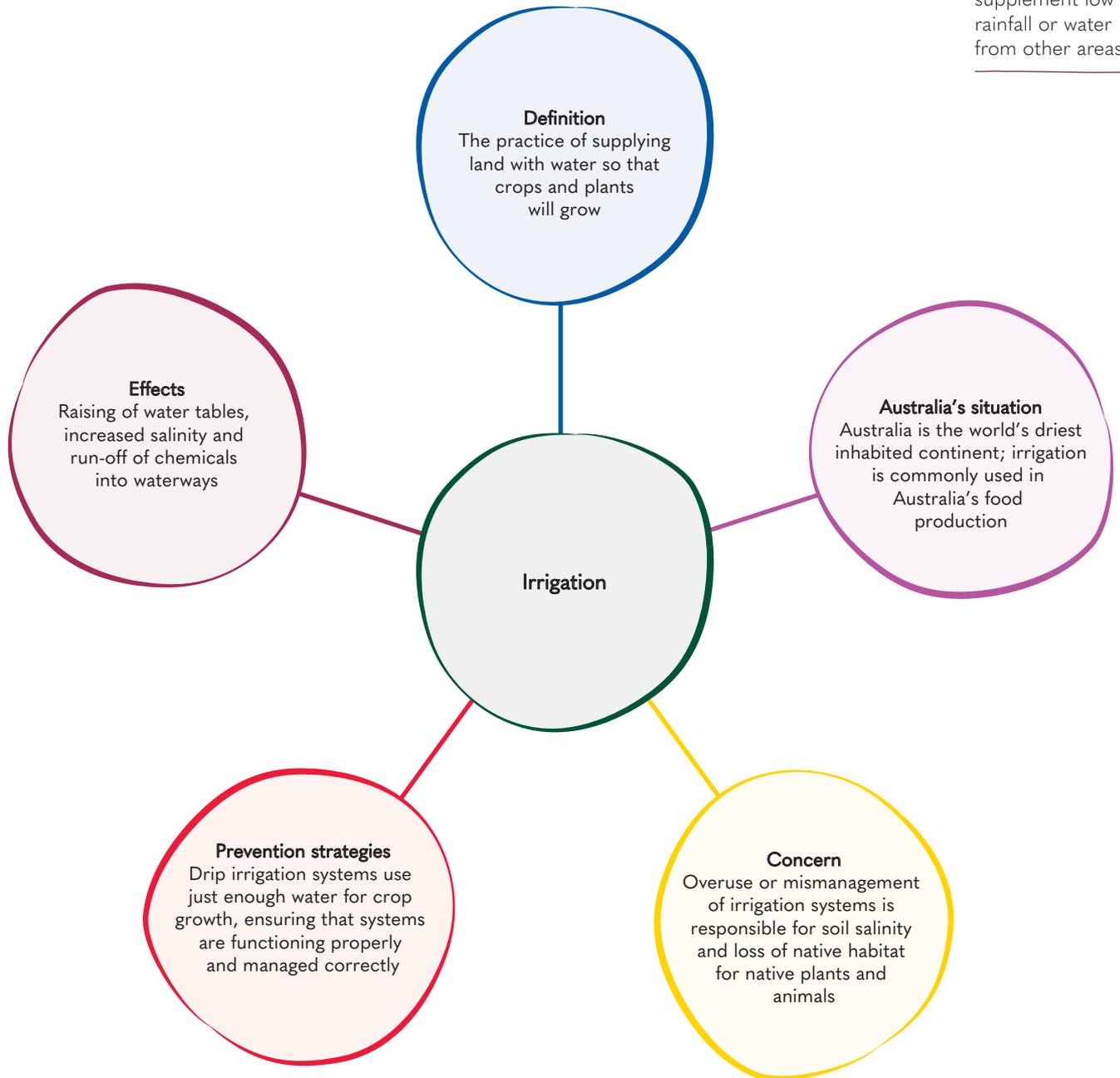
**Irrigation** is a system used to water crops to supplement low rainfall or water from other

areas. It is a reliable way to ensure that crops receive regular and much-needed water for food production.

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**irrigation**  
a system used to water crops to supplement low rainfall or water from other areas

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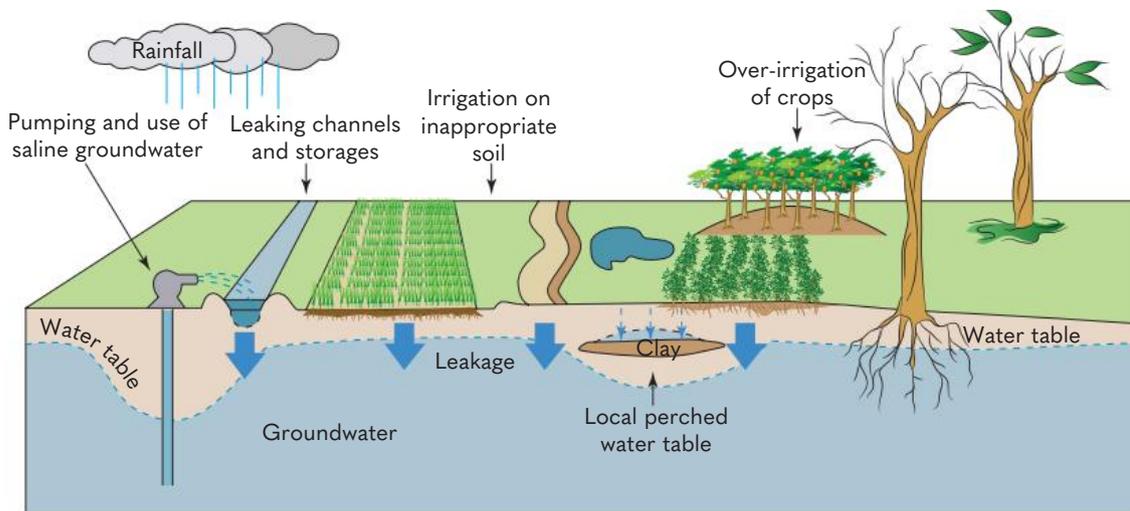


**Figure 14.11:** Issues related to irrigation.

### Issues of irrigation

About 40 per cent of water used to irrigate crops is lost through seepage and evaporation. Poor management of

irrigation can lead to the rising of the water table, increasing salinity and reducing the productivity of the land.



**Figure 14.12:** The water table plays an important part in irrigation.

Strategies for effective water use and reduction of environmental issues include:

- **Drip irrigation** – This maximises the water available and provides crops with just enough water to grow. This system is less damaging to the soil and reduces the use and wastage of water.
- **Monitoring water use and the water quality.**

- **Maintaining dams** – This is important to avoid water loss. Also important is catching irrigation water so that it runs back into dams and is able to be reused.

Advancements in technology to monitor crops are reducing overwatering and improving the environmental impacts of water use (see Figures 14.13–14.15).



**Figure 14.13:** Mobile phone technology can be used to monitor weather conditions. Farmers can avoid spraying in high winds or irrigating when there is predicted rainfall.



**Figure 14.14:** Satellite tracking technology (GPS) can be used by aerial spray contractors to correctly determine the path of watering application.



**Figure 14.15:** Drones can be used to monitor crops on a weekly basis to determine if they need spraying.

**Activity 14.4 (Inquiry): The Internet of Things – positive impact on water use**



Research the Internet of Things to discover what it is and how it is being used effectively with smart irrigation systems in primary food production.

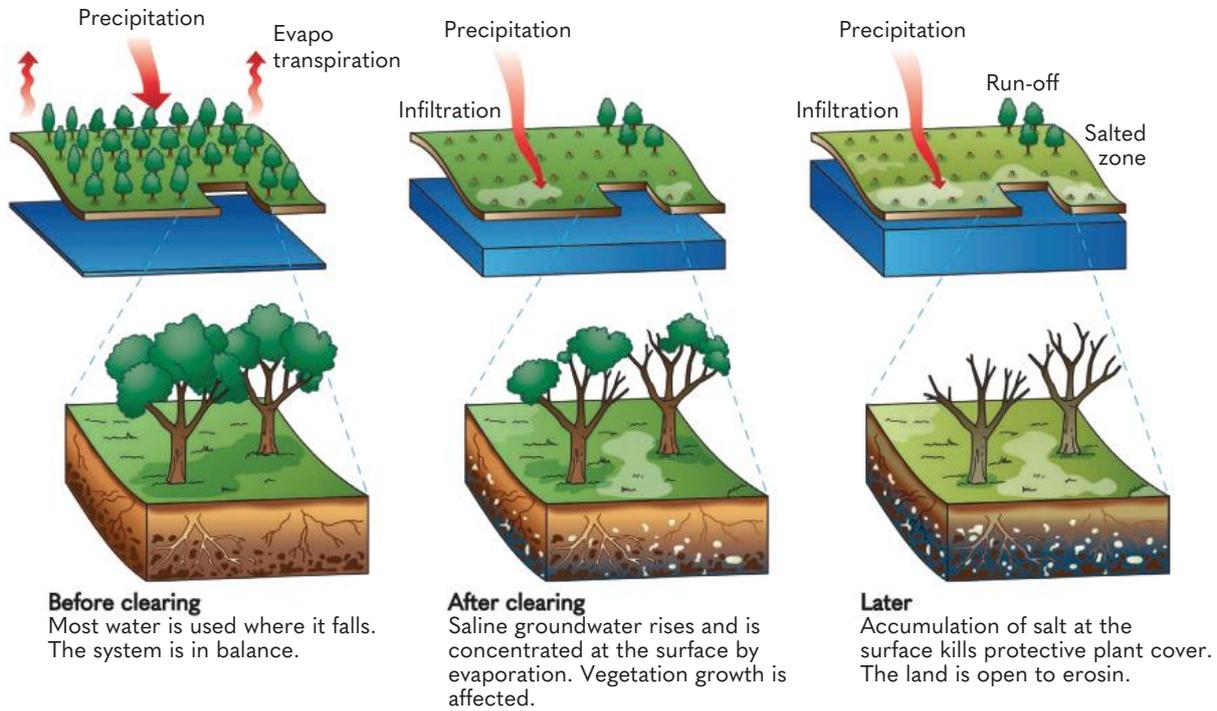
- 1 Explain how this pathway is working to improve environmental sustainability.
- 2 Prepare a podcast or video to share your findings with others. Your podcast or video should be 5-10 minutes in length, and detail your research findings, including examples from Australia and at least one other country.

**salinity**

the presence of excess salt in soil due to the rising of the water table bringing natural salts to the surface of the land

**Salinity**

**Salinity** is the presence of excess salt in the soil. This can be due to the rising of the water table, bringing natural salts to the surface of the land. When land is cleared or when water is mismanaged, the water table rises, bringing salt to the surface. Salt in the soil makes land unproductive, for both farming and natural land vegetation, as the majority of plants are unable to grow in salty soil conditions.



**Figure 14.16:** Environmental impacts of salinity



**Let's talk**

Discuss how the issue of salinity would affect primary food production.

The number one cause of soil erosion is deforestation and land clearing, leaving valuable topsoil exposed to the weather conditions. Once cleared, the topsoil is easily carried away by wind or eroded by other weather conditions. It is the topsoil that contains the nutrients required by plants for growth, so the absence of topsoil impacts the productivity of the land and reduces crop yield.

**soil erosion**

the wearing away of land by weather conditions: water, rain, wind and ice

**Erosion**

**Soil erosion** is the wearing away of land by weather conditions, including water, rain, wind and ice.



**Figure 14.17:** There are many ways to reduce problems associated with salinity in soil.

### Activity 14.5 (Inquiry): Soil erosion



Investigate the effects of soil erosion in Victoria, including the cost for producers and consumers and environmental concerns. The Landcare Australia and Landcare Victoria websites will help you get started.

Strategies for the reduction of erosion issues include:

- **Not overstocking** – Animal activity can compact the soil, preventing the growth of grass and plant life, damaging the soil for future use.
- **Planting trees and vegetation** – This will help hold soil in place and reduce the impact of weather conditions eroding needed topsoil.

### Choice of crops and animals for farming

Australia is well known for the food it produces, particularly beef products that are exported all over the world. The choice of crops and animals used in farming can have implications for the environment. For environmental sustainability, to feed a growing population, we need to produce more food with fewer resources.

## Crops



**Figure 14.18:** Precision agriculture

### Activity 14.6 (Case study): What's wrong with rice?



Rice is a global staple, and Australia has been growing rice for many years. But there has been some discussion about the sustainability of rice production and whether alternative crops should be grown instead.

Rice is a thirsty crop. Farms producing rice require large volumes of water.

Visit the Ricegrowers' Association of Australia website and the 'student resources' page to watch the video *All About Australian Rice*, then answer the questions.

#### Questions

- 1 'Rice is suitable for Australia's climate.' Discuss.
- 2 Outline why people might disagree with the statement in question 1.
- 3 Describe how science and technological developments have worked to support the rice growing industry in Australia. Include reference to environmental sustainability.
- 4 Identify where most of the rice produced in Australia is located.
- 5 Are there any environmental concerns with the preparation of land for the sowing of rice? Justify your response.

### Activity 14.7 (Inquiry): New technologies or innovations



The Commonwealth Scientific and Industrial Research Organisation (CSIRO) is working with farmers to develop new tools and management systems to increase profitability and productivity, reduce resource use and maintain environmental sustainability.

Choose one of the CSIRO's new technologies or innovations. Use the CSIRO website as your starting point.

- 1 Provide a summary of what this new technology or innovation is. In your summary include:
  - why it has been developed
  - where it is hoping to make an impact
  - how it will improve environmental sustainability.
- 2 Evaluate its capacity to improve environmental sustainability within the food systems.
- 3 Make a final judgement or conclusion and justify your response with evidence.

**Activity 14.8 (Inquiry): Find out more**

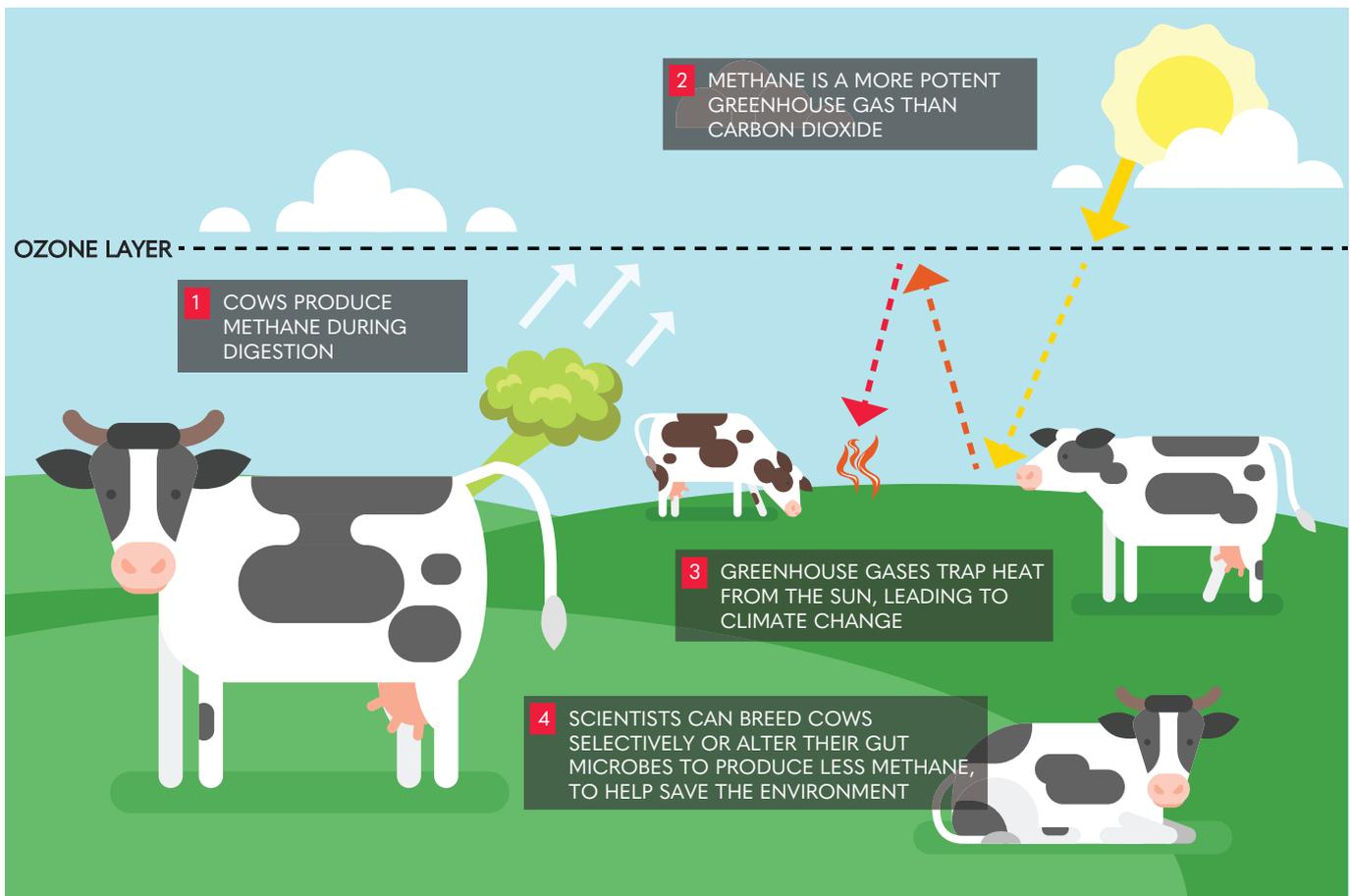
- 1 Research a pathway to improve the issues of environmental sustainability related to crops and animal choice.
- 2 Evaluate your chosen pathway's capacity to improve environmental sustainability within the food systems.
- 3 Start by unpacking the strengths and limitations of this as a solution.
- 4 Make a final judgement or conclusion and justify your response with evidence.

**Animals**

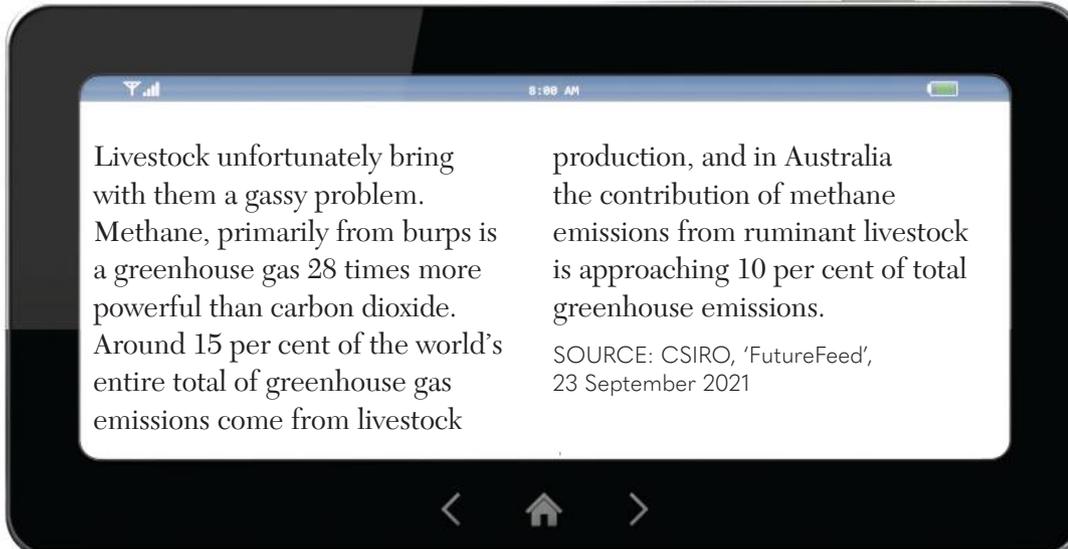
The choice of animal being farmed can have a more significant impact on environmental sustainability than other choices.



**Figure 14.19:** How livestock farming impacts climate change



**Figure 14.20:** One of the environmental challenges of beef and dairy production is increased methane.



**Figure 14.21:** Extract from CSIRO article, 'FutureFeed'

 **Let's talk**  
With beef being a popular meat choice here and abroad, is simply farming fewer cattle a practical solution to address environmental sustainability issues?

feed for animals, the animals use the land for pasture, which in turn can result in land degradation.

If animal feed did not need to be produced, the land could be made available for human food. The number of animals would be reduced and then the impact of the animals, such as methane production, would also be reduced.

The food we feed animals has an impact on the environment. The land is used to grow

**Activity 14.9 (Inquiry): FutureFeed** 

CSIRO scientists have collaborated with Meat & Livestock Australia and James Cook University to develop the FutureFeed program. Could this be our environmental sustainability solution for livestock?

Visit the FutureFeed website to view and read the information provided. Copy and complete the table.

What is FutureFeed?	Who has developed this?	Why has this been developed?	What evidence supports this innovation?	How is this contributing to improved environmental sustainability?

**Pathway: kangaroo**

Kangaroos are native to Australia, yet they are not our most popular meat for consumption. Shifting meat consumption with a focus to increase kangaroo meat offers gains in environmental sustainability because their physical impact on the soil is less than that

of larger animals. The population numbers of kangaroos are currently so great that there is no need for kangaroos to be farmed. Instead, kangaroos are harvested wild to reduce their numbers as they are considered by farmers to be pests for their crops and livestock.



**Figure 14.22:** Did you know kangaroos don't expel methane? Kangaroos are abundant already in our Australian environment and do not need to be farmed. In fact, many farmers consider them pests to their crops and livestock, so they are harvested, which not only reduces their numbers but also provides their meat for consumption.

**Let's talk**

Develop a concept map showing all the reasons why the choice of kangaroo is a pathway for improved environmental sustainability.

# Aussie roo souva

Serves 1

## Ingredients



150 g kangaroo,  
diced



1 teaspoon olive  
oil



2 teaspoons  
lemon juice



1 teaspoon  
lemon zest



1/2 teaspoon oregano  
(dried or fresh),  
finely chopped



1 clove garlic,  
finely chopped



1 bay leaf



1/4 teaspoon black  
pepper, crushed



1/3 Lebanese  
cucumber,  
finely diced



1/4 cup plain Greek-  
style yoghurt



2 lettuce leaves,  
shredded



1 pita bread  
(home-made flat  
bread is best)



1 clove garlic,  
crushed



1/8 red onion,  
sliced



1/4 tomato, diced

## Method

- 1 Place the kangaroo in a medium-sized bowl. Add the olive oil, lemon juice, lemon zest, chopped garlic, bay leaf and black pepper. Leave to marinate for at least 10 minutes.
- 2 Place the yoghurt, cucumber and second clove of garlic in a small bowl. Mix together.
- 3 Drain the kangaroo.
- 4 Heat the olive oil in a frying pan and cook the kangaroo. Kangaroo is best cooked to medium, so be careful not to overcook.
- 5 Heat the pita bread.
- 6 Place your meat on the warmed pita bread. Top with the vegetables and yoghurt sauce. Serve.



### Evaluation questions

- 1 Explain how using kangaroo could be a more sustainable animal choice.
- 2 Suggest how reducing any food waste from this recipe positively impacts environmental sustainability.
- 3 Traditional souvlaki uses lamb. Can you taste any difference? Justify your response.
- 4 Identify one social factor and outline how it could contribute to an individual choosing this recipe.
- 5 Outline how consuming kangaroo might also be considered a more ethical meat choice.

Pathway: smaller animals



**Figure 14.23:** Smaller animals and different breeds will have less impact on the land.

Smaller animals can have less impact on the environment. They:

- have smaller pasture requirements compared to larger breeds
- require less water and feed as they are more efficient in converting feed to meat
- consume less feed, which reduces the use of fertilisers needed to grow crops for animal feed

- reduce the impact on the soil as there is less trampling
- produce less methane.



**Let's talk**

Suggest why consumers might not be happy to see a shift in primary production reducing the production of larger animal foods.

**Activity 14.10 (Inquiry): Report card**



**Sustainable farming**

Apart from native animals, there are a number of breeds suitable for the Australian environment.

- 1 Investigate an example of a breed that would be suitable for the Australian climate.
- 2 Produce a report card with the following information provided to share with your class:

Name: \_\_\_\_\_

Picture: \_\_\_\_\_

Features that make this breed suitable: \_\_\_\_\_

Environmental solutions: \_\_\_\_\_



**Let's talk**

Australian consumers are becoming more aware of environmental issues associated with livestock production and are seeking alternative protein sources. What evidence have you learned in Food Studies that supports this statement?

they play in our diet, but also for their role in food production.

Our native bees are being threatened by habitat loss, introduced wasps, pesticide use, climate change and exotic plant species being planted over native flora. The impact of losing bees is more than reduction of honey. The flow-on effect would also reduce significantly the number of plants, impacting biodiversity.

**Loss of biodiversity**

**Biodiversity** is the variety of all living things: the different plants, animals and micro-organisms, the genetic information they contain and the ecosystems they form. Our primary production relies on the vast variety of crops and animals not only for the role



**Let's talk**

Suggest strategies people could use to increase and protect our pollinators.

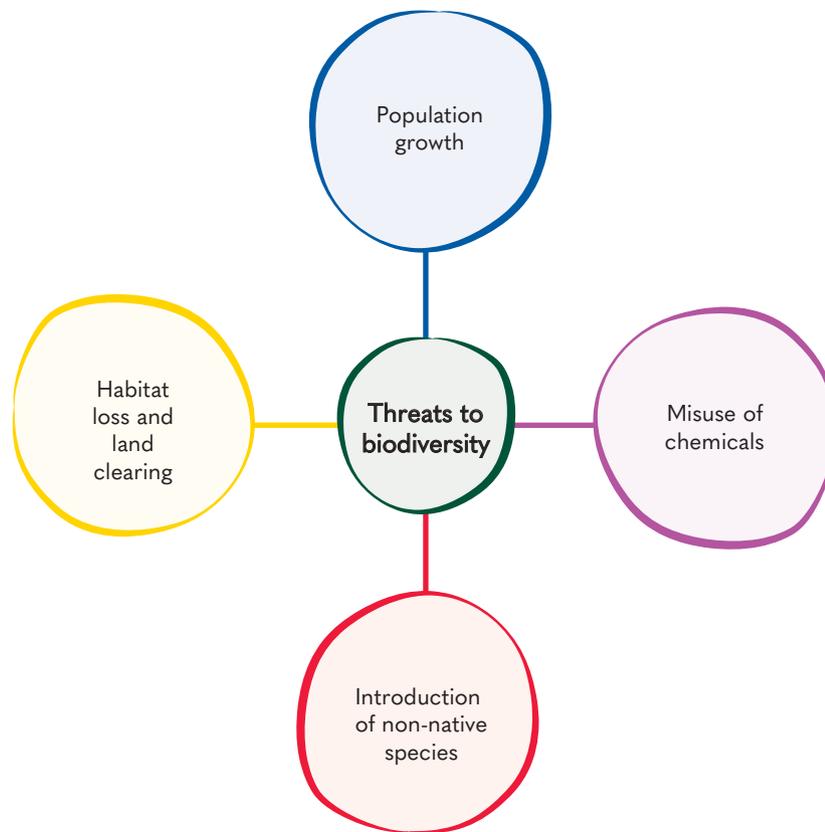
**biodiversity**  
the variety of plant and animal life in a particular habitat or the world

Biodiversity is critical for environmental sustainability in primary production because:

- pollination improves crops, which can increase food supply and food security
  - greater genetic diversity is guaranteed, resulting in stronger, healthier and more resistant flora and fauna
  - the reliance on a few species is reduced, as there is greater variety of crops and animals
- it promotes healthy soils and waterways, reducing the need for fertiliser
  - it maintains the health of our waterways and strengthens ecosystems, which leads to a stronger food chain
  - natural pest control can occur, with native animals such as frogs eating insects that can damage crops, reducing the need for pesticides.



**Figure 14.24:** Bees and birds are critical for the pollination of crops, helping plants to produce seeds.



**Figure 14.25:** Threats to biodiversity



**Figure 14.26:** Continued population growth in urban areas is having an impact on surrounding ecosystems and biodiversity.

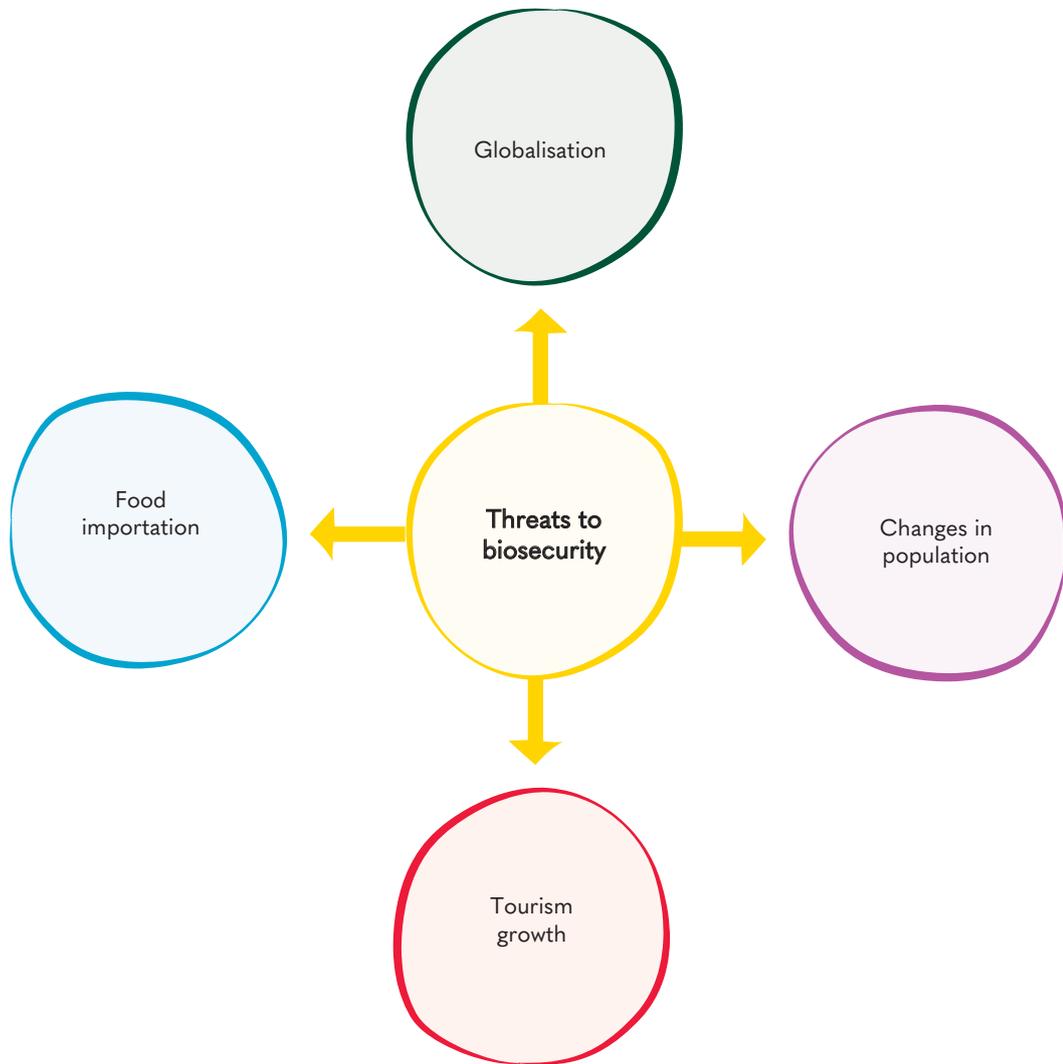
### Risks to Australia’s biosecurity

As an island, Australia is quite fortunate to be able to protect its borders and beyond.

**Biosecurity** involves the management of risks to the economy, the environment and the community, of pests and diseases entering, emerging, establishing or spreading.

**biosecurity**

the measures designed to protect populations of nations such as Australia against harmful biological or biochemical substances, diseases and pests



**Figure 14.27:** Biosecurity threats

Risks to our biosecurity include exotic pests and diseases not currently in Australia impacting crops, livestock and our soil. These enter Australia by sea and air through transportation via travellers, mail and cargo. Diseases such as foot-and-mouth disease in animals can result in them having to be destroyed and no longer available for consumption.

**Activity 14.11 (Inquiry): Postcard from a pest**



Pick one of the plant pests shown in Figure 14.28.

Write a postcard from this pest to a relative in Australia from its homeland.

In your postcard, include information to show where the pest naturally lives, the plants it likes, why it might want to come to Australia and how it can get here.



**Figure 14.28:** Australia’s top 10 exotic and unwanted plant pests  
 Source: *The Plant Surveillance Network Australasia-Pacific (PSNAP)*



**Figure 14.29:** The importance of biosecurity for primary production in Australia  
 ISBN 978-1-009-10524-8 Sally Lasslett et al. © Cambridge University Press & Assessment 2022  
 Photocopying is restricted under law and this material must not be transferred to another party.

**Activity 14.12 (Inquiry): Diseases that threaten primary production**



Investigate a disease that threatens Australia’s primary production. Include where this disease originates, the impact it has on primary production and any possible pathways to help reduce its threat.

**Climate change**

Australia is impacted by climate change, but contributes to it as well! Increased extreme

weather events such as drought, flooding and temperature changes have placed pressure on primary production.



**Figure 14.30:** Some of the ways that climate change is affecting the environment



**Let's talk**

Suggest how each of the implications shown in Figure 14.30 will impact primary food production.

## Changing rainfall patterns and temperature extremes in Australia can lead to risks...



### Quality and quantity of crops

Improved crop management strategies have enabled Australian wheat yields to remain constant. However, as Australia progresses towards 2°C warming with the associated changes in rainfall, it will be extremely challenging for crop yields to be maintained. As well as yield, the nutritional value of crops may be altered<sup>^</sup>.



### Biosecurity

The distribution and occurrence of pests and disease can be detrimental on crops and livestock. Pesticide applications may not be an effective solution, which may lead to resistance by the pest and also have negative environmental effects.



### Heat stress on livestock

Animals experiencing heat stress have reduced appetites and are less likely to breed, thus leading to significant productivity losses for the livestock industry. This is region specific, for example dairy production has been expanded in some regions of Southern-Australia.



### Distribution of crops and livestock

Crops may become inviable in regions where they are currently grown, for example, grape vines for wine production may need to be moved to cooler areas to retain their quality characteristics. Lower rainfall and higher temperatures reduces forage and pasture production for livestock<sup>#</sup>.

**Figure 14.31:** Changing rainfall patterns and temperature extremes in Australia can lead to risks in these areas.

Source: Australian Academy of Science, "Australian agriculture and climate change: a two-way street"

### Activity 14.13 (Inquiry): Climate change



Design an infographic like the one in Figure 14.31 for another example of climate change to show how this example impacts environmental sustainability of food production.



**Let's talk**

Use specific examples to explain how climate change may result in a decrease in food production.



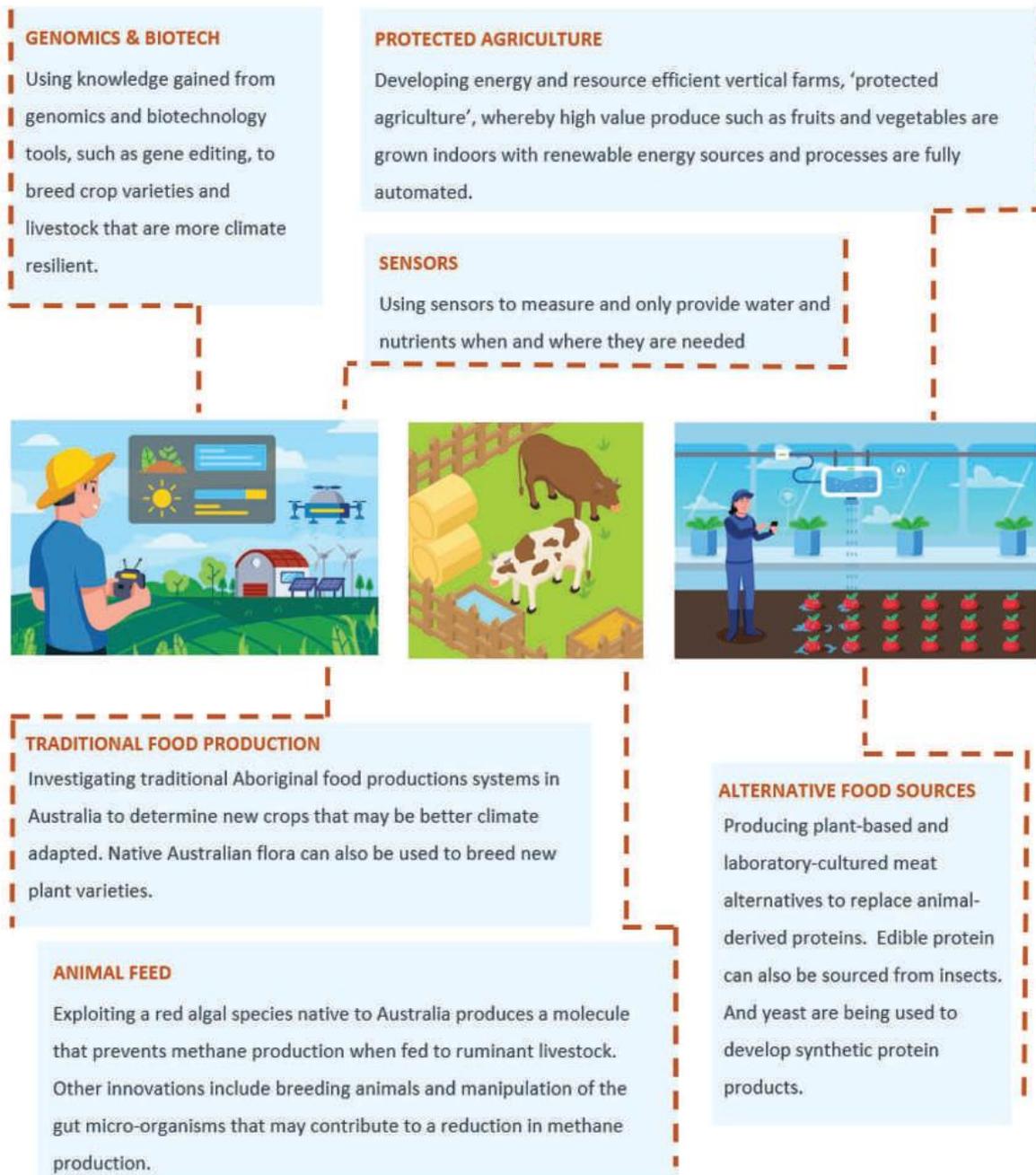
**Figure 14.32:** Rising temperatures may result in crops and livestock no longer being viable to grow in areas where they are currently produced, impacting primary production.



**Figure 14.33:** As sea temperatures rise, aquaculture may be at risk.

## --- AGRICULTURE RESEARCH & CLIMATE CHANGE ---

Research activities in Australia and overseas aim to develop technologies or processes to mitigate the impact of climate change on agriculture.



**Figure 14.34:** Examples of pathways using technology to address the impacts of climate change on primary production

Source: Australian Academy of Science, "Australian agriculture and climate change: a two-way street"

**Activity 14.14 (Inquiry): Environmental sustainability within the food systems**

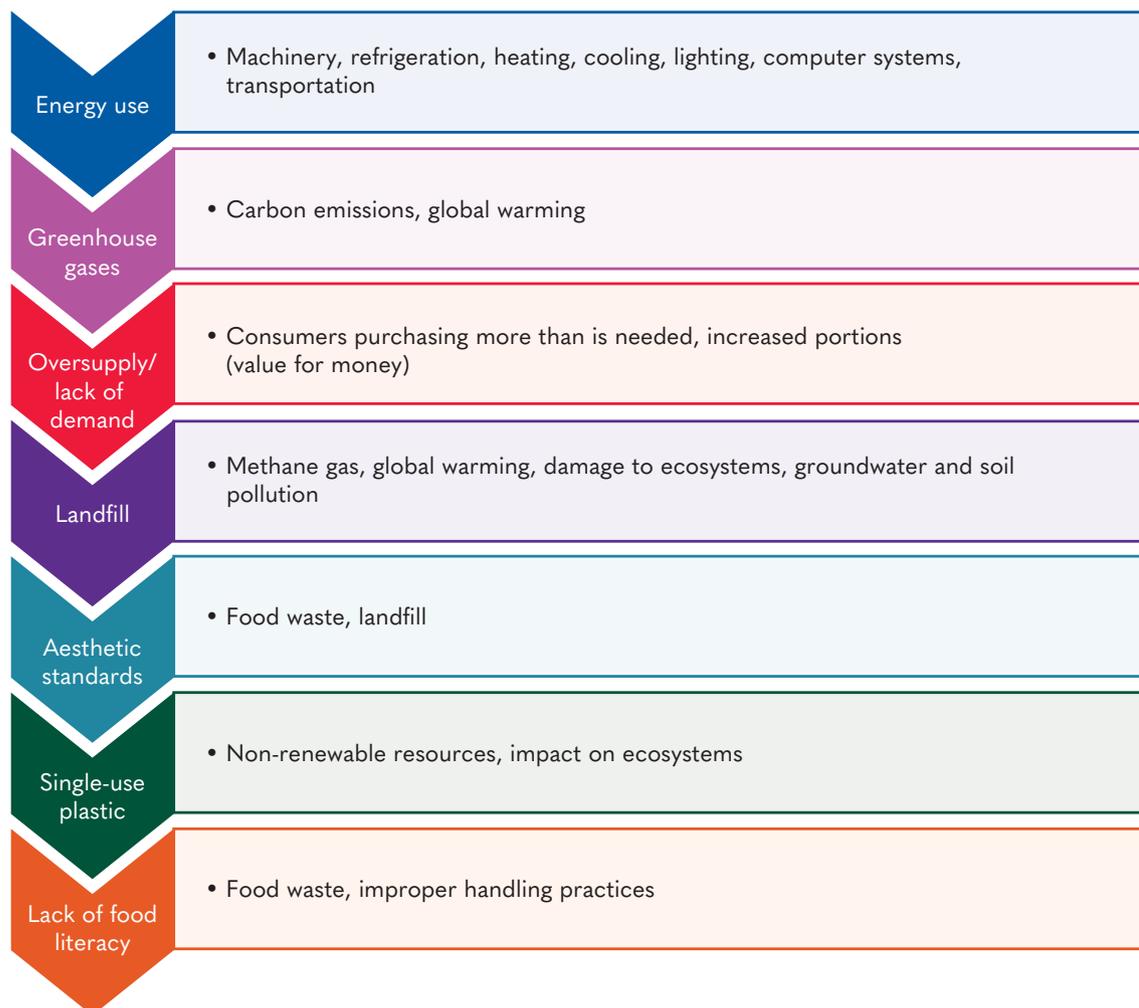
Research and evaluate a pathway to improve environmental sustainability within the food systems that addresses climate change.

- 1 Start by unpacking the strengths and limitations of this as a solution.
- 2 Make a final judgement or conclusion and justify your response with evidence.

### *Environmental effects of food processing and manufacturing, retailing and consumption in Australia*

All stages of the food systems contribute to environmental issues, from production and manufacturing to retail, food service

and consumption. All food makes waste. The production of food can create large amounts of waste, such as orange peel when making orange juice, carrot tops after carrots have been processed and wrapped, and the packaging that food is distributed and sold in.



**Figure 14.35:** The environmental effects of food processing and manufacturing, retailing and consumption in Australia

The disposal of waste is an issue, not only for consumers, but also for food manufacturers, and is a factor that needs to be considered when producing food. Non-biodegradable waste contributes to **landfill**, and can pollute waterways. Food waste also contributes to landfill. This includes food that is discarded in preparation, such as fruit peels and cores, and food that has been produced and prepared but not consumed, such as leftovers or the vegies and fruit that sit in the fridge until they deteriorate and end up in the bin.

Food producers and manufacturers, alongside consumers, are now looking for ways to address the environmental impacts within our food systems.

### Food packaging environmental effects

Packaging is an integral part of our food production and consumption in Australia. It protects goods from damage and increases shelf life, allows efficient distribution, informs the consumer and helps to promote goods in a competitive marketplace. But it also has a major impact on the environment.

Australia has a long history of environmental responsibility in terms of food packaging. In Australia, consumers have been proactively involved in recycling even before the environment became a major issue in the community at large in the 1990s. Our commitment is shown by the fact that nearly all households engage in some recycling or reuse of household waste, according to data from the Australian Bureau of Statistics (ABS). In 2018–19, over half of all waste in Australia was sent for recycling (38.5 million tonnes). The majority of waste recycling occurs via kerb-side collections.

**landfill**  
a tip or rubbish dump where waste is sent for disposal by burying it



#### Let's talk

Visit the OECD iLibrary website and analyse the 'Circular economy - waste and materials' page. Who are the world leading nations in terms of recycling, and why? Discuss how Australia ranks in terms of recycling on the global stage.



**Figure 14.36:** Where does our next landfill site go? According to the ABS, in 2018–19, 27 per cent of waste generated in Australia was sent to landfill for disposal (20.5 million tonnes).

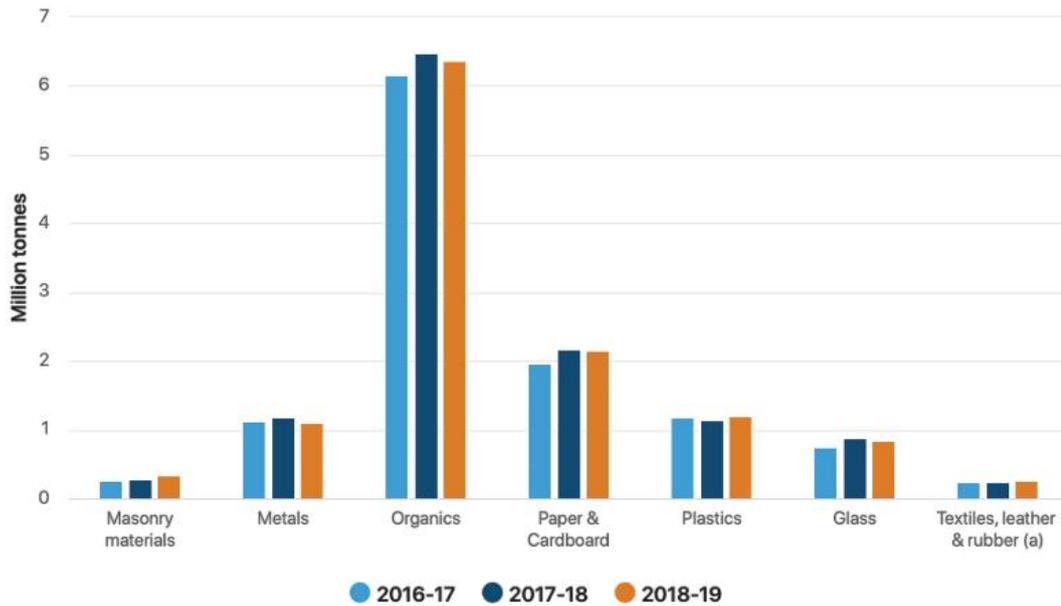


**Figure 14.37:** By the end of 2030, every Victorian household will have four rubbish bins, with the aim of reducing household waste going to landfill by 80 per cent by 2030.

## Activity 14.15 (Data analysis): Household waste



Household waste by waste material



a. Textiles, leather and rubber excludes tyres.

**Figure 14.38:** Household waste in Australia, 2016–19

Source: Australian Bureau of Statistics: Waste Account, Australia, Experimental Estimates, 2018-19 financial year

- Waste occurs in all stages of the food systems. For each activity listed below, identify the types of waste products that occur:
  - Food processing and manufacturing
  - Consumption.
- Refer to Figure 14.38. State how much of household waste was organics.
- Suggest why organic waste is significantly higher than other household waste materials shown in Figure 14.38.
- Identify ways you contribute to waste within your own home.
- Explain how your family works to reduce its waste, including products being sent to landfill.
- Describe two ways this waste could be reduced.

## Landfill

Landfill space in Australia is limited. It is for this reason that Australian governments at federal, state and local levels, along with many retailers and manufacturers, are working together to reduce packaging waste.

Here are a few simple ideas that we, as consumers, could consider at our next food purchase:

- eliminate packaging
- reduce packaging
- recycle packages
- purchase packages made of recycled materials.



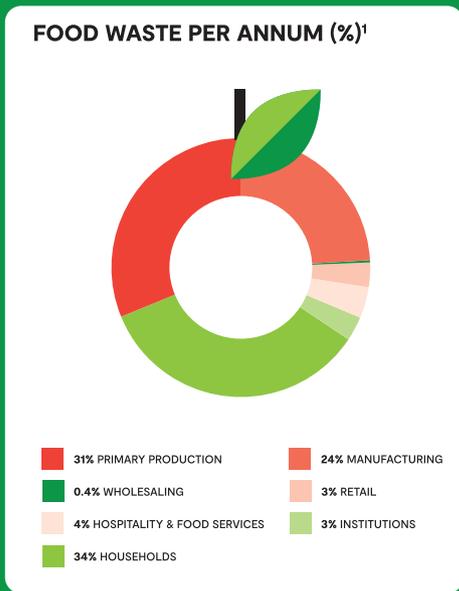
### Let's talk

Packaging is not the only contribution to landfill. Discuss ways food service and retail can contribute food waste to landfill.

# Situational snapshot

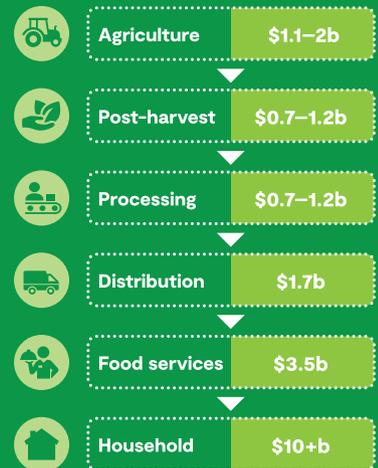
## 7.3m tonnes per year

Food waste by value chain sector<sup>1</sup>



FOOD WASTE PER ANNUM (DOLLARS)<sup>2</sup>

### \$20 billion



4

Figure 14.39: Food waste in Australia



**Figure 14.40:** Packaging also causes pollution and waste issues for our environment.



**Figure 14.41:** Food waste rotting in landfill emits nearly six times the amount of greenhouse gases as the aviation industry.



### Let's talk

Do you think choice of animals or rotting food waste is a bigger environmental problem? Justify your response.

Why might composting food waste not be the best answer to this environmental problem?

As consumers of food products, we are all responsible for managing our waste. The need for the recovery of waste generated from food packaging is partly our responsibility. The waste management hierarchy is a way we can all be more responsible as consumers and decrease the impact of food packaging on the environment.

## The 3Rs

### Reduce

- This involves the process of reducing or minimising waste.
- Food manufacturers are developing strategies to avoid or reduce the generation of waste from their food items.

- As consumers, we need to choose food products that have minimal packaging and, if the product is packaged, that the packaging can be recycled.

### Reuse

- Reuse containers, packaging or waste products.
- Reuse plastic bags.
- Look for products in reusable, refillable or recyclable packaging when you shop.



### Let's talk

Develop a list of products that come in reusable containers.

### Recycle

- The process of recycling includes the collection, sorting and processing of recyclable packaging materials, which can then be reused or resold.
- The reuse of a food packaging (for example, reusing jars for the storage of food) is a type of recycling.



**Figure 14.42:** Is this really necessary? Corn comes in its own natural packaging, doesn't it? Here is one example of food packaging that could be eliminated, reducing waste.



### Let's talk

Explain how the production of packaging has an impact on the environment.

There are three types of green packaging:

- reusable packaging, such as glass bottles, which can be cleaned and reused to store the same food or something else
- **recyclable** packaging, which is made of materials that can be used again, usually after processing, for packaging or another purpose. Recyclable packaging materials include glass, metal, card and paper.
- **biodegradable** packaging, which will easily break down and disappear into the soil or the atmosphere, without causing damage.

**recyclable**  
material that is able to be used again after processing

**biodegradable**  
a substance that is able to be broken down naturally into the physical environment

## Green packaging

Green packaging causes less damage to the environment than other forms of packaging.



**Figure 14.43:** Times and materials are changing – edible packaging. Pictured is a Good-Edi cup. This Melbourne-based company is producing vegan-friendly oat and grain based edible cups which can be used for serving hot beverages like coffee and cold items like ice-cream. The mission of Good-Edi is to provide sustainable and eco-friendly single-use takeaway cups.

Source: Good Edi

## Water use

Water is not only used for the processing and manufacturing of food, it is also used at home in the consumption of food. Most food products are washed or cleaned during different stages of the food systems, often using large amounts of water. Many manufacturers are not in a position to reuse their water and this water ends up as waste in sewerage systems or in local waterways.



### Let's talk

Suggest how food manufacturers could reduce their water consumption.

## Pollution

It is estimated that between one-third and one-fifth of greenhouse gases causing climate change are from agriculture producing the

foods that we eat. Use of **fossil fuels** for manufacturing and transporting food products is having a direct impact on the environment by increasing greenhouse gases and pollution.

By choosing locally grown foods, consumers and food manufacturers are reducing the amount of fossil fuels used to produce food products.

**fossil fuels**  
non-renewable fuels such as coal, natural gas and oil



**Figure 14.44:** The transportation of food contributes to greenhouse gases, impacting environmental sustainability.

## Food waste



**Figure 14.45:** Examples of how food waste occurs throughout the food systems. These are all reasons why food is thrown away.



### Let's talk

Choose one source of food waste within the food systems and suggest how this wastage could be reduced or eliminated. Create an infographic as a class to share your ideas.

**Table 14.1:** Examples of how food waste can occur

<b>Primary production</b>	Product loss due to pests and diseases or weather Stock is damaged or discarded during production, packing or handling Fall in market prices making it unprofitable to harvest Inability to meet contracted produce specifications, such as quality or size Changes in consumer tastes and preferences
<b>Processing and manufacturing</b>	Product damaged during handling Spoilage due to contamination or inadequate temperature control Excessive trimming of vegetables for processed foods Changes in production due to consumer demand Equipment failure Spillage on conveyor belts and transfer points Inefficient inventory management Damage to packaging resulting in food unfit for sale
<b>Distribution</b>	Spoilage due to inadequate temperature control in transport and storage Damage due to improper handling
<b>Retail</b>	Poor stock management, including over ordering, improper stock rotation, storage and handling practices Produce no longer meets quality standards Last-minute order changes that can leave suppliers with excess product Limited access to facilities to recycle or repurpose food waste
<b>Hospitality and food service</b>	Poor stock management, storage and handling practices
<b>Households</b>	Confusion over 'use-by' and 'best-before' date labelling Over-purchasing of food that is then thrown away Limited knowledge of how to safely repurpose or store food leftovers Limited access to food waste collection systems

Source: Australian Government, National Food Waste Strategy, Commonwealth of Australia, 2017, p. 9

### Activity 14.16 (Inquiry): Augmented reality



Augmented reality is being used effectively in marketing to enhance consumers' understanding about food.

- 1 Investigate examples of how this new technology is being used.
- 2 Present a report sharing your example. Include a picture and annotate it to show how augmented reality is enhancing consumer knowledge and improving environmental impacts of food.

### Consumption and disposal or recycling and repurposing of food

When we waste food, we waste the resources that have been used to produce it and the energy used to process, package, transport,

market and retail it. Food consumption will always generate waste, but are we wasting more than we should? One of the biggest changes consumers can make is to only purchase what they need and dispose of only

what cannot be consumed or turned into something else. Ever had carrot top pesto? What about banana muffins that include the peel as an ingredient?

Perhaps we are disposing of more food than we should. Food can be recycled. Many families set up their own compost bins or worm farms, using the nutrients from the

food for another purpose. Local councils have a separate bin for the collection of food and garden waste. This waste is then hot composted to produce soil conditioner used to improve soil health supporting primary food production. Food can also be **repurposed**, resulting in new and innovative products.

**repurpose**  
to use something for a different purpose to the one it was originally intended

**Activity 14.17 (Case study): Natural Evolution Foods**



Visit the Natural Evolution website to read the story about how Rob Watkins turned his wasted Lady Finger bananas, unsuitable for specific supermarket guidelines, into banana flour.

- 1 Describe why local wallabies would sit and wait for Rob every Friday afternoon.
- 2 List some of the challenges of growing Lady Finger bananas compared to other varieties.
- 3 How many tonnes of wasted bananas did Rob have every week?
- 4 Watch the two clips provided from *The Project* and *TED*. Copy and complete the PMI table.

Plus	Minus	Interesting

- 5 Identify recipes that utilise green banana flour. Try making one of these in class or at home.

**Activity 14.18 (Inquiry): Repurpose It**



Visit the Repurpose It website and read about the partnership with Foodbank Victoria. Watch the video clip to see how Repurpose It is working with Foodbank to turn food waste into electricity and soil.

- 1 Describe the focus of this program.
- 2 Explain how the food is being repurposed.
- 3 Explain how this partnership is working together to reduce the environmental effect of food waste.

**Activity 14.19 (Inquiry): Food recovery**



Visit the website of one of Australia's food recovery organisations such as Foodbank, OzHarvest or FairShare.

- 1 Explain how they are reclaiming food from food waste.
- 2 Discuss the environmental effect this action is having.
- 3 Describe what their motivation was to develop this program.
- 4 List some statistics of their contribution to food recycling and supporting others.
- 5 Suggest how this program supports food access and distribution in Australia.



**Let's talk**

How do you recycle food?  
How is food repurposed? Suggest why or how food laws might impact the opportunity to repurpose food.



### Let's talk

You have had a huge crop of lemons that you don't want to waste. There are only so many lemon cakes you can make.

Brainstorm ideas for how to use the lemons so that they do not end up as landfill. Also think about the peel. Can you come up with waste-free solutions?



### Let's talk

Why do we care so much about the look of fruit and vegetables? Does a blemish matter? How might we shift these food behaviours in the future?



**Figure 14.46:** Ever eaten the Odd Bunch? This initiative not only prevents misshapen fruits and vegetables ending up in landfill, and the produce is also a cheaper option for consumers.



**Figure 14.47:** OzHarvest’s ‘Use It Up’ initiative focuses on changing food behaviours so Australians waste less food at home. Pictured is OzHarvest founder and CEO Ronni Kahn AO. ‘Use It Up’ recipes for making good use of food scraps can be found on the OzHarvest website.

Source: OzHarvest Limited



**Figure 14.48:** A lot of food wasted in the potato industry goes into animal feed or compost. Research is now looking at how this waste could be turned into prebiotics such as resistant starch.

# Banana peel muffins

Makes 6

## Ingredients



1 ripe banana,  
washed and  
sliced with peel  
on



1½ tablespoons  
water



1½ tablespoons  
oil



½ cup plain  
flour



⅓ cup  
caster sugar



¼ teaspoon  
bicarbonate of  
soda



1 pinch salt

## Method

- 1 Preheat the oven to 200°C.
- 2 Line 6 muffin pans with patty pan cases.
- 3 Blend the sliced banana with the oil and water using a stick blender or food processor until smooth.
- 4 Sift the flour and bicarbonate of soda into a medium bowl. Stir in the sugar and salt.
- 5 Gently fold the blended banana into the dry ingredients until just mixed.
- 6 Divide the batter evenly between the 6 muffin pans.
- 7 Bake until cooked through, approximately 15 minutes.
- 8 Cool on a cooling rack before serving.



### Evaluation questions

- 1 Describe how you felt when you realised you would be including the banana peel in your muffins.
- 2 Complete a sensory analysis of your muffins.
- 3 Explain the environmental benefits of using the banana peel in cooking.
- 4 Describe the nutritional benefits of using the banana peel in cooking.
- 5 Explain the impact that wasting this banana peel could have on the environment.
- 6 Suggest other ways you can reduce food waste in the kitchen.





## How food waste is managed in Australia



### 1 Supporting efficiency and innovation in agriculture

*Key players: Australian Government, state and territory governments, primary producers, academic institutions.*

In Australia food that does not make it to the consumer can result from weather, pest and diseases or not meeting market specifications. Some businesses have identified opportunities to use unwanted produce—for example, turning broken or bent carrots into packaged carrot sticks for sale in supermarkets.



### 2 Assessing food ordering, transport and storage practices

*Key players: food and grocery retailers, primary producers.*

Food and grocery retailers are assessing their supply chains to maximise the shelf life of food and to improve their ordering systems so that the food ordered accurately reflects demand.

Households should consider the food they buy and how they store it. They should only buy what is needed and use 'best before' and 'use by' dates effectively.



### 3 Using packaging effectively and sustainably

*Key players: food processing and manufacturing industries, state and territory governments, Standards Australia, Australian Government.*

Effective use of packaging can increase the shelf-life of food products but it can also make food waste unsustainable for composting if it is not disposed of separately. The Australian Government partners with other jurisdictions and industry through the Australian Packaging Covenant to improve packaging design and increase the recycling of packaging.



### 4 Encouraging partnerships between food and grocery retailers and charitable organisations

*Key players: food and grocery retailers, food rescue organisations.*

Major food and grocery retailers in Australia have partnered with food recovery organisations and committed to reducing the amount of food waste that goes to landfill. This means retailers can meet their food waste reduction goals and also help charities to improve food security.



### 5 Conducting household education and community initiatives

*Key players: state and territory governments, local governments, not-for-profit organisations.*

A number of state and territory governments have invested in public education campaigns to reduce food waste. Some local councils are also encouraging home composting by providing their residents with home compost bins or offering a rebate on composting equipment.

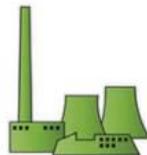
[www.environment.gov.au](http://www.environment.gov.au)



### 6 Diverting food waste from the commercial food sector

*Key players: state and territory governments, commercial food sector, academic institutions, not-for-profit organisations.*

Queensland, Western Australia and South Australia have piloted programs to turn food waste from commercial kitchens into compost or fertiliser. Businesses save money because they no longer have to pay landfill fees. Tools for businesses to self-assess their food waste practices have also been developed, including the Royal Melbourne Institute of Technology's DIRECT, the 'Dynamic Resource Efficiency Calculation Tool'.



### 7 Investing in alternative treatment technology and infrastructure

*Key players: state and territory governments, private sector, Australian Government.*

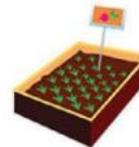
A number of states are upgrading their waste treatment infrastructure, particularly for organic waste. For example, in May 2017 a large scale biogas digester was opened in Western Australia to treat food waste, generate electricity and produce compost for agricultural uses. These investments are often funded through landfill levies.



### 8 Finding incentives for alternatives to disposing of food waste in landfill

*Key players: state and territory governments, waste management sector, private sector.*

Because landfill is relatively cheap in Australia compared to other parts of the world, it can be difficult to make alternative food waste treatment technologies cost effective. To address this problem, most states and territories have introduced levies or fees to dispose of organic waste to landfill. This makes alternative treatment methods such as biogas digestion and composting more cost effective options for businesses.



### 9 Creating value from food waste

*Key players: academic institutions, Australian Government research institutions, private sector.*

A number of research and development activities are taking place to find the best value uses for food waste. Research organisations, including CSIRO Agriculture and Food, are supporting the development and commercialisation of new bio-products.



### 10 Standardising data to measure food waste and track its reduction

*Key players: waste management sector, state and territory governments, private sector, Australian Government.*

Standardising waste data will allow more consistency between the states and territories and is supported by the food industry. The Australian Government can assess where national standards will make a difference—for example, where standards can be used to reduce the costs associated with meeting different state and territory requirements.

[www.environment.gov.au](http://www.environment.gov.au)

**Figure 14.49:** How food waste is managed in Australia

Source: *The Australian Government Department of Agriculture, Water and the Environment, November 2017*

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## Chapter revision

- Primary production, including the use of pesticides and fertilisers, water use, choice of crops and animals, can impact environmental sustainability. Misuse can result in impacts such as soil acidification, land degradation, salinity and impacts to our waterways.
- There are a number of pathways addressing the environmental impacts of primary production, such as organic farming, innovation and technological developments such as seaweed feed for cattle, that are improving environmental sustainability.
- Environmental sustainability risks associated with biodiversity, biosecurity and climate change include reduction of the variety of flora and fauna, introduction of pests and diseases from outside Australia and changes in weather patterns – all of which have an impact on the primary production of food. These all have an impact on each other as well.
- All components of the food systems have environmental effects, some negative and some positive. Environmental issues include food waste, pollution, water use and landfill.
- Consumers are looking for more environmentally friendly foods. A focus on processing and manufacturing, retailing and consumption in Australia, including food packaging, food transportation, marketing, retailing, food service, and consumption and disposal or recycling and repurposing of food, is driving improvements. Changes being made by food producers, manufacturers, retailers and consumers are having impacts, such as reducing food waste and instead recycling or repurposing it, benefiting the environment.

### Apply your knowledge

- 1 Explain why the choice of animals has an impact on environmental sustainability.
- 2 Discuss how the issue of salinity impacts on climate change.
- 3 Outline the difference between biodiversity and biosecurity.
- 4 Describe the environmental impacts of food waste.
- 5 Explain the environmental effects of marketing and retailing.
- 6 Consumption can have positive and negative impacts on environmental sustainability. Provide an example of a positive impact and a negative impact.
- 7 Define food repurposing.
- 8 Explain how food repurposing will have a positive environmental impact.
- 9 Outline one positive and one negative environmental effect from food service.

## Practice exam questions



### Question 1

Consumers are demanding foods that are environmentally friendly.

**a** Suggest and explain one environmental issue of primary food processing.

**3 marks**

**b** Suggest one pathway that would reduce the environmental issue identified.

**4 marks**

### Question 2

‘The only way to improve biodiversity is to improve biosecurity.’

Discuss this statement.

**6 marks**

### Question 3

Using an example, explain how the repurposing of food will improve environmental sustainability.

**4 marks**

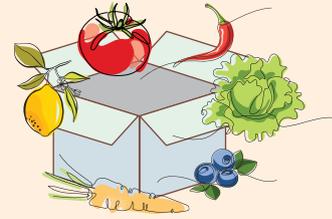
## Area of Study 2: Extended response question

### Question 1

'The biggest issue facing Australia is not food security, but food sovereignty.'  
Discuss this statement.

**10 marks**

# Let's unpack it



Refer to 'How to unpack exam questions' on pages xv–xvi as a guide to the following question breakdown.

## Question 1

'The biggest issue facing Australia is not food security, but food sovereignty.'  
Discuss this statement.

**10 marks**

**A Annotate the command word:** Discuss means to present a clear, considered and balanced argument that identifies issues and shows the strengths and weaknesses of, or points for and against, one or more arguments, factors, hypotheses and/or opinions.

**B Parts of question**

**C Count the marks** – holistically marked

**D Determine key words to use**

Food sovereignty

Food security – availability, accessibility, acceptability, adequacy, stability

Australia

Discuss: for and against

Sustainability

Food supply

**E Evidence**

Use your knowledge to provide evidence to support your statements.

# Glossary

## absorption

how the nutrients are absorbed by the digestive system. Where this occurs is different depending on the macronutrient

## activism

campaigning to bring about social, political, economic or environmental reform

## advergaming

a form of advertising in video games where the consumer interacts with the advertisement through gameplay

## advertising

promoting a product; the activity or profession of producing advertisements for commercial products or services

## agribusiness corporations

large-scale agricultural businesses

## agroecology

studies ecological processes applied in agricultural production systems

## allergen

a substance that can cause an allergic reaction. There are many different allergens. When in the body, an allergen binds with a protein and triggers the allergic reaction

## allergic reaction

when the body overreacts to an allergen and triggers a series of symptoms that vary for each individual and depend on the severity of the reaction. A reaction can be mild (sneezing) or life-threatening (anaphylaxis). An allergic reaction relates to the immune system

## amino acids

organic compounds that are made up of an amino group. They are said to be the building blocks of life

## anaphylactic

an individual who suffers from anaphylaxis

## anaphylaxis

extreme sensitivity to a food product; can be life-threatening

## antibodies

a protein produced by the body's immune system when the body detects a harmful substance. The harmful substance is referred to as an antigen. The body creates a unique antibody to defend against a specific type of antigen

## appetite

the desire to eat

## Australian Guide to Healthy Eating

a food selection guide that visually represents the proportion of the five food groups recommended for consumption each day

## autoimmune disease

a disease in which the body's immune system attacks healthy cells

## bacteria

a single-celled micro-organism responsible for decay, fermentation and ultimately food spoilage

## bioactive factors

found in breast milk, these are elements that have an effect on biological processes and thus impact our health. Examples found in breast milk include living cells, antibodies and hormones

## biodegradable

a substance that is able to be broken down naturally into the physical environment

## biodiversity

the variety of plant and animal life in a particular habitat or the world

## biologically active substance

'a substance, other than a nutrient, with which health effects are associated' (FSANZ, Standard 1.2.8).

## biomarker

'a biological molecule found in blood, other body fluids, or tissues that is a sign of a normal or abnormal process, or of a condition or disease' (National Cancer Institute)

## biosecurity

the measure designed to protect populations of nations such as Australia against harmful biological or biochemical substances, diseases and pests

## body image

refers to how you perceive, think and feel about your body as well as how you think others see you. This can refer to your general appearance, size, weight and shape

## body mass index (BMI)

$BMI = \text{weight (kg)} / \text{height}^2 \text{ (m)}$ ; a statistical measure of body mass calculated by dividing weight (in kilograms) by height (in metres) squared. A score of 18.5–24.9 is considered a healthy weight

## bolus

a small lump or ball of chewed food mixed with saliva ready for swallowing

**burden of disease**

a measure of the impact of disease and injuries by calculating the years of healthy life lost due to premature death or living with a disability due to illness or injury

**cancer**

a range of diseases categorised by uncontrolled and abnormal cell growth

**cardiovascular disease**

includes all diseases and conditions of the heart and blood vessels (including heart, stroke and vascular diseases) caused mainly by blood supply to the heart, brain and legs

**chemical digestion**

the breaking down of food, through the action of enzymes, into small molecules that can be absorbed and utilised by the body

**chyme**

partly digested food and gastric juices, which passes from the stomach to the small intestine

**climate change**

'any long-term trends or shifts in climate over many decades' (CSIRO)

**coeliac disease**

a disease of the small intestine that results in permanent intolerance to gluten

**comfort eating**

consuming foods as a reaction to an emotional state rather than hunger or appetite. The consumption of these foods provides a sense of wellbeing and pleasure

**complex carbohydrates**

are built up of sugar molecules, strung together in long complex chains

**connectedness**

a feeling of belonging to or having an affinity with a particular person, group or as a family

**crop rotation**

the growing of different crops on the same land each year, improving soil fertility and helping to control insects and diseases

**digestion**

the process of breaking down food into smaller substances

**discretionary choices**

foods that are not an essential part of our dietary needs. These foods and drinks appear in the bottom right-hand corner of the Australian Guide to Healthy Eating

**discretionary foods**

foods and drinks not necessary to provide the nutrients the body needs. These foods are high in saturated fats, sugars, salt and/or alcohol, and are therefore described as energy-dense

**duopoly**

a situation in which two companies dominate the market

**ecology**

study of the relationship between living organisms and their interaction with their environment

**emotional**

a state or feeling

**energy**

macronutrients (carbohydrates, protein and fats) in the diet provide the body with energy required for growth, metabolic processes, physiological functions, heat production and muscular activity

**environmental sustainability**

concerned with whether environmental resources will be protected and maintained for future generations

**enzymatic hydrolysis**

the process in which enzymes break the bonds in molecules with the addition of water. This is an important role in the digestion of food

**enzyme**

naturally produced in the body, enzymes create chemical reactions, including breaking down food particles during digestion

**ethical concerns**

thoughts, behaviours and decisions reflecting one's moral values in relation to what is considered right and wrong

**evidence-based**

the information is supported by the best available current research and data that has been sourced using sound methodology

**exposure**

the action of continually introducing foods and experiences around healthy and nutritious food for children

**fakeaway**

home-made version of a takeaway meal

**fermentation**

a natural process that converts micro-organisms such as yeast and bacteria, and carbohydrates such as starch and sugar into acids or alcohol

**fertiliser**

a substance that provides nutrients to help plants grow or improve soil and is used to produce more crops

**foetus**

the unborn offspring of a person

**folate (or folic acid)**

a B-group vitamin that is essential for the development of the foetus in pregnancy. Adequate folate in the diet of women who are of childbearing age can reduce the risk of neural tube defects in babies

**food allergy**

an abnormal immunological reaction to food caused by a foreign substance, usually protein. Some severe food allergies can cause an anaphylactic reaction and as a result are life-threatening (for example, peanut allergy)

**food citizenship**

the practice of encouraging food-related behaviours that support the development of democratic, socially and economically just, and environmentally sustainable, food systems

**food fad**

an intense enthusiasm for a particular food item or way of eating that is often a short-lived craze

**food insecurity**

a lack of 'regular access to enough safe and nutritious food for normal growth and development and an active and healthy life. This may be due to unavailability of food and/or lack of resources to obtain food. Food insecurity can be experienced at different levels of severity' (FAO)

**food intolerance**

a chemical reaction in the body to particular foods. It is much more common than food allergy (for example, gluten intolerance)

**food literacy**

a set of knowledge, skills and attitudes that impact food behaviours

**food security**

'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' (Prime Minister's Science, Engineering and Innovation Council)

**food sovereignty**

'the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems' (Declaration of Nyéléni)

**food systems**

the components and activities involving the primary production, processing and packaging, distribution and access, media and marketing, consumption and waste management of food, all of which can affect food accessibility and health

**food trend**

a widespread change in food preferences, consumption and behaviour that is often long-lived

**fortified**

a food that has added nutrients not normally found in the food product

**fossil fuels**

non-renewable fuels such as coal, natural gas and oil

**general level health claim**

'A general level health claim is a claim that describes a relationship between the consumption of a food, or a component in the food, and particular benefits in relation to health (a health effect). A general level health claim does not refer to a serious disease or a biomarker of a serious disease' (FSANZ)

**gluten**

a protein substance found in many cereal products, including wheat, rye, barley and oats, which gives dough its elastic texture

**gut**

referring specifically to the gastrointestinal system, which includes the stomach, small intestine and colon

**health benefit**

the positive effect on one's health gained when an action is taken (for example, food, treatment or activity)

**high-density lipoprotein (HDL)**

known as 'good' cholesterol, HDLs recover cholesterol from cells, vessel walls and other lipoproteins to take back to the liver for disposal. HDLs tend to prevent or reverse the build-up of plaque in the arteries

**high level health claim**

'High level health claims reference a serious disease, or a biomarker of a serious disease' (FSANZ). A high level health claim refers to the presence of a nutrient or substance in a food and its relationship to a serious disease or condition

**hunger**

the physiological need by the body to eat

**hygiene**

the practice or principles of cleanliness in order to preserve health and prevent the spread of disease

**hypertension**

persistently elevated or high blood pressure

**identity**

who a person is or the qualities of a person that makes them different from others

**immune system**

the body's defence against infection. It is made up of cells and proteins that create a complex network that recognises a germ in the body and creates microbes to destroy the germ

**insulin resistance**

an impaired response of the body to insulin, resulting in elevated levels of glucose in the blood

**intensive farming practices**

removing animals from their natural habitats and social structures in order to house and confine them to small, restrictive environments

**inulin**

a starchy substance found in a wide variety of fruits, vegetables and herbs

**irrigation**

a system used to water crops to supplement low rainfall or water from other areas

**lactation**

the secretion of milk by the mammary glands

**lactose**

the sugar found in milk and milk products

**lactose intolerance**

a condition where the body is unable to digest lactose

**land degradation**

a deterioration in the quality of the land until it may no longer be able to be used. This can be the result of water use, land clearing, soil erosion or overuse of land for cropping

**landfill**

a tip or rubbish dump where waste is sent for disposal by burying it

**low-density lipoprotein (LDL)**

known as 'bad' cholesterol as it tends to accumulate in the vessel walls, forming plaque and hardening the arteries

**macronutrients**

vital energy-yielding nutrients that are required in large quantities by the body; carbohydrates, including dietary fibre, fats and proteins

**marketing**

the action or business of promoting and selling products or services, including market research and advertising

**mechanical digestion**

involves physically breaking down food substances into smaller particles to more efficiently undergo chemical digestion

**media**

a means of mass communication such as broadcast, print and new media (electronic communication generated through digital technologies such as the internet)

**mental health**

the current state of wellbeing relating to the mind or brain and to the ability to think and process information. A mentally healthy brain enables an individual to positively form opinions, make decisions and use logic. Mental health is about the wellness of the mind rather than illness, and is associated with low levels of stress and anxiety, positive self-esteem, and a sense of confidence and optimism

**methodologist**

oversees research to ensure that the collection and analysis of data is conducted in an appropriate, transparent, unbiased and accurate manner

**microbiome**

collective term that describes the many micro-organisms that live in the human body in different environments. The different environments include the gut, the mouth, skin, lungs and so on. It is the relationship between the microbial cells and the body's genetic material

**microbiota**

the wide variety of micro-organisms (microbiome), including fungi, yeast and bacteria, that live in the gut

**micronutrients**

nutrients required by the body in small amounts; vitamins and minerals

**mindless eating**

consuming foods without full awareness or conscious thought about the process

**modelling**

the behaviour where parents and/or carers demonstrate nutritious eating habits. Modelling can be intentional or unintentional

**morbidity**

'ill health in an individual and levels of ill health within a population' (AIHW)

**mortality**

the numbers of deaths in a population in a given period

**neural tube defects**

birth defects of the brain, spine or spinal cord, including spina bifida and anencephaly

**Nutrient Reference Values (NRV)**

recommendations of the amounts of nutrients required on an average daily basis for adequate physiological function and the prevention of disease

**nutrients**

the chemical compounds found in food that are used by the body to function effectively during periods of growth or during pregnancy and to repair the body

**nutrition content claim**

a statement made by a manufacturer about the amount of a nutrient, energy or a biologically active substance in the food

**nutritional efficacy**

the effectiveness of the nutritional information

**obesity**

a condition in which a person's weight is 20 per cent or more above 'normal' weight, or they have a body mass index (BMI) of 30 or more

**organic farming**

farming practices that produce food without the use of artificial chemicals

**osteoporosis**

a medical condition where bones become brittle and fragile. It is usually seen in older people as a result of hormonal changes and/or a deficiency in calcium and/or vitamin D

**passive consumers**

consumers who don't actively consider the impact of their food choices or challenge issues within the food systems

**peristalsis**

the involuntary constriction and relaxation of the muscles that move food through the digestive tract

**pester power**

the ability of children to pressurise their parents into buying them a particular product through constant nagging

**pesticide**

a chemical substance used in agriculture to kill pests

**physical health**

relates to the functioning of the body and its systems. It includes the physical capacity to perform daily activities or tasks

**phytochemicals**

compounds found in plant material that can provide health benefits and act as antioxidants

**prebiotics**

the fuel for beneficial bacteria in the gut

**prevalence**

the number of people in a population who have a particular characteristic at a specific point in time or period of time

**primary production**

the production, growing or rearing of raw materials (e.g. harvesting)

**probiotics**

foods that contain live, healthful bacteria. They are foods that maintain a healthy balance of bacteria in the intestine

**recyclable**

material that is able to be used again after processing

**repetition**

being offered the same healthy foods a number of times, creating a familiarity with nutritious foods

**repurpose**

to use something for a different purpose to the one it was originally intended

**restrictive diet**

limits the intake of a particular food, food groups or overall energy consumption; often associated with the desire to lose weight

**salinity**

the presence of excess salt in soil due to the rising of the water table bringing natural salts to the surface of the land

**satiety**

the feeling of being full after consuming an adequate amount of food

**sedentary**

describes a lifestyle that involves little or no physical activity. It is usually characterised by minimal energy expenditure, such as sitting

**sedentary behaviour**

'a state in which body movement is minimal, such as sitting time while watching television, reading, working at a computer, talking on the telephone, driving a car, or meditating' (NHMRC)

**sensory properties of food**

the characteristics of food that are detected by the senses

**simple carbohydrates**

sugars composed of monosaccharides (single sugar molecules) or disaccharides (two joined sugar molecules) such as glucose, sucrose, lactose and fructose

**social**

relates to interaction with other people

**social media**

internet-based applications that facilitate the exchange of user-generated content

**social media influencer**

a content creator who has built a large following across their social media platforms. Their wide reach, reputation, knowledge and relationships enable them to persuade others to act based on their recommendations

**sociocultural**

relates to the interaction of social and cultural elements, such as family, peers, identity, community, religion and traditions

**soil acidification**

a process where soil pH decreases to the detriment of many plants that best grow in a specific range

**soil erosion**

the wearing away of land by weather conditions: water, rain, wind and ice

**sustainable**

to be able to be continually used without depleting; something that can be ensured for both current and future generations

**systematic literature review**

a comprehensive and objective study that uses explicit repeatable methodology in order to identify, assess and synthesise existing relevant literature on a specific topic in order to answer a clearly formulated question

**type 2 diabetes**

a condition in which the body becomes resistant to the normal effects of insulin and/or gradually loses the capacity to produce enough insulin in the pancreas, thus putting healthy blood glucose levels at risk

**umami**

a Japanese word translated as 'pleasant savoury taste'; one of the five basic tastes

**utilisation**

how the body uses nutrients

**viruses**

microscopic parasites that are food-borne or water-borne. They cause viral infections that result in illnesses in humans

**whole foods**

this refers to foods themselves (e.g. fruit, vegetables, bread, meat and milk) and not the food components they contain, such as fibre, protein, iron and calcium

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Michael Powell (Cauliflower florets) / alex\_skp (Cauliflower whole) / Cristina Alexe (Cauliflower rice) / Alina555 (Cayenne Pepper) / omersukrugoksu (Celeriac) / Floortje (Celery/diced) / pamelad\_mcadams (Charcuterie) / fcafotodigital (Celery sticks) Lilkin (Fetta) / Yevgen Romanenko (Cheese grated) / burwellphotography (Cheese slices) / Yevgen Romanenko (Cheese Swiss) / chorboon\_photo (Cheese/mozzarella) / Richard Coombs (Chick peas) / Diana Taliun (Chicken/thigh/fillets) / Yulia Naumenko (Chilli) / Hafiz Ismail (Chilli/chopped) / JoKMedia (Chilli flakes) / burwellphotography (Cinnamon/stick/powder) / iprachenko (Coconut cream) / PicturePartners (Coconut/Coconut oil) / Halldark (Cordial) / Creative Crop (Coriander) / hongquang09 (Coriander/chopped) / a-Taiga (Corn) / Corn/frozen (AlasdairJames) / Creativeeye99 (Cos lettuce), 3.5 (1 left & right) / SvetlanaK (Couscous) / Winston Gambatto (Cream/bowl) / Basilios1 (Cream cheese) / vikif (Crème Fraiche) / Sarawut Kaewboonrueang (Cucumber) / robynmac (Cucumbers Lebanese) / lunanaranja (Cumin powder) / Iridenta Florescu / 500px (Currants) / fcafotodigital (Dairy) / Brian Hagiwara (Dairy products) / Suzifoo (Dijon mustard) / jirkaejc (Dijon mustard) / AtlasStudio (Dips) / kyoshino (Edamame) / macida (Egg fried) / J U N E-1989 (Egg) / domin\_domin (Egg/yolk/broken) / David Burton (Eggs) / PicturePartners (Endive) / Brian Hagiwara (Energy drink) / HUIZENG HU (Fish) / Floortje (Fish variety) / Lauren Burke (Flour/jar/spoon) / baibaz (Flour/plain) / Remains (Flour/self-raising) / KrimKate (Freekeh) / Peter Dazeley (Fruit and vegetables box) / lunanaranja (Garam Masala) / Oksana Ermak (Garlic minced) / Nattawut Lakjit (Garlic + cloves) / Afrumgartz (Ginger ground) / Tim UR (Ginger pickled) / Tetra Images (Ginger) / Simon Murrell (Grains/beans), 4.6 (2) / Simon Murrell (Grains) / PicturePartners (Harissa paste/green/red/chillis) / Lena\_Zajchikova (Healthy fat foods) / JoKMedia (Herbs/dry/basil) / JoKMedia (Herbs mixed) / SPL (Herbs + spices) / Yevgen Romanenko (honey) / Dorling Kindersley:Dave King (Hummus) / Luis\_Molinero (Jar) / Dimitris66 (Kefir glass and bowl) / bedo (Kimchi) / Jimmy Alim (Kiwi fruit) / AlisLuch (Kombucha) / Antoniu Rosu / 500px (Lassi) / Martin Barraud (Leafy green vegetables), 4.7 (1) / SimicVojislav (Leek) / Nattawut Lakjit / (Lemon) / Brian Hagiwara (Lemon zest) / Jenny Dettrick (Lentils), 4.4 (3) / ManuWe (Lentils red) / Andrzej Siwec (Lettuce leaf) / mikroman6 (Lettuce iceberg) / I Rozenbaum (Lime) / Mr.nutnuchit Phutsawagun (Lime quartered) / HamidEbrahimi (Lime/ Lemon juice bottle) / Peter Dazeley (Lollies) / stray\_cat (Macadamia nuts) / ma-no (Macarons matcha) / ALEAIMAGE (Margarine) / hdagli (Mayonnaise) / EddWestmacott (Meat-Kangaroo) / Finn (Meat-plant based) / robynmac (Meats) / eAlisa (Meats-lean) / anmbph (Meats-processed) / Tetra Images (chicken/beef/seafood) / Jeffrey Coolidge (meat/beans/seafood) / L Callvetti/SPL (Milk/glass) / Chris Stein (Milk-measuring cup) / Mo Semsem (Milk-skim) / Fascinadora (Milkshake) / Floortje (Mince-Beef) / Claudia Totir (Mint-bunch) / Floortje (Miso Soup) / Michelle Lee Photography (Molasses) / egal (Muffin papers) / sanapadh (Muffin tray) / Jamakosy (Mustard) / Nora Carol Photography (Oats) / Neosiam (Oil-Macadamia nut) / stuartbur (Oil sunflower) / Brian Hagiwara (Oil olive tbs) / Okea (Oil olive tsp) / Victoriano Izquierdo (Olive oil bottle) / Image Studios (Olives) / Image Studios (Olives preserved) / Juanmonino (Olives) / AlexyPnferov (shallot) / Floortje (Artichoke hearts) / PicturePartners (capers) Nenov (Onion brown) / Nicole Lienemann (Onion red) / SPL (Orange juice) / Richard Clark (Oregano) / Richard Clark (Paprika) / Massimiliano Clari (Parmesan) / mescioglu (Parsley) / PicturePartners (Parsnips) / anilakkus (Pasta) / R.Tsubin (Pasta spiral) / (Peas frozen) Oksana Ermak / Sergio Delle Vedove (Pepper) / Joff Lee (Pickle) / Lena\_Zajchikova (Pies) / timsa (Pine nuts) / Isabelle Rozenbaum (Pineapple) / AYImages / (Pineapple/glass) / Taras Dovhych (Pineapple/ pieces) / Taras Dovhych (Pineapple/ring) / Melanie Hobson (Pistachio) / Juanmonino (Pita bread) / Brian Hagiwar (Pomegranate/cut) / Ivaylo Ivanov (Pomegranate) / Basilios1 (Pork loin) / Yevgen Romanenko (Potato) / Douglas Sacha (Potato black) / Ekaterina Kapranova (Probiotic) / Dmitriy Sidor (Probiotic/fermented foods) / R.Tsubin (Prunes), 4.5 (2) / Brian Hagiwara (Pumpkin), 3.5 (4 right) / YuanruLi (Pumpkin peices) /

Jon Stokes (Pumpkin seeds) / sarahdoow (Quinoa) / Happycreator Kong-Im (Red kidney beans) / Barcin (Rice Basmati) / Nattawut Lakjit (Rice brown) / AlasdairJames (Rice white) / Kondor83 (Rice wild) / Picture Partners (Rice vinegar) / ConstantinosZ (Saffron) / (Salami) esemelwe / Jonathan Kantor (Salmon) / TheCrimsonMonkey (Salsa sauce) / Nattawut Lakjit (Salt) / MirageC (Salt rock) / MediaProduction (Salt tsp) / Glowimages (Salt & Pepper) / spline\_x (Saltbush) / hydrangea100 (Sauerkraut) / omersukrugoksu (Seaweed) / M Hobson (Seeds) / sunstock (Sesame oil) / John White Photos (Shellfish/seafood) / levkr (Silverbeet), 4.4 (1) / fcafotodigital (Sliced ham) / Sean Gladwell (Sourdough bread) / design56 (Soy sauce) / lunanaranja (Spices) / SPL (Spices) / Aitor Muñoz Muñoz (Spices sesame) / Poh Kim Yeoh (Spinach) / Creativ Studio Heinemann (Pomegranate seeds) (Soy sauce) (Snack foods) (Spinach leaves), 4.4 (2), (Nuts) (Meat-lean steak), 4.4 (4) (Curry powder) (Apple slices) (Beetroot) / (Berries mixed) / Tom Blizzard (Sugar/brown) / AlasdairJames (Sugar) / trigga (Sugar/cup) / Jon Sotkes (Sunflower seeds) / Yevgen Romanenko (nori sheet) / AlasdairJames (Sushi rice) / Floortje (Sweet potato) / Kwanisik (Tahini) / xamtiw (Tahini) / sarahdoow (seasoning) / Nikhil Patil (seasoning/spoons) / Floortje (Thyme) / koosen (Tofu) / Membio (tomato) / Richard Coombs (Tomato/chopped) / PicturePartners (Tomato paste) / Mayamo (Tomato Sauce) / masa44 (Tomato/tin) / Jimmy Alim (Tomatoes/cherry) / Jim Cochrane (Tomato sundried) / Brian Hagiwara (Tuna) / Nattawut Lakjit (Turmeric) / C Wachiprasri (Turmeric powder) / SvetlanaK (vinegar/oil) / Liudmila Chernetska (Vegetable stock) / PicturePartners (rice vinegar) / SvetlanaK (white vinegar) / Brian Macdonald (Vinegar – balsamic) / Candy\_Vandy (Wasabi) / Sean Gladwell (Water) / frahaus (Water/glass) / kyoshino (Water/ measuring jug) / Alina555 (Wattle seed) / robynmac (Wheat) / robynmac (Wholegrain/mustard) / Wombok (Oat\_Phawat) / kuppa\_rock (Worcestershire sauce) / timsa (Yeast) / videofe (Yeast tsp) / Magone (Yogurt Greek) / Han Van Vonno (Yogurt/bowl) / Pacharee Watanakul (Zucchini), 3.5 2 (left & right) / Eskay Lim (Ground Coriander) / Richard Coombs (Chickpeas), 4.4 (5) / Dimitris66 (Arborio rice) / pejft (Peas/corn) / Michelle Arnold (Mustard powder) / Westend61 (Eggplant) / StockFood (Cranberries) / Marieke Feenstra (Dried Basil) / fcafotodigital (Legumes) / Peter Dazeley (Chocolate), 4.19 (2) / bonchan (Fufu) / Matthias Kulka (Ice cream cone) / Basilio1 (custard) / JohnGollop (soft cheese) / Angela Bax (Cake/dessert) / deepblue4you (Lactose free/yogurt) / klenova (Lactose free products) / BWFolsom (protein bar) / Lentils, Miriam2009, 4.5 (3); © WHO, p.xxv; Based on The Food Safety Information Council, 0003; Mariana Ruiz, Jmarchn, WC/PD, public domain, 1.2; © NHMRC / CC By 4.0 Int'l Licence, 3.1, 3.7, 3.11 (top & bottom), 3.12, 3.18, 3.13, 3.21, 3.23, 3.24, 3.29; © Food Standards ANZ/CC By 3.0 Licence, 4.12; Dept of Gastroenterology, Monash University. Table reproduced with permission from Monash University (monashfodmap.com). Download the Monash University FODMAP Diet App for a comprehensive food guide containing the FODMAP ratings and serving sizes for hundreds of different foods and beverages. Available on iOS and Android, Table 4.6; AIHW, 5.1, 5.2; © Copyright CSIRO Aust., (date of first publication)", 5.3; © Obesity Policy Coalition, 7.22; © Nutrition Australia, 7.24; © Qukes® part of the Perfection family of fresh Australian produce, 7.27; © FSANZ/CC BY 3.0, 10.2; © FAO, 2022 Hunger and food insecurity. Reproduced with permission, 11.7; © Foodbank, p.287; © OzHarvest, p.287; © FareShare p.287, 10.10, 10.11; © WRI/CC By 4.0, 11.13; Based on McLeroy, Bibeau, Steckler, & Glanz (1988) / Aus Gov AIFS/CC By 4.0 Int'l Licence, 11.11; © Braelands Beef & Lamb, 13.18; © Vow Food, 13.9; 'How fertilisers can lead to soil acidification' © State of Western Aust. (Dept of Primary Industries & Regional Dev., WA, 14.3; Aust Gov: Dept of the Environment & Energy © Dept of Agriculture, Water & the Environment/CC By 4.0 Int'l Licence, 14.39; **Text:** 'Gut microbiota and diet: an introduction', The Food & Mood Centre at Deakin University, Astrid Bovell, Activity 2.1; 'A review of the evidence to address targeted questions to inform the revision of the Aust Dietary Guidelines' © NHMRC/CC By 4.0 Int'l Licence, 3.3; © We are Social

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