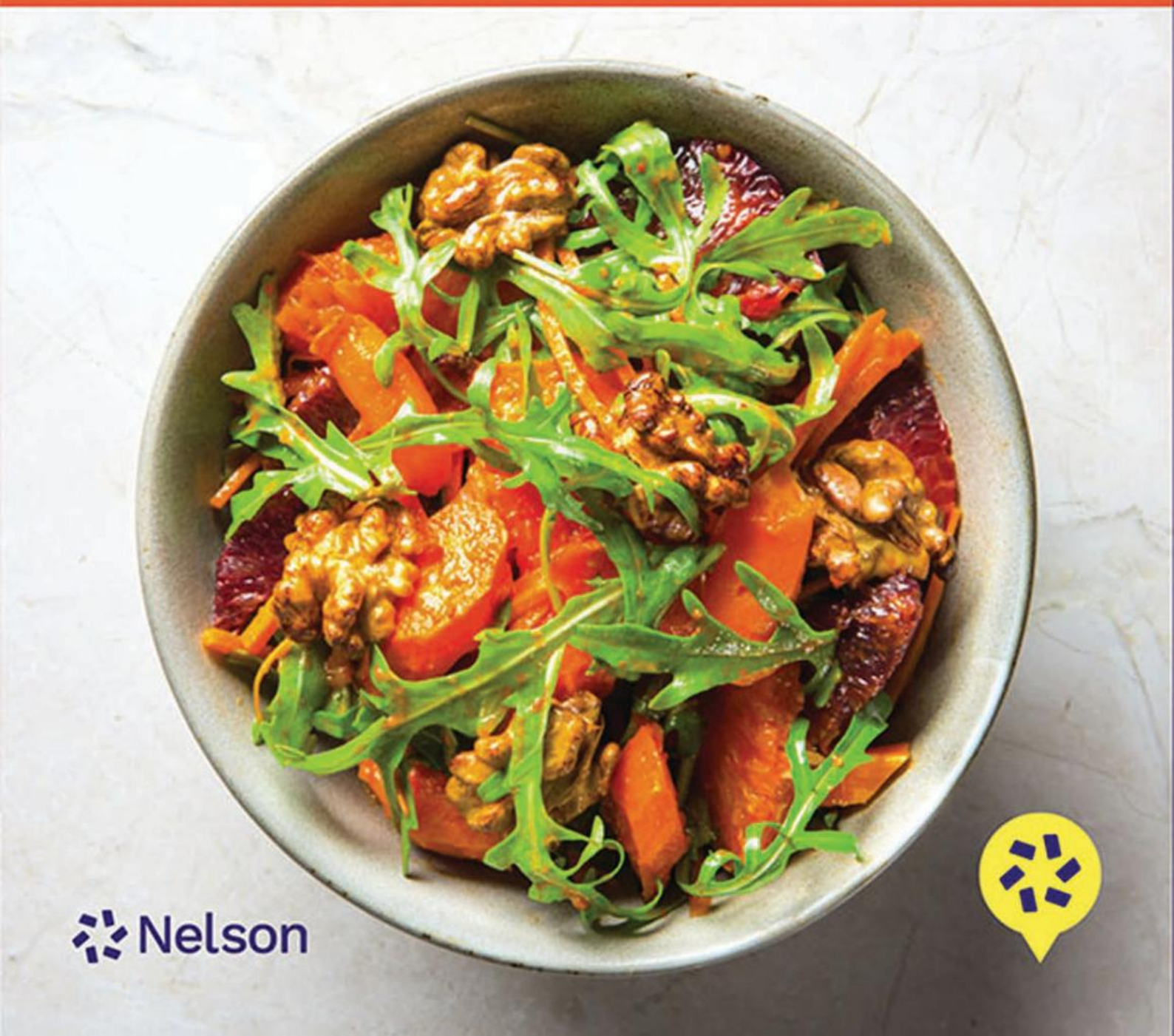
FOOD SOLUTIONS

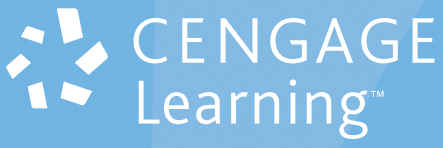
Food Studies
Units 1 & 2

5TH EDITION

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



Nelson



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FOOD SOLUTIONS

Food Studies
Units 1 & 2

5TH EDITION

Nelson

Food Solutions: Food Studies Units 1 & 2
5th Edition
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Laurel Tully
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ISBN 9780170454643

Publisher: Caroline Williams
Project editor: Alana Faigen
Editor: Natasha Broadstock
Proofreader: Angela Dennis
Indexer: Max McMaster
Series text design: Danielle Maccarone
Cover image: Mark Fergus
Cover image styled by: Melanie Vandegraaff
Permissions researcher: Catherine Kerstjens
Production controller: Karen Young
Typeset by: Lumina Datamatics
First Nations sensitivity reading: Dr Mark Lock (Ngiyampaa)

Any URLs contained in this publication were checked for currency during the production process. Note, however, that the publisher cannot vouch for the ongoing currency of URLs.

Acknowledgements
The publisher would like to thank:
Mark Fergus, photographer and stylist
Melanie Vandegraaff, chef and stylist
Rhonda Fergus, photo shoot production
Cedar Hospitality Supplies, provider of tableware



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National Library of Australia Cataloguing-in-Publication Data
A catalogue record for this book is available from the National Library of Australia.

Cengage Learning Australia
Level 7, 80 Dorcas Street
South Melbourne, Victoria Australia 3205

Cengage Learning New Zealand
Unit 4B Rosedale Office Park
331 Rosedale Road, Albany, North Shore 0632, NZ

For learning solutions, visit **cengage.com.au**

Printed in Singapore by 1010 Printing International Limited.
1 2 3 4 5 6 7 26 25 24 23 22

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ABOUT THIS BOOK

The fifth edition of *Food Solutions Units 1 & 2* has been written to meet the VCE Food Studies Study Design 2023–27.

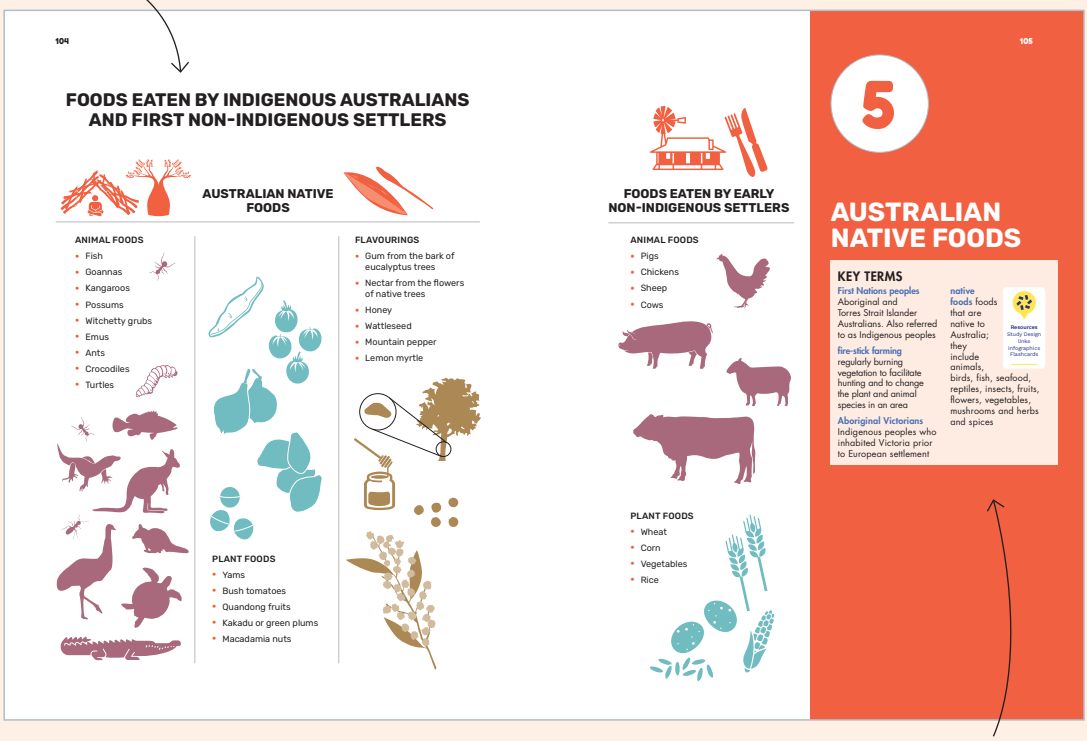
The trusted and well-respected author team have drawn on their vast experience and knowledge of Food Studies both as teachers and examiners to create a new edition that retains in-depth coverage of the Study Design as well as the key features that you have come to expect in this long-standing and successful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

- new and on-trend recipe dishes from around the world included in each chapter
- practical activities

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

Infographics

Visually engaging infographics scaffold key information contained within each chapter.



Key terms

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



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ALTERNATIVE TYPES OF FOOD SYSTEMS

Australia's current food system is complex and can involve both conventional or industrialised features as well as alternative systems such as organic and local food systems. Food is also imported into Australia from many countries across the world through the global food system.

Organic food systems

An organic food system is one that involves growing and producing food without the use of synthetic chemicals such as pesticides and artificial fertilisers. Genetic modification and food irradiation are also prohibited in an organic food system. These strategies ensure that the food production system sustains the health of soils and ecosystems as well as the health of the people who consume the food produced in this system.

Local food systems

Local food systems may involve organic food production and are associated with small-scale independent producers who are concerned about their environmental stewardship. A key feature of a local food system is that it aims to shorten the distance between where the food is grown and where it is sold to consumers. Local food markets and farmers' markets are a key feature of local food systems where consumers can have direct interaction with the fruit and vegetable farmer, cheese maker, butcher, baker or producer of jams and chutneys. A key advantage of a local food system for many consumers is that it gives them the opportunity to exercise their food sovereignty and food citizenship by purchasing nutritious food that has been ethically and sustainably produced.

Global food systems

Food is produced in every country across the globe. The components of a food system will be similar regardless of the individual country, in that they all involve farmers and other primary food producers, commercial food manufacturers, food consumption, transportation of food between sectors, food waste and food citizenship. Given the availability of high-speed air transport and the ability to move large volumes of raw or processed food products on bulk carrier ships, food can be easily, safely and reliably transported from one side of the world to the other. This enables consumers to have access to specific products that may not be made locally, that are out of season in the northern hemisphere or that can be purchased at a lower price than similar locally produced food products. For example, grapes or stone fruit that are in season during Australia's summer months are often flown in from America so that consumers can have access to these fruits during our winter months if they wish to purchase them.

Local farmers' markets allow consumers to have direct interaction with the farmers who produce their food.

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Activity 9.1

Coles Group sustainability strategies

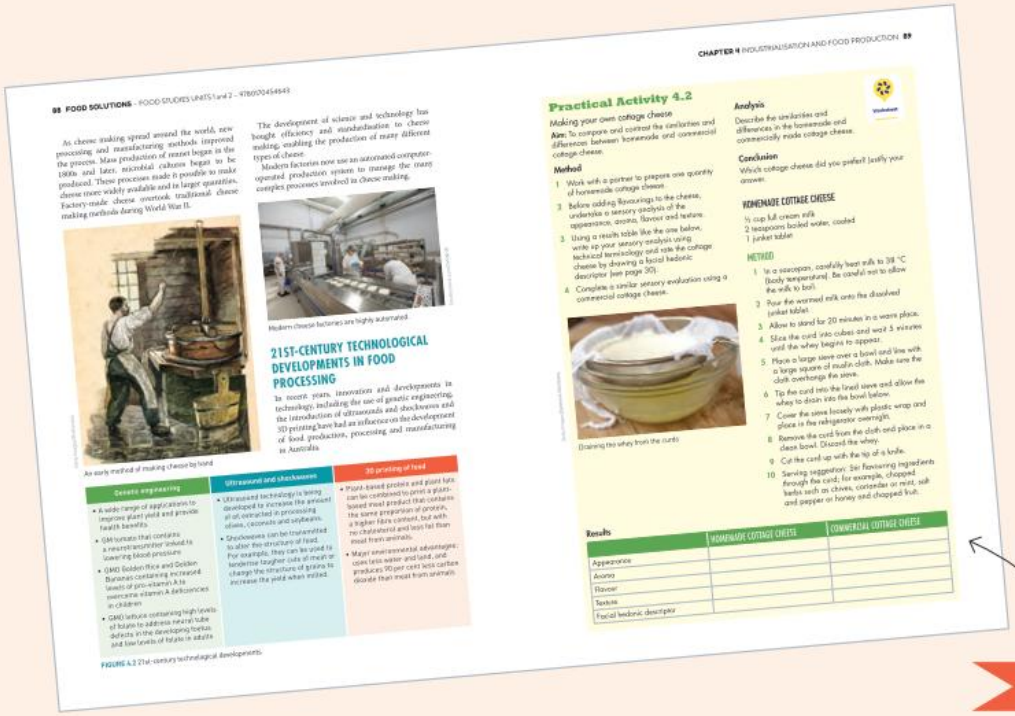
Coles Group is an example of a large-scale Australian business working towards becoming more environmentally sustainable in all areas of their retail food supply system. The Coles Sustainability Report brings together its Together to Zero and Better Together initiatives. In addressing sustainability, the company is taking strides to ensure food security for both Australia as a nation, and Australian consumers.

1 Search for and read the article 'Coles Moonee Ponds sets a new benchmark for sustainability and innovation', which is featured on the Coles website.
2 Review the information on Coles Group's sustainability initiatives on its website in the Sustainability section.
3 Identify one new initiative Coles has implemented in each section of the food system. Highlight it in a table like the one below and explain how it will improve environmental or economic sustainability, or food sovereignty.

ASPECT OF THE FOOD SYSTEM	COLES INITIATIVE	HOW THE STRATEGY IMPROVES SUSTAINABILITY OR FOOD SOVEREIGNTY
Primary food production – crops, animals for food, agricultural inputs		
Ingredients processing and manufacturing of food products		
Packaging		
Food distribution		
Food marketing and retailing		
Food consumption		
Waste management and recycling		

Activities

A range of exercises that address and reinforce learning outcomes.



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As cheese making spread around the world, new processing and manufacturing methods improved the process. Mass production of rennet began in the 1800s and later, microbial cultures began to be produced. These processes made it possible to make cheese more widely available and in larger quantities. Factory-made cheese overtook traditional cheese making methods during World War II.

The development of science and technology has brought efficiency and standardisation to cheese making, enabling the production of many different types of cheese.

Modern factories now use an automated computer-operated production system to manage the many complex processes involved in cheese making.

An early method of making cheese by hand

Modern cheese factories are highly automated

21ST-CENTURY TECHNOLOGICAL DEVELOPMENTS IN FOOD PROCESSING

In recent years, innovation and developments in technology, including the use of genetic engineering, the introduction of ultrasounds and shockwaves and 3D printing have had an influence on the development of food production, processing and manufacturing in Australia.

Genetic engineering	Ultrasound and shockwaves	3D printing of food
• A wide range of applications to improve plant yield and provide health benefits • GM tomato that contains a neurotransmitter linked to lowering blood pressure • GMO Golden Rice and Golden Bananas containing increased levels of pro-vitamin A to overcome vitamin A deficiencies in children • GMO lettuce containing high levels of folate to address neural tube defects in the developing foetus and low levels of folate in adults	• Ultrasound technology is being developed to increase the amount of oil extracted in processing olives, canolas and soybeans. • Shockwaves can be instrumental to alter the structure of food. For example, they can be used to tenderise tougher cuts of meat or change the structure of grains to increase the yield when milled.	• Plant-based protein and plant fats can be combined to print a gluten-based meat product that contains the same proportion of protein, a higher fibre content, but with no cholesterol and less fat than meat from animals. • Major environmental advantages: uses less water and land, and produces 90 per cent less carbon dioxide than meat from animals.

FIGURE 4.2 21st-century technological developments

CHAPTER 4 INDUSTRIALISATION AND FOOD PRODUCTION 99

Practical Activity 4.2

Making your own cottage cheese

Aim: To compare and contrast the similarities and differences between homemade and commercial cottage cheese.

Method

1 Work with a partner to prepare one quantity of homemade cottage cheese.
2 Before adding flavourings to the cheese, undertake a sensory analysis of the appearance, aroma, flavour and texture.
3 Using a results table like the one below, write up your sensory analysis using technical terminology and rate the cottage cheese by drawing a facial hedonic descriptor (see page 95).
4 Complete a similar sensory evaluation using a commercial cottage cheese.

Draining the whey from the curds

Analysis

Describe the similarities and differences in the homemade and commercially made cottage cheese.

Conclusion

Which cottage cheese did you prefer? Justify your answer.

HOMEMADE COTTAGE CHEESE

½ cup full cream milk
2 teaspoons boiled water, cooled
1 junket tablet

METHOD

1 In a saucepan, carefully heat milk to 38 °C (body temperature). Be careful not to allow the milk to boil.
2 Pour the warmed milk onto the dissolved junket tablet.
3 Allow to stand for 20 minutes in a warm place.
4 Slice the curd into cubes and wait 5 minutes until the whey begins to appear.
5 Place a large sieve over a bowl and line with a large square of muslin cloth. Make sure the cloth overhangs the sieve.
6 Tip the curd into the lined sieve and allow the whey to drain into the bowl below.
7 Cover the sieve loosely with plastic wrap and place in the refrigerator overnight.
8 Remove the curd from the cloth and place in a clean bowl. Discard the whey.
9 Cut the curd up with the tip of a knife.
10 Serving suggestion: Stir flavouring ingredients through the curd; for example, chopped herbs such as chives, coriander or mint, salt and pepper or honey and chopped fruit.

Results

	HOMEMADE COTTAGE CHEESE	COMMERCIAL COTTAGE CHEESE
Appearance		
Aroma		
Flavour		
Texture		
Facial hedonic descriptor		

Practical activities

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



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Victoria Street in the Melbourne suburb of Richmond is often called 'Little Saigon'. The street is lined with many Vietnamese restaurants, greengrocers, grocery stores and butcher shops. The Footscray market in Melbourne's north boasts the largest selection of Asian produce in inner Melbourne, selling an enormous array of fruit, vegetables, meat, fish and grocery items that are integral to Vietnamese cuisine. Similarly, Springvale in Melbourne's south has a vast number of stores and markets selling Vietnamese produce to the local community, and shoppers come to the area specifically to find the Vietnamese ingredients they love. Today, the traditional ingredients of Vietnam, such as fish sauce, lemongrass and Vietnamese mint, have become commonplace and many Australians, regardless of their heritage, use them in their everyday cooking.

Vietnamese restaurants are a common sight throughout Australia and are seen as being great family restaurants because of their distinctive cuisine, with its fresh, light flavours and fragrant aromas. Dishes such as pho, broken rice, chicken salad with hot mint and fish with green mangoes are some of the dishes found in many of these restaurants.

The popularity of Vietnamese food amongst the wider community has paved the way for Vietnamese food to become a popular takeaway choice, with franchises such as Roll'd focusing their menu on traditional Vietnamese street food such as rice paper rolls, pho or noodle soup, noodle salads, Vietnamese pancakes and a dish called com tam (or broken rice).

Roll'd is a chain that serves Vietnamese street food.

Activity 7.1

Luke Nguyen

Luke Nguyen, a Vietnamese-Australian chef, is the host of a popular television series – *Luke Nguyen's Vietnam*. This program has been aired on SBS television and documents Luke's culinary journey through the country of his ancestors. Luke was born in a refugee camp in Thailand after his parents fled Vietnam following the war. His parents settled in Sydney where he grew up and later opened his award-winning restaurant, The Red Lantern.

While documenting his love of Vietnamese food, he has also produced many shows, such as *Street Food Asia* and *Railway Vietnam*, taking Australian food lovers to discover foods in places such as France, the United Kingdom and the Greater Mekong.

Luke is a great communicator, and his shows are among the most popular on SBS Food.

Luke Nguyen

View one of the episodes of *Luke Nguyen's Vietnam* and answer the following questions.

1. Summarise the information Luke gives about two of the recipes he is about to prepare.
2. What ingredients are used to prepare each of the recipes Luke cooks?
3. Does Luke use any ingredients that are common to each of the recipes?
4. List four ingredients that you are unfamiliar with. Search for the ingredients online and briefly describe each of these ingredients and its uses.
5. What cooking methods does Luke use to prepare each of the recipes?
6. What serving suggestions does Luke give for each of the recipes he prepares?
7. List two examples of Vietnamese recipes or ingredients that are now commonly used in Australian modern cooking.

CHAPTER 7 THE IMPACT OF MIGRATION ON AUSTRALIAN CUISINE 165

Understanding the Text

1. Outline four features of the type of food eaten by the early settlers in Australia.
2. Draw a knowledge map to demonstrate the key points about the role of the Chinese in the availability and supply of food during the gold rush.
3. Explain how the Chinese community continued to influence the type of food consumed in Australia after the decline of the gold rush.
4. What impact did the migrants who arrived in Australia after World War II have on Australian cuisine?
5. Draw a simple timeline to demonstrate the spread of Italian cafés and food stores in the 1950s and 1960s.
6. Why was Hermann Schneider considered to be an influential figure in bringing international cuisine to Australia?
7. Outline the key factors that led to thousands of people fleeing Vietnam to seek refuge in Australia.
8. Prepare a table like the one below to demonstrate:
   - the strategies that members of the Vietnamese community used to access their traditional ingredients
   - the types of ingredients that were soon available for consumers to purchase.

Gaining access to Vietnamese ingredients	Types of Vietnamese ingredients

9. What role did recipe books such as those published by the *Australian Women's Weekly* play in introducing Australian cooks to the flavours of Vietnam?
10. Give three examples that show how the cuisine of Vietnam has become widely accepted by Australian consumers.

REFUGEE RESETTLEMENT IN AUSTRALIA

Since the early days of European settlement, Australia has welcomed refugees. War and the fear of persecution are the two key forces that drive people out of their home countries. Since the 1980s, thousands of people from Afghanistan, the Balkan States, the Democratic Republic of the Congo, East Timor, Eritrea, Ethiopia, Iran, Iraq, Myanmar, Pakistan, Somalia, Sri Lanka, Syria and Ukraine have sought refuge in Australia. These people have enriched the Australian community and brought their traditional food cultures and distinctive cuisines with them.

More than 7000 refugees from war-torn Afghanistan settled in Australia in the 1980s and 1990s. Today, there are close to 20 000 Afghanis living here. Afghan cuisine is influenced by the cuisines of neighbouring countries, particularly Iran, India and Mongolia. Herbs and spices, such as saffron, chilli, garam masala, cardamom, cinnamon, cumin, nutmeg, coriander and mint are key ingredients in their dishes. Rice is an important ingredient served at every meal and **chalau**, a simple dish of fluffy white rice, is a staple recipe. Many Afghanis have opened up restaurants across the country, giving Australians the opportunity to sample and enjoy this delicious cuisine.

Chalau is usually served with vegetables or stews in Afghan cuisine.

More recently, refugees from north-west African countries, including Eritrea, Somalia and Ethiopia have settled in Australia. As earlier migrants and refugees discovered, many of the traditional ingredients used in their homelands were initially hard to find in Australia. Somali food is a spicy mix of rich flavours and uses many of the spices from neighbouring Arab countries. Rice, garlic, coriander, chilli, cumin and cloves are key ingredients in Somali cuisine.

Understanding the Text

These sections are checkpoints for students' learning and appear at regular intervals throughout the text.

Case studies

These include real-life examples that broaden student understanding and link to the wider context of food production, distribution and manufacturing.



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Case study 2.1

The A1 Bakery

The A1 Bakery on Sydney Road, Brunswick, is one of Melbourne's leading Lebanese bakeries and Middle Eastern grocers. It was established in 1992 to provide Melburnians with authentic Lebanese cuisine. Today, The A1 Bakery operates a number of bakeries throughout Melbourne – its original store in Brunswick, as well as stores in Dandenong, Fairfield and Werribee.

The A1 Bakery sells a wide variety of breads such as their famous Turkish bread, a popular sourdough bread called *pide*, pocket breads, spelt or grain bread and a wide range of wholemeal, brown, white and organic seeded breads. In 1997, the owners of the A1 Bakery opened their own bread-manufacturing plant so that their hand-kneaded bread could be purchased in other parts of Melbourne.

Walking into the A1 Bakery is an exciting culinary experience. A vast array of pizzas and traditional Lebanese pies and pide, falafel or kebab, and delicious dips with Turkish bread are freshly made each day. The A1 Bakery grocery also sells a wide variety of oils, spice mixes, homemade dips and pickles.

The A1 Bakery, Sydney Road, Brunswick

A1 Bakery flavoured flat bread

Practical Activity 2.2

Cooking with Freekah

Tabouli is a dish traditionally associated with Lebanese. This dish originated in the mountain regions of Lebanon where it was originally made from bulgur. Bulgur is a variety of wheat grown in the region. This recipe is based on tabouli and uses freekah, which also originated in Lebanese.

Method

1. Work with a partner to prepare one quantity of freekah and tomato salad following the recipe provided on the next page.
2. Serve the freekah and tomato salad with shop-bought mini pocket bread.
3. Undertake a sensory analysis of the appearance, aroma, flavour, and texture of the freekah and tomato salad. Write up your sensory analysis using technical terminology.
4. After tasting the product, rate it using a facial hedonic descriptor like the one below.

CHAPTER 2 DEVELOPMENT OF FOOD CULTURES 31

FREEKEH AND TOMATO SALAD

1 cup water
½ cup freekah, washed and drained
1 tomato, finely diced
½ Lebanese cucumber, finely diced
2 spring onions, finely sliced
½ cup parsley, chopped
1 tablespoon mint, finely chopped
½ lemon, zest and juice
1 tablespoon oil
salt and pepper
4 mini pita pockets

METHOD

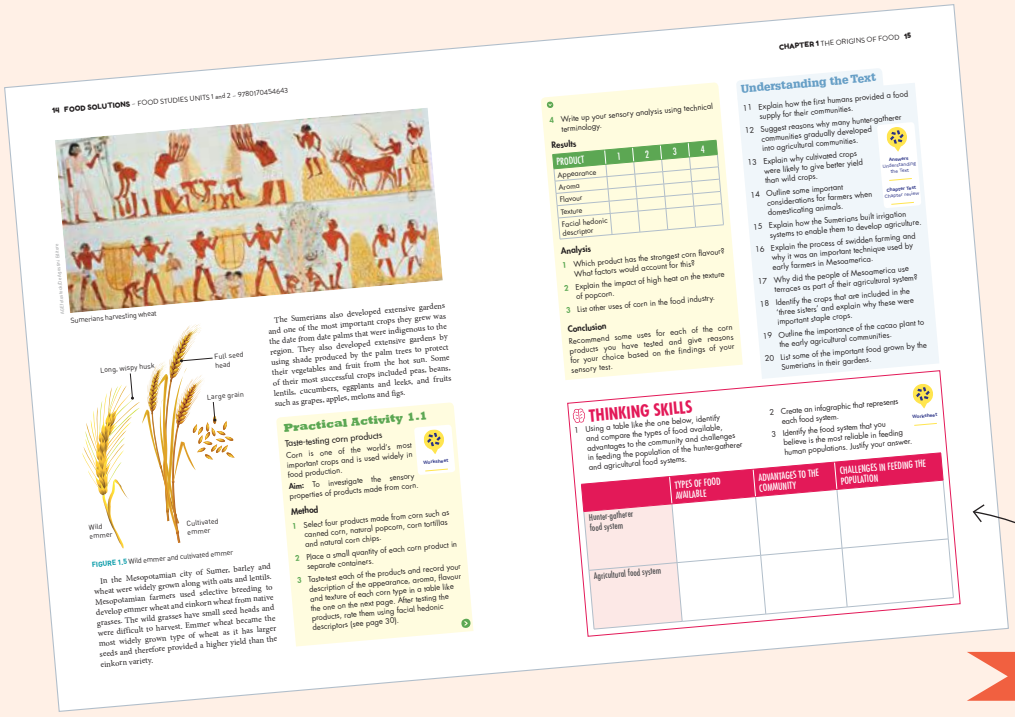
1. Bring the water to the boil in a small saucepan with a tight-fitting lid.
2. Add the freekah to the boiling water. Cover and simmer over a low heat for 20–25 minutes until tender. Drain if necessary.
3. Combine the freekah, tomato, cucumber, spring onions, parsley and mint.
4. Mix the lemon zest, lemon juice and oil and stir through the freekah mixture. Season with salt and pepper.
5. Carefully cut the mini pita pockets open and fill each one with a ¼ of the freekah and tomato salad.

Freekah

Understanding the Text

1. Explain the difference between food culture and cuisine.
2. Draw up a diagram to demonstrate the differences in the types of food available in the savannah-covered regions of central Africa compared with those in the dense rainforest regions of Africa.
3. Outline the reason why there was little external influence on Ethiopian cuisine until modern times.
4. Write a short paragraph to explain how geography, climate and religion have influenced food production in Ethiopia.
5. Draw up a knowledge map to demonstrate the importance of including *teff* in the diet.
6. Explain what is meant by the term the 'Fertile Crescent'.
7. Prepare a table like the one below to demonstrate the factors that influenced the development of agriculture in the Fertile Crescent around 9000 BCE and the staple crops that were grown at this time.

Types of crops grown	Factors influencing the development of agriculture



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Sumerians harvesting wheat

Long, wispy husk
Full seed head
Large grain
Wild emmer
Cultivated emmer

FIGURE 1.5 Wild emmer and cultivated emmer

In the Mesopotamian city of Sumer, barley and wheat were widely grown along with oats and lentils. Mesopotamian farmers used selective breeding to develop emmer wheat and einkorn wheat from native grasses. The wild grasses have small seed heads and were difficult to harvest. Emmer wheat became the most widely grown type of wheat as it has larger seeds and therefore provided a higher yield than the einkorn variety.

The Sumerians also developed extensive gardens and one of the most important crops they grew was the date from date palms that were indigenous to the region. They also developed extensive gardens by using shade produced by the palm trees to protect their vegetables and fruit from the hot sun. Some of their most successful crops included peas, beans, lentils, cucumbers, eggplants and leeks, and fruits such as grapes, apples, melons and figs.

Practical Activity 1.1

Taste-testing corn products

Corn is one of the world's most important crops and is used widely in food production.

Aim: To investigate the sensory properties of products made from corn.

Method

1 Select four products made from corn such as canned corn, natural popcorn, corn tortillas and natural corn chips.
2 Place a small quantity of each corn product in separate containers.
3 Taste-test each of the products and record your description of the appearance, aroma, flavour and texture of each corn type in a table like the one on the next page. After testing the products, rate them using facial hedonic descriptors (see page 30).

4 Write up your sensory analysis using technical terminology.

Results

PRODUCT	1	2	3	4
Appearance				
Aroma				
Flavour				
Texture				
Facial hedonic descriptor				

Analysis

1 Which product has the strongest corn flavour? What factors would account for this?
2 Explain the impact of high heat on the texture of popcorn.
3 List other uses of corn in the food industry.

Conclusion

Recommend some uses for each of the corn products you have tested and give reasons for your choice based on the findings of your sensory test.

Understanding the Text

11 Explain how the first humans provided a food supply for their communities.
12 Suggest reasons why many hunter-gatherer communities gradually developed into agricultural communities.
13 Explain why cultivated crops were likely to give better yield than wild crops.
14 Outline some important considerations for farmers when domesticating animals.
15 Explain how the Sumerians built irrigation systems to enable them to develop agriculture.
16 Explain the process of swidden farming and why it was an important technique used by early farmers in Mesoamerica.
17 Why did the people of Mesoamerica use terraces as part of their agricultural system?
18 Identify the crops that are included in the 'three sisters' and explain why these were important staple crops.
19 Outline the importance of the cacao plant to the early agricultural communities.
20 List some of the important food grown by the Sumerians in their gardens.

THINKING SKILLS

1 Using a table like the one below, identify and compare the types of food available, advantages to the community and challenges in feeding the population of the hunter-gatherer and agricultural food systems.
2 Create an infographic that represents each food system.
3 Identify the food system that you believe is the most reliable in feeding human populations. Justify your answer.

	TYPES OF FOOD AVAILABLE	ADVANTAGES TO THE COMMUNITY	CHALLENGES IN FEEDING THE POPULATION
Hunter-gatherer food system			
Agricultural food system			

Thinking skills

These sections appear at the end of each chapter to challenge students to apply, analyse and evaluate the information in the preceding chapter.

Recipes

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



RECIPE

130 FOOD SOLUTIONS - FOOD STUDIES UNITS 1 and 2 - 9780170454643

Chocolate and wattleseed self-saucing pudding

Wattleseed is an Australian native spice that gives a chocolate, coffee and hazelnut flavour and aroma to recipes. It is very versatile and can be used to flavour a wide variety of dishes; for example, biscuits, ice-cream and desserts such as this simple chocolate pudding.

CHOCOLATE AND WATTLESEED PUDDING

2 tablespoons boiling water
1 tablespoon wattleseeds
½ cup self-raising flour
1 tablespoon cocoa
40 grams butter
¼ cup brown sugar
1 egg, lightly beaten
¼ cup milk

SAUCE

½ cup brown sugar
1 tablespoon cocoa
¾ cup boiling water

METHOD

1 Pour boiling water over the wattleseeds and soak for 10 minutes. Strain through a fine strainer. Retain the wattleseed grounds.
2 Preheat the oven to 180 °C. Grease 2 individual oven-proof ramekins.
3 Sift the flour and cocoa into a medium bowl.
4 In a separate bowl, cream the butter and brown sugar until light and fluffy.
5 Add the egg gradually, a tablespoon at a time, into the creamed mixture, and beat until well-combined.
6 Stir in the sifted flour and cocoa mixture alternately with the milk. Gently stir through the retained wattleseed grounds.
7 Divide the pudding mixture evenly between the oven-proof ramekins.
8 To make the sauce, mix the brown sugar and cocoa. Sprinkle over the top of the puddings. Pour the boiling water gently over the top of the puddings.
9 Bake in the preheated oven for approximately 25 minutes until the puddings have risen and feel firm to touch.

EVALUATION

1 Describe the sensory properties of the chocolate and wattleseed self-saucing pudding using descriptive language.
2 Explain why the wattleseeds are soaked for 10 minutes in step 1 of the recipe.
3 Predict what would happen if you were to add the egg all at once in step 5 of the recipe rather than adding it gradually.
4 Why does the recipe recommend pouring the boiling water 'gently' over the top of the pudding?
5 Explain why nutritionists and dietitians recommend that desserts such as this should only be eaten occasionally.

Chocolate and wattleseed self-saucing pudding CHAPTER 5 AUSTRALIAN NATIVE FOODS 131

RECIPE

Recipes

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

Nelson acknowledges the Traditional Owners and Custodians of the lands of all First Nations Peoples of Australia. We pay respect to their Elders past and present. We recognise the continuing connection of First Nations Peoples to the land, air and waters, and thank them for protecting these lands, waters and ecosystems since time immemorial.

Warning – First Nations Australians are advised that this book and associated learning materials may contain images, videos or voices of deceased persons.

Nelson MindTap

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

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

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

Nelson MindTap for students

- Links to Key Knowledge and skills in the Study Design for each chapter
- Worksheets
- Activities/Collaborative Activities
- Weblinks
- Chapter review tests
- Answers to Understanding the Text questions
- Videos



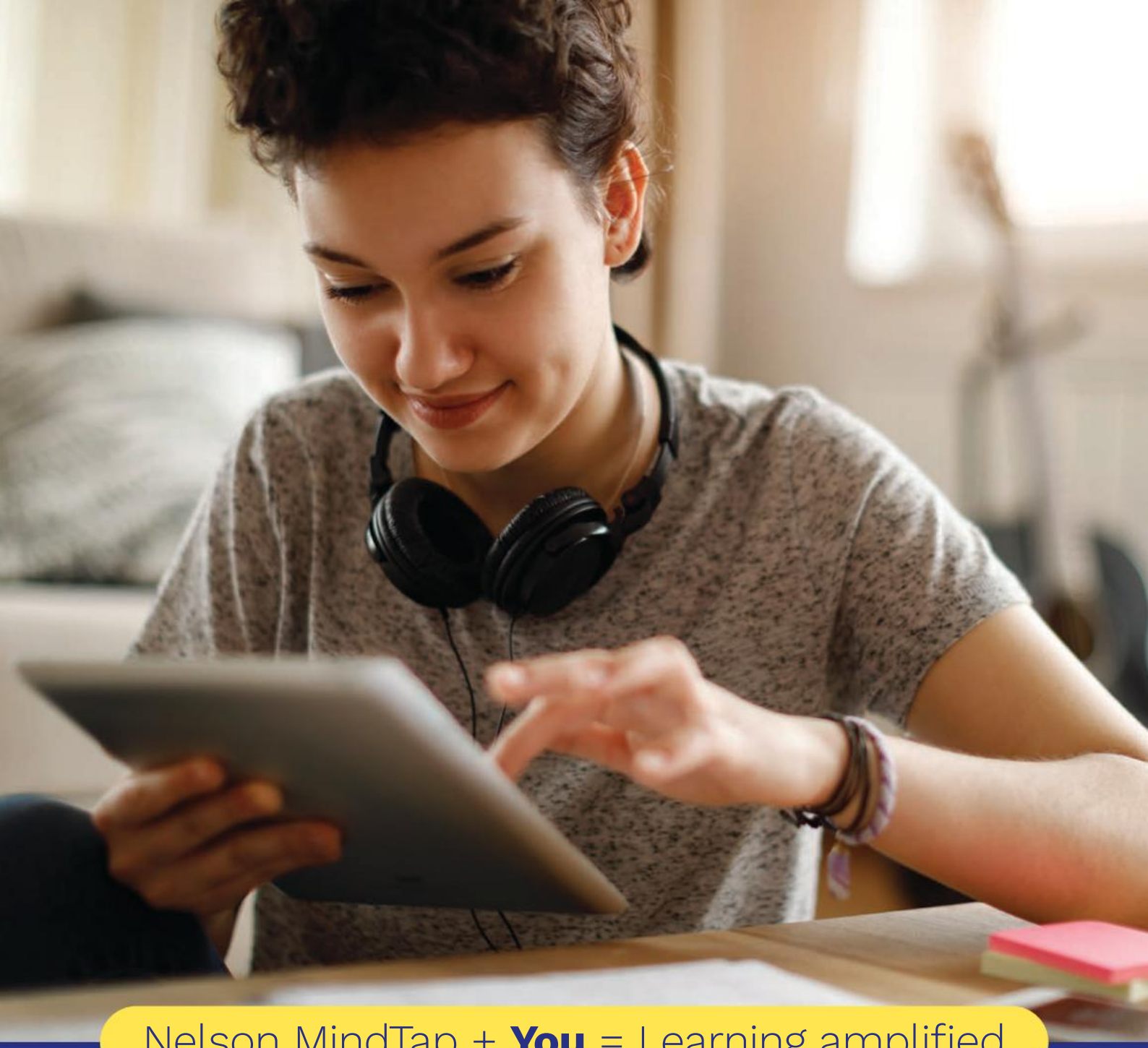




Nelson MindTap for teachers*

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

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— **Sarah,** Secondary School Teacher

KEY CONCEPTS IN FOOD STUDIES

FOOD SECURITY

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



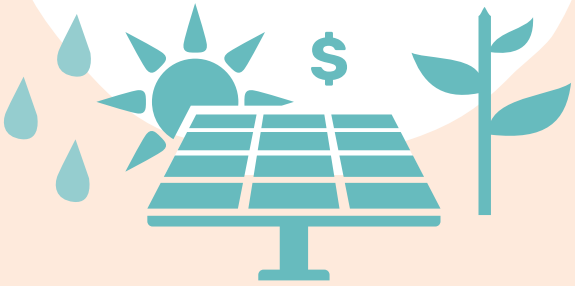
HEALTHY EATING

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



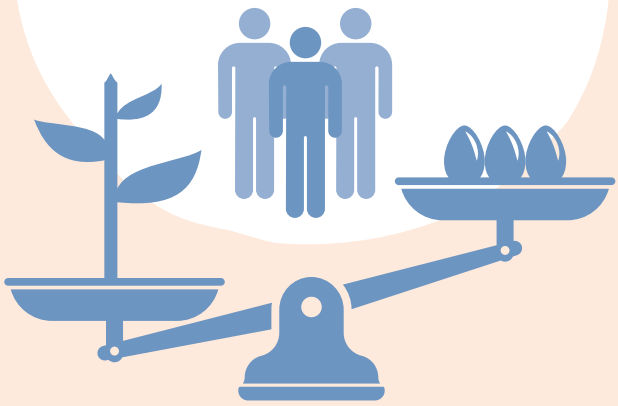
SUSTAINABILITY

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



FOOD CITIZENSHIP

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



FOOD SYSTEMS

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



FOOD SOVEREIGNTY

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



ABORIGINAL AND TORRES STRAIT ISLANDER KNOWLEDGE, CULTURE & HISTORY

The specialist knowledge and practices of Australia's First Nations peoples include food and cooking knowledge, food growing and preparation practices, and the social and kinship act of sharing meals.



INNOVATION & TECHNOLOGIES

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



ISSUES IN FOOD

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



HUNTER-GATHERER SOCIETIES



THE SAMI

GEOGRAPHIC LOCATION

The Sami are the indigenous people who live in the far northern Arctic and subarctic region of Europe, often referred to as Lapland. The region is very cold, mountainous and treeless.

LIFESTYLE

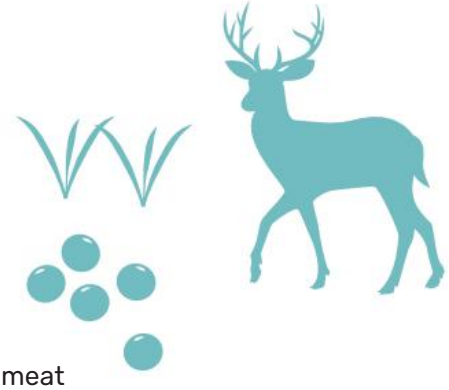
- The early Sami people lived in peat-covered huts.
- Traditional Sami society is based on a system of groups of two or three families living together in what is called a *siida*.



FOODS

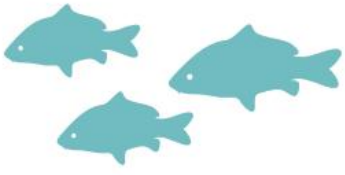
SUMMER

- Fish
- Berries
- Plants
- Meat
- Milk



WINTER

- Preserved meat
- Preserved fish



THE MBUTI PEOPLE

GEOGRAPHIC LOCATION

The Mbuti people live in the Ituri Forest, a tropical rainforest covering about 70 000 square kilometres of the Democratic Republic of the Congo, in central Africa.

LIFESTYLE

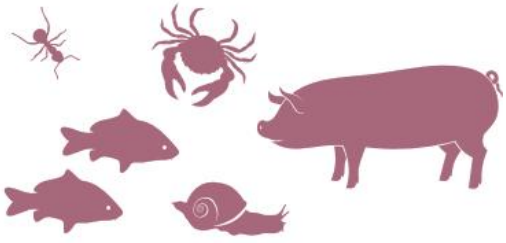
- The rainforest, streams and rivers provide for the basic needs of food, fresh water, firewood and clothing.
- The Mbuti people live in village groups called bands or kinship groups consisting of between seven and 30 families who each have their own hut.



FOODS

ANIMAL

- Crabs
- Ants
- Snails
- Pigs
- Monkeys
- Fish



VEGETABLE

- Wild yams
- Termite mushrooms
- Berries
- Leaves
- Honey



1

THE ORIGINS OF FOOD

KEY TERMS

agricultural food systems the establishment of early permanent settlements close to reliable water supplies, in order to plant and harvest crops, and to domesticate or tame animals such as dogs, goats and sheep

CE the abbreviation of Common Era or Current Era, the calendar era that we use in Australia

BCE the abbreviation of Before Common Era; that is, before the year 0

chinampas the plant beds built by Mayan farmers on floating plots of land

cultivate to deliberately sow and tend a crop on nearby land

domestication the process of using selective breeding to make wild plants and animals more useful to humans

food system the path that food travels from 'paddock to plate'

hunter-gatherer the term used to describe humans who obtain their food from nature, hunting animals and gathering wild plants

sedentary hunter-gatherer communities groups of people who settled in one place, near a rich food resource

swidden farming an agricultural technique that involves slashing and burning the plants in a forest to create fields to grow crops

Resources
Study Design links
Infographics
Flashcards

THE EARLY DEVELOPMENT OF FOOD SYSTEMS

DOMESTICATION OF ANIMALS 8000–2500 BCE

SELECTION

- Animals selected could survive on food, such as grass, that was not needed by the human population.
- They needed to reach their adult size quickly to become useful to humans.
- A quiet disposition was required, so they didn't endanger humans or panic when enclosed with other animals.



BREEDING

- The domesticated animals were selectively bred to develop positive traits such as size and strength.

USES

- Domesticated animals provided food, including meat, milk, cheese and butter.
- They were used for pulling farm machinery.
- Their skins were used for clothing.



Ancient hunter-gatherer societies

Collaborative Activity

The first humans were nomads who survived by hunting animals and gathering food from wild plants. They moved from place to place, according to the food that was available and the seasons of the year. They followed migrating herds of animals or sought shoals of fish, and gathered nuts, berries and other wild plants. Each day was spent searching for food, making tools such as spears and fishing nets, or building shelters so that they could survive.

Hunter-gatherer is the term used to describe humans who obtained their food from nature by hunting animals and gathering wild plants. Ten thousand years ago all humans lived this way. Hunter-gathering was a subsistence lifestyle that provided only the amount of food needed for the people to survive.

Hunter-gatherers were sometimes described as foragers; that is, people who obtained food by hunting, fishing or gathering plant matter. This was the most basic type of **food system**, which describes the path that food travels from 'paddock to plate'. In a hunter-gatherer community, the food system involved obtaining the food that was needed for that day or for the following few days. This meant there was no opportunity to grow or store food for the long term or as a safeguard of their food supply against adverse weather conditions.

FEATURES OF A HUNTER-GATHERER COMMUNITY

Hunter-gatherers were totally dependent on the natural food available and therefore they were mobile or nomadic, moving on when food supplies in the area were exhausted. Because they were nomadic, they needed to carry all their possessions with them as they moved from one location to another. They also needed to build a shelter when they moved to a new area and so constructed simple shelters with whatever material was available in the new region.

Hunter-gatherer societies tended to be made up of small groups of people, because large communities would quickly exhaust local food supplies. Societies were grouped according to kinship or tribes. The people lived together in cooperative groups, usually without a specific leader, as all men and women, young and old, were considered to have equal power and respect.

Because the group moved frequently in search of wild foods, women could not carry more than one baby at a time. By breastfeeding their children for at least four years, they were able to space births until their children were old enough to walk independently.



Alamy Stock Photo/Boyd Norton

Some hunter-gatherer societies still exist today, such as the Hadza, a people who live in small groups in northern Tanzania.

TYPES OF FOOD AVAILABLE

Hunter-gatherer societies developed differently depending on the food available in their natural surroundings. Some societies hunted big game or trapped smaller animals, while others fished in lakes, rivers or along the coast. They all collected fruit, roots, nuts and seeds depending on what grew in the area. Those hunter-gatherer societies that lived nearer to the equator where the temperatures were higher, depended more on gathering rather than hunting and fishing, which provided much of the food source in temperate regions.

Usually, the men were the hunters while the women and children undertook the gathering and the domestic tasks. The more gathering a society did, the more likely it was to be controlled by the women. By contrast, the more fishing and hunting the group used to obtain their food, the more control the men had in the group. Sharing was a central feature of hunter-gatherer societies, and when the hunter returned with meat, it was shared among the whole group.

ADVANTAGES AND ATTRIBUTES OF A HUNTER-GATHERER SOCIETY

The hunter-gatherer lifestyle provided many benefits for members of their community. They had a healthy diet, based mainly on plant foods, with some protein from the animals and fish they caught. They were physically active, moving from place to place in search of food as they hunted animals and gathered plants, roots and honey. This lifestyle was energy intensive, and consequently they stayed physically strong and healthy and did not gain excessive weight.

Because they relied on mobility as a survival strategy, knowledge, skill and teamwork were important, as members of the community hunted and gathered food. They had strong social connections within the group as they relied on each other to obtain food. As tasks were divided evenly amongst the members of the group based on need rather than hierarchy, there was a general sense of equality and harmony within the community. They were also very democratic communities, believing that all the available resources belonged to the group rather than to individuals.

CHALLENGES FACING HUNTER-GATHERER COMMUNITIES

One of the most significant challenges faced by hunter-gatherer communities was a dramatic change in climate. In approximately 12 900–11 700 BCE – that is, Before Common Era, or before the year 0 – the climate in the northern hemisphere suddenly became much cooler and dryer. This change in the climate caused shortages of food and often these nomadic people faced starvation after a natural disaster, such as drought, when there was little food available to forage. In addition, many of the hunters' first choice of prey, such as big-game species, began to die out when the grazing lands the animals relied on began to disappear as the climate changed.

Hunter-gatherer communities kept strict control over their population numbers to balance the availability of food resources such as animals, fish, nuts and berries with the number of people they could feed. However, as populations grew larger, there was a greater demand for food than the natural landscape could supply. As communities settled and mothers no longer needed to travel constantly with babies and young children, a family's birth spacing became shorter and communities grew much larger.

The Mbuti people

One indigenous hunter-gatherer society is the Mbuti people who inhabit the Congo rainforests of Africa. The Mbuti people live in the Ituri Forest, a tropical rainforest covering about 70 000 square kilometres of the Democratic Republic of the Congo, in central Africa. These people are hunter-gatherers and are one of the oldest indigenous cultures of the Congo region. Today, there are approximately 40 000 Mbuti people living in the Congo.

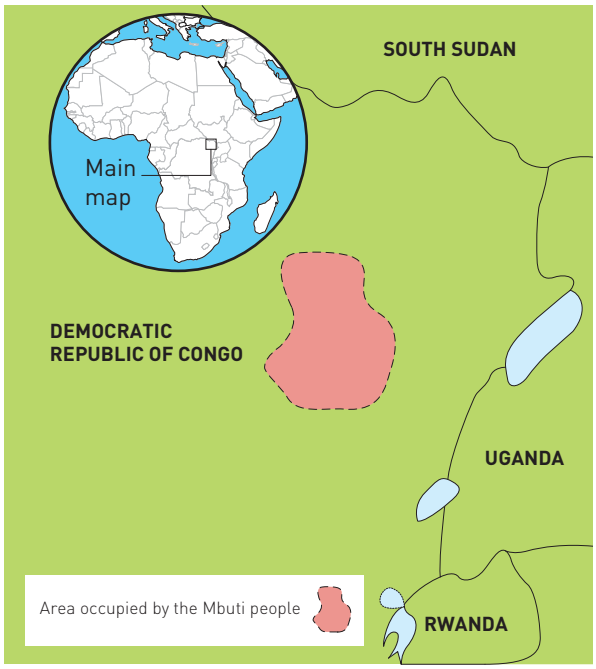


FIGURE 1.1 The Mbuti people live in the Democratic Republic of the Congo, in central Africa.

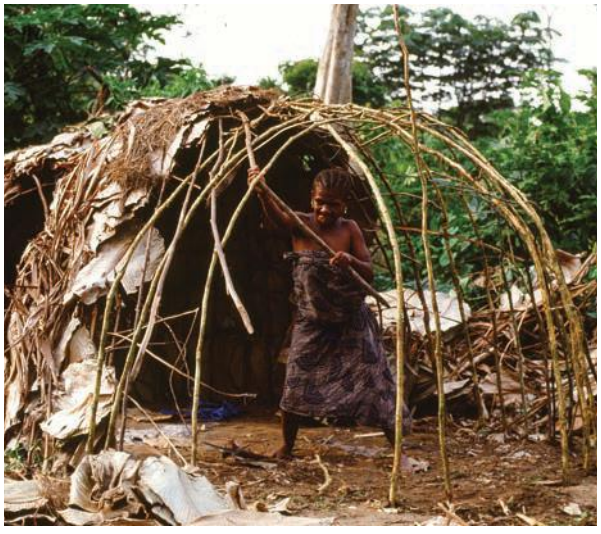
The rainforest in which the Mbuti people live has a dry season lasting for one to two months and a generally moist, humid climate. There are a number of rivers and lakes throughout the forest region. The rainforest, streams and rivers provide for their basic needs of food, fresh water, firewood, and clothing. However, periods of excessive rain or long droughts can diminish their food supply.

THE MBUTI LIFESTYLE

The Mbuti people live in village groups called bands or kinship groups. The band consists of between seven and 30 families who each have their own hut. The huts are shaped like beehives and are very temporary in structure.

At the start of the dry season, the band goes to the forest to set up a series of camps that allows them to maximise the land area available for foraging. A group or band of people live in a camp for up to a month and then they abandon it as the food supplies begin to diminish.

The Mbuti people construct their hut by drawing a circular outline of the house on the ground. Then they make the walls by placing strong sticks in the ground around the circular shape. The sticks are tied together with vine at the top to keep them together and they use large leaves to form the roof.



Getty Images/Wendy Stone

A typical Mbuti hut

Mbuti groups have no ruling group and little societal structure. Their society is one in which everyone is considered equal and has the same rights. Men and women have equal power, and there is little division of labour and everyone shares in the care of the children. Women are in charge of the cooking, cleaning and repairing the hut and obtaining water.



Alamy Stock Photo/Friedrich von Horsten

A Mbuti woman holding a basket of palm nuts

HOW THE TRADITIONAL MBUTI PEOPLE OBTAIN THEIR FOOD

Both women and men gather and forage for food. The women make the nets for hunting and the baskets to carry the food they forage. Hunting is usually done in groups of men, boys, and women, who form a cooperative team to catch the animals.

The animal foods available in the rainforest are crabs, shellfish, ants, larvae, snails, pigs, antelopes, monkeys, fish, and larger animals such as buffalo and elephants. Other foods found in the rainforest include wild yams, termite mushrooms, berries, fruits, roots and leaves as well as honey. Honey is the most prized and sought-after food product in the forest and the men often lift the women up into trees to obtain the honey from a hive. In some seasons, beans, peanuts, hibiscus and gourds are also foraged and eaten.

In the past, the Mbuti people used large nets and spears to capture and kill large animals such as buffalo and elephants. The nets were approximately 30–100 metres long and strung end to end to form a large semicircle. Up to 30 nets were used in a game drive. The best hunters were placed in the centre of the circle, and boys guarded the ends while the women drove the animals into the nets. Today, the Mbuti people are banned from hunting large animals, but they still hunt small animals such as monkeys and antelope with bows and arrows.



Alamy Stock Photo/Nature Picture Library

The Mbuti people use a bow and arrow to hunt small animals.

The Sami

The Sami are indigenous people who live in the far northern Arctic and subarctic region of Europe. The region covers four countries – Norway, Sweden, Finland and Russia. The Sami's name for their traditional homeland region is Sápmi. Like the Mbuti people, they are a hunter-gatherer community.

The Arctic and subarctic region in which the Sami live is a treeless plain, or tundra. Because of its close proximity to the Arctic Circle, the subsoil is permanently frozen and only hardier plants, such as moss, lichen and low-growing shrubs, are able to survive.



FIGURE 1.2 The Sami live in the Arctic and subarctic region of northern Europe, often referred to as Lapland.

SAMI LIFESTYLE

The Sami have lived in the area of far northern Europe since the end of the ice age, more than 10 000 years ago. They traditionally lived a semi-nomadic way of life and ate a diet that was mainly meat-based, supplemented by berries and herbs with the addition of some fat and reindeer milk.

The early Sami people lived in sturdy peat-covered huts in the winter months, and in tents made from reindeer hide during the summer. The frame of the hut or cot was made from crooked birch trunks that formed arches. Straight poles were secured between frame posts, and birch trunks were placed around the frame to hold the turf in place. This turf covering insulated the hut from the extremes of winter. The hut had three windows, and an open fire was situated in the centre of the hut. In more recent times, the Sami have used a small iron stove and chimney to provide for heating and cooking.



Alamy Stock Photo/Rjfoto

A typical Sami peat-covered hut

The traditional Sami society is based on a system of two or three family groups living together in what is called a *siida*. These *siidas* work collaboratively to share the responsibility of providing food for their families by hunting and fishing together. The area in which the *siida* hunt and the rivers and lakes in which they fish are tightly controlled, and are respected by neighbouring family groups. A *siida* council oversees a number of *siddas* and makes decisions about whether a particular *siida's* territory needs to be expanded if its family groups increase in size. The *siida* council also helps to resolve conflicts between individuals or neighbouring groups.

HOW THE TRADITIONAL SAMI OBTAIN THEIR FOOD

Because the climate of the far northern Arctic and subarctic region of Europe inhabited by the Sami people is extemely cold and the terrain is unsuitable for agriculture, the seasons of the year became the most important factor in determining the food resources that were available.

Spring and summer are the seasons when the Sami can forage and gather plants, berries and herbs. During these warmer seasons, they also fish and hunt by following the migration patterns of reindeer so that they can build up supplies and store food for the winter months when food is scarce.

Salmon and trout are in plentiful supply in the summer months and are fished in the major rivers that flow into the Atlantic Ocean. The fish is eaten fresh, or salted, dried or smoked, and stored for use when the waterways freeze over.

In addition, the Sami eat a great deal of reindeer, elk and bear meat, which provide them with good sources of protein. Reindeer meat is rich in minerals and very lean, and the fat is commonly used instead of butter or milk. Just as they preserve fish, the Sami preserve their meat by salting, smoking or souring so that it can be kept for the long winter months.

The Sami make use of the limited edible plants available, and these provide them with many essential vitamins. They gather edible berries, especially blueberries and lingonberries. Cloudberries are important as they are a good source of vitamin C that is otherwise lacking in such a high meat- and fish-based diet.



Shutterstock.com/Olga Filippova

Cloudberries

The Sami collect mountain sorrel and use the fleshy leaves to prepare a stew-like dish that is served with milk. Like cloudberries, mountain sorrel is high in vitamin C and is important in preventing diseases such as scurvy. The Sami also gather the herb angelica. They use angelica in a variety of ways, and often simply peel the roots and stalks and eat them raw, or toast them over a fire. Angelica is also added to reindeer milk, which is then heated, causing it to thicken into a porridge. The milk porridge is then placed in a keg and buried in the very cold mountainous ground where it ferments, enabling the milk to be preserved during the cold winter months.



Shutterstock.com/Ragnar Unnarsson

Angelica

Hunting and fishing

Reindeer are very important in the life of the Sami as they provide the Sami with a vital source of milk and meat. The Sami also use the reindeer as a means of transport. It is thought that by 98 CE the Sami were hunting wild reindeer using a series of traps called pitfalls. The pitfalls were constructed by digging long, deep pits that were then lined with stones. Once a reindeer fell into the pit, it was impossible for it to escape. During the annual migration of the reindeer, the Sami worked in large teams based on their *siida* to build a series of fences to push the reindeer towards the

traps. When a reindeer fell into the trap it was killed by being speared by sharpened sticks or with a bow and arrow. Around this time, the Sami also began keeping small numbers of domesticated reindeer for milk or for use as draft animals.

As their communities grew, the Sami herded larger numbers of reindeer and became what is known as 'reindeer nomads'. During the summer months, they moved with the herd to their natural grazing pastures in the mountains and stayed with them until the seasons changed. Then, in the winter months, they drove the reindeer back down to the coastal regions. These hunting practices are evidence of the early domestication of animals by the Sami.

The Sami are also very proficient fisher people and trappers. They fish for salmon and trout in the lakes, rivers, seas and fjords, and trap beavers.

The Sami developed a special knife that had a wide, long blade that is used for many tasks, such as cutting small trees for building houses, splitting firewood, and butchering reindeer or other animals.



Alamy Stock Photo/Nick Haslam

A Sami man herding reindeer in Norway

Understanding the Text

1 Write a list that identifies the main features of the hunter-gatherer lifestyle.
2 Describe the foods that were available to hunter-gatherer societies.
3 Explain some of the challenges that hunter-gatherer societies faced in the period 12 900–11 700 BCE.
4 Describe the geographic location of the Mbuti people.
5 List some characteristic of the lifestyle of the Mbuti people.
6 Explain how the Mbuti people hunted for food.
7 Describe the geographic location of the Sami.
8 Explain how the traditional Sami live.
9 Describe the foods that are available to the Sami in the area in which they live.
10 Explain how the Sami traditionally hunted and trapped animals, particularly reindeer.

Answers
Understanding the Text

Early development of agricultural food systems

Hunter-gatherer communities began the first attempts at agriculture to decrease the risk and unpredictability of their food supply. In order to care for crops and herds of animals, people needed to live in one place. They began the process of **domestication**; that is, the process of using selective breeding to make wild plants and animals more useful to humans.

These more settled groups became known as **sedentary hunter-gatherer communities**; that is, groups of people who settled in one place near a rich food resource. This brought about the development of some of the earliest **agricultural food systems**. These communities started to build more permanent settlements close to reliable water supplies, to plant and harvest crops and to domesticate or tame animals such as dogs, goats, and sheep. Historic evidence suggests, however, that it took many hundreds of years for agricultural production to become well established and that these communities developed in parallel with hunter-gatherer communities.

Agricultural food systems enabled communities to have a safe and reliable supply of food. Communities also had the ability to produce surplus food that they could store for use in winter months or if crops failed in a later season. Agricultural food systems also saw the development of trade between other communities, either nearby, or with other city states.

One theory suggested for the move to a more agriculture-based settlement rather than a hunter-

gatherer lifestyle is climate change. Changes in climatic conditions and the end of The Ice Age about 10 000 years ago meant that many big game animals such as bison and mammoths could not survive in the more temperate climate. This change in climate meant that there was a dwindling supply of game for human hunters.

These climatic changes also impacted on the distribution and growing patterns of wild grains and other crops on which hunter-gatherers had traditionally depended. As food sources became scarce, tribes began to go to war over the limited food supply. Groups of people that had once been nomadic built stronger, permanent homes and surrounded their settlements with walls to protect themselves from other tribes or clans that might try to overpower them. Agricultural development took place in these settlements, which meant that a larger population could be supported and therefore the group would have more warriors to protect them from invading forces.

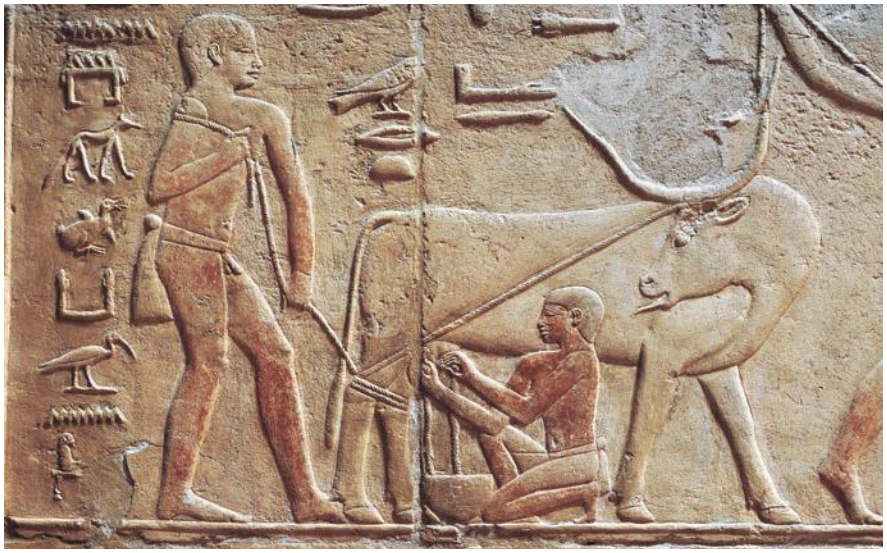
Once people became more settled, they began to **cultivate** wild plants; that is, to deliberately sow and tend crops on nearby land. Farmers soon discovered which grains gave the best yields and they selected and planted only the best seeds from their last crop. The domesticated crops were planted in specially cleared plots or seed beds where, unlike plants that grew in the wild, they had little to no competition from weeds. The crops produced larger clusters of seed heads, which improved their yield and the amount of food that could be produced from the crop. In addition, when they were planted to produce new crops, these larger seed heads germinated more quickly.

As harvests improved, settlements began to produce more food than they needed and so they developed a system for storing the excess grain. This grain was used as the seed for planting future crops or to feed non-farmer workers such as craftsmen and women. The farmers also traded their excess grain for various kinds of useful or decorative goods. A stable food supply also meant that nutritional levels increased and so more children were born.

Domestication of animals

Living in settled communities meant that farmers could build enclosures to contain and tame wild animals. The domestication of animals occurred at around the same time as the domestication of wild plants; that is, between 8000 and 2500 BCE. Not all animals were suitable for domestication and farmers only attempted to tame those animals that could survive on food, such as grass, that was not needed by the human population. The animals they chose to domesticate also needed to mature rapidly so that they could reach their adult size quite quickly and become useful to humans. It was also important to select animals that would not endanger their human masters or panic when enclosed, and so animals with a relatively quiet disposition such as sheep, goats, horses, cattle and oxen were selected.

The domesticated animals were selectively bred, and they produced offspring, which farmers used to grow larger herds. These animals provided them with food such as meat, milk, cheese and butter or their skins were used for clothing. Animals such as oxen were also bred to help with the heavy agricultural task of pulling a plough.



Getty Images/De Agostini

An ancient Egyptian depiction of a cow being milked

Development of agriculture

Mesopotamia is a large region that covers much of what is today Iraq and parts of Syria and Turkey. As occurred in other parts of the world, the earliest people to live in this region were hunter-gatherers. They lived in tribes or clans, hunted animals, and gathered wild fruit, roots, nuts and berries.

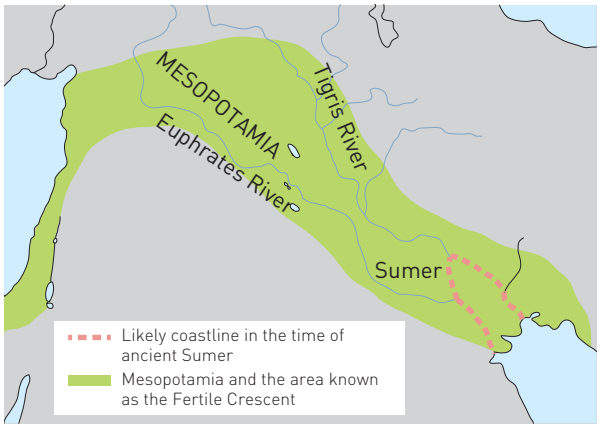


FIGURE 1.3 Mesopotamia covers much of modern-day Iraq.

The earliest village settlements began to appear in northern Mesopotamia about 10 000–6000 BCE. During this period, agricultural food systems developed as communities became more settled as they learnt how to grow and dry grains that could be ground into flour. They domesticated animals and used them to plough fields and to provide milk and meat.

One of the other areas of development of early agricultural food systems was in ancient Mesoamerica – present-day Mexico and Central America.



FIGURE 1.4 The modern-day countries covering the area known as Mesoamerica

In the era between 50 000 and 10 000 BCE, the people of Mesoamerica were nomadic hunter-gatherers. Gradually, the people of Mesoamerica became sedentary settlers as they began to cultivate wild plants. The cultivation and domestication of these plants allowed them to store surplus foods for use when hunting was poor, or during times of drought when food in the natural environment was scarce. The cultivation of wild plants brought these crops closer to their campsites and made them easier to tend and collect. As sedentary settlements increased and became more permanent, there was a greater reliance on plant-based cultivation and domestication. An important difference between Mesoamerica and Mesopotamia was the domestication process. In Mesoamerica domestication focused on plants, with almost no domestication of animals, whereas in Mesopotamia both plants and animals were domesticated.

FACTORS THAT FACILITATED THE DEVELOPMENT OF AGRICULTURE

The development of agricultural food systems across the globe was largely dependent on the ability of sedentary hunter-gatherer groups to provide a reliable water supply for crops. Locating fertile land, adapting the landscape so that it could be used for crop growing, and developing tools for farming were other important factors that facilitated the development of agriculture in Mesopotamia and Mesoamerica.

Access to water and the development of irrigation systems

Mesopotamia is a Greek word that means 'between the rivers'. There are two main rivers that flow through this region: the Tigris and Euphrates. The rivers begin in Mesopotamia's high mountains where rainfall is plentiful. They then rush through the grasslands of the lower reaches of the rivers, which became an important region for growing wheat and herding sheep and cattle.

Sumer, one of the first of the ancient civilisations, developed along the banks of the Euphrates River in southern Mesopotamia in about 3500 BCE. The area around Sumer was crossed by numerous streams that ran from the Tigris and Euphrates rivers. The land around these rivers and streams was very marshy and needed to be drained so that it could be used as farmland.

Archaeological evidence shows that by 5000 BCE, Sumerian farmers developed an extensive network of irrigation canals and waterways. Large embankments were built along the river's edge to prevent the water spilling onto the fields and allowed the Sumerians to create channels to move the water further inland from the river. The area around the river flood plains was very fertile and the water from the irrigation channels allowed them to grow wheat, flax, and barley. The Sumerians also used irrigation channels to water their fruit and vegetable gardens.



Science Photo Library/David C Clegg

A basic irrigation channel, similar to ancient irrigation systems used in Mesopotamia.

Mayan farmers who lived around south-eastern Mexico and Guatemala grew crops in raised beds along the edge of rivers. The beds were raised with rich fertile silt from the river beds. These orchard gardens known as *pet kot*, were surrounded by a low wall of stones. Farmers here also built plant beds on flood plains with floating plots of land called **chinampas**.



Alamy Stock Photo/The Art Archive

Chinampas were used by Mayan farmers.

Swidden farming

People living in the Central American region of Mesoamerica during the time of the Aztecs and the Maya used various methods to cultivate their land. Farmers in the rainforests grew the maize, beans and squash in fields. They used a system called **swidden farming**, an agricultural technique that involved slashing and burning the plants in a forest to create fields for cropping. Seeds for the crops were then planted in the ashes that remained on the forest floor. The soil remained fertile for a few years and then farmers moved on, allowing the area to return to forest. New areas were found and cleared for the next crops.

Terraced farming

One of the greatest challenges to farming in the mountainous regions of Mesoamerica was the lack of flat arable land. Archaeological evidence shows that early Mesoamerican farmers built extensive terraces into the slopes of mountain valleys. Terraces were constructed by building walls of rock, or by cutting down large trees and then backfilling the terrace with soil. This terracing allowed farmers to use more of the land than would otherwise have been available to grow their crops; and Aztec farmers used these terraces to plant maize.



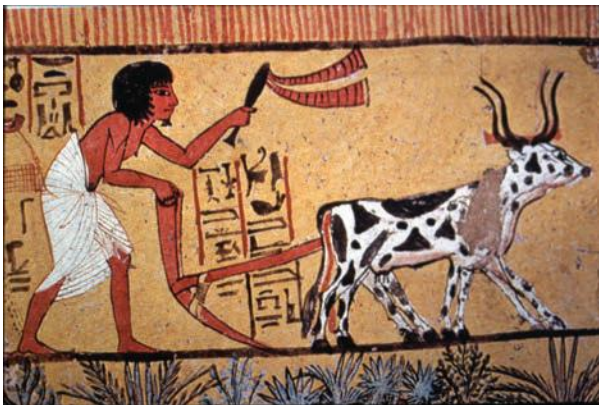
Shutterstock.com/Vadim Petrakov

An archaeological site in Peru containing circular terraces

Development of farming tools

Archaeological evidence shows that the Sumerians began to make tools using the locally available clay, stone and timber to assist them in their farming activities. Pictographs on clay tablets at the end of the fourth millennium BCE, show the use of ploughs in Mesopotamia. These ploughs consisted of a beam-ard, which is a simple machine that scratched a furrow without turning the soil. The land was cultivated by teams of oxen that pulled these wheel-less ploughs and the grain was harvested with sickles. Later, seed ploughs were developed; they consisted of a funnel through which a seed was dropped into the furrow.

Mesoamerican farmers did not use heavy ploughs or horses to help them prepare the land, but only sharp-bladed wooden digging sticks. These sticks were called *uictlii*, and were used for planting seeds and hoeing weeds.



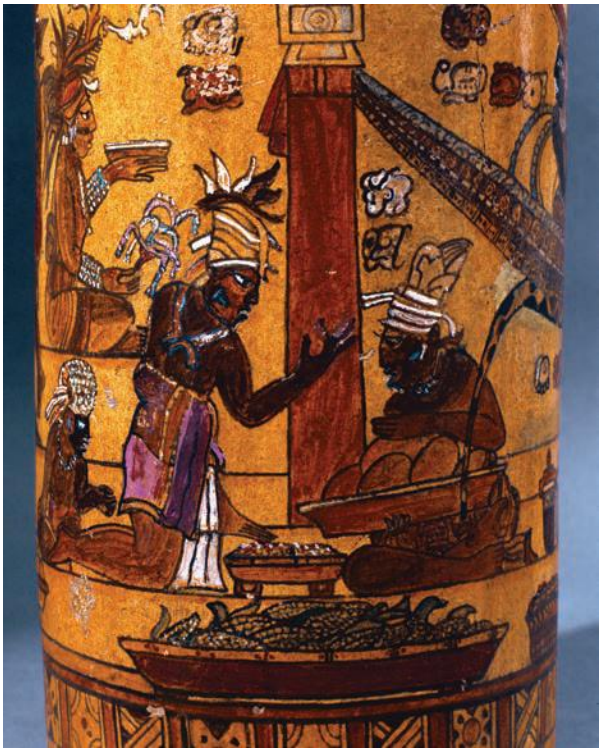
Alamy Stock Photo/Heritage Image Partnership Ltd

A beam-ard plough pulled by oxen

TYPES OF FOOD AVAILABLE TO EARLY AGRICULTURAL COMMUNITIES

Collaborative Activity

Archaeological records show that maize or corn was grown in Mesoamerica from about 3500 BCE. Maize was considered to be important to the lives of the people of western Mesoamerica because it could be dried, and any surplus could be stored for use later in the year. Archaeological relics show the Maize God featured in stone carvings on altars and temples.

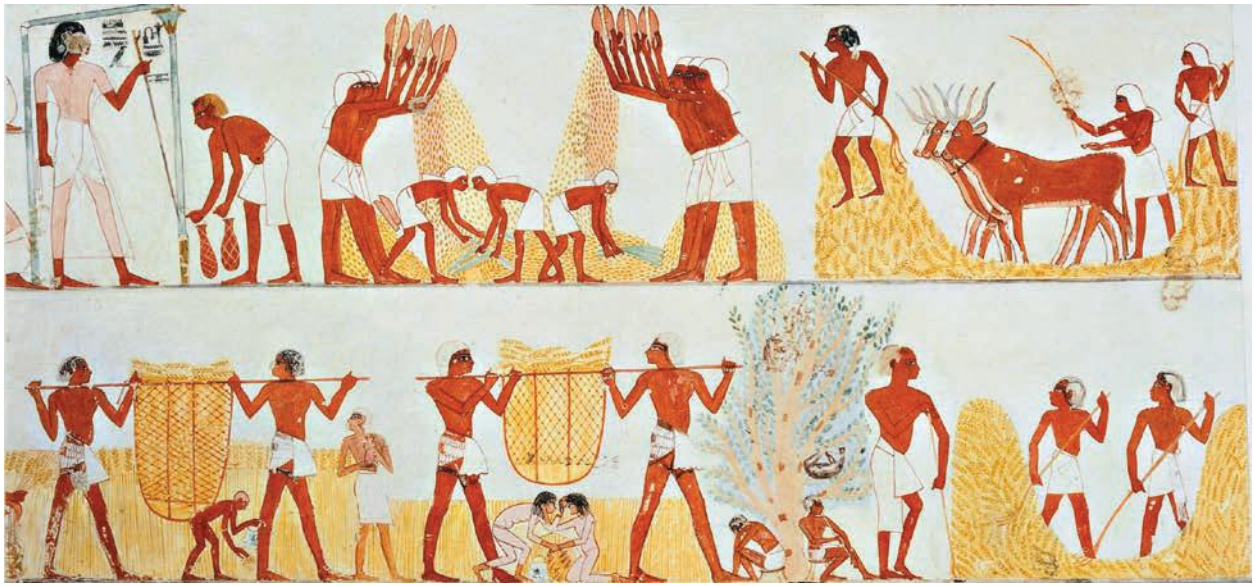


Bridgeman Images/Museo Nacional de Antropologia, Mexico City

A vase from the Mayan city state of Palenque, 559–950 CE, illustrating the importance of maize in Mayan culture

As well as corn, many Mesoamerican communities, particularly Mayan, also grew winter squash and climbing beans. These three crops were often grown as companion crops and became known as the 'three sisters'. Planting the three crops closely together was important as the strong corn stalks provided a natural framework for the beans to climb and the squash covered the surface of the soil and prevented weeds from growing. The beans also worked as a natural fertiliser, adding nitrogen to the soil, and they were a valuable food source with their protein content. The squash or bottle gourd – a relative of today's pumpkin – was also useful when dried, for collecting seeds for grinding or planting, and for carrying water.

Fruit trees were thought to be some of the first plants domesticated and cultivated in Mesoamerica. These trees were highly productive and a good source of food for early civilisations. Another culturally important plant was the cacao plant, which was used for making ancient Mesoamerican chocolate. Cacao beans later became an important commodity used in trade.



AGEfotostock/De Agostini Editore

Sumerians harvesting wheat

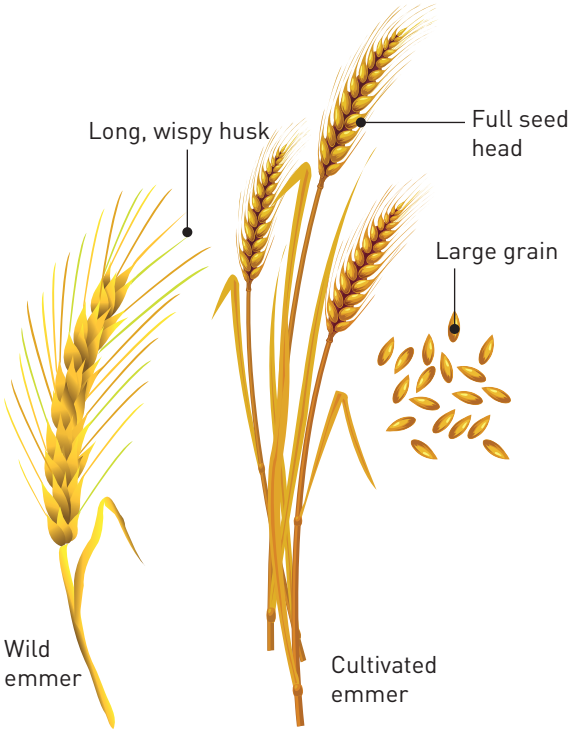


FIGURE 1.5 Wild emmer and cultivated emmer

In the Mesopotamian city of Sumer, barley and wheat were widely grown along with oats and lentils. Mesopotamian farmers used selective breeding to develop emmer wheat and einkorn wheat from native grasses. The wild grasses have small seed heads and were difficult to harvest. Emmer wheat became the most widely grown type of wheat as it has larger seeds and therefore provided a higher yield than the einkorn variety.

The Sumerians also developed extensive gardens and one of the most important crops they grew was the date from date palms that were indigenous to the region. They also developed extensive gardens by using shade produced by the palm trees to protect their vegetables and fruit from the hot sun. Some of their most successful crops included peas, beans, lentils, cucumbers, eggplants and leeks, and fruits such as grapes, apples, melons and figs.

Practical Activity 1.1

Taste-testing corn products

Worksheet

Corn is one of the world's most important crops and is used widely in food production.

Aim: To investigate the sensory properties of products made from corn.

Method

1. Select four products made from corn such as canned corn, natural popcorn, corn tortillas and natural corn chips.
2. Place a small quantity of each corn product in separate containers.
3. Taste-test each of the products and record your description of the appearance, aroma, flavour and texture of each corn type in a table like the one on the next page. After testing the products, rate them using facial hedonic descriptors (see page 30).

4 Write up your sensory analysis using technical terminology.

Results

PRODUCT	1	2	3	4
Appearance				
Aroma				
Flavour				
Texture				
Facial hedonic descriptor				

Analysis

1 Which product has the strongest corn flavour? What factors would account for this?

2 Explain the impact of high heat on the texture of popcorn.

3 List other uses of corn in the food industry.

Conclusion

Recommend some uses for each of the corn products you have tested and give reasons for your choice based on the findings of your sensory test.

Understanding the Text

11 Explain how the first humans provided a food supply for their communities.

12 Suggest reasons why many hunter-gatherer communities gradually developed into agricultural communities.

13 Explain why cultivated crops were likely to give better yield than wild crops.

14 Outline some important considerations for farmers when domesticating animals.

15 Explain how the Sumerians built irrigation systems to enable them to develop agriculture.

16 Explain the process of swidden farming and why it was an important technique used by early farmers in Mesoamerica.

17 Why did the people of Mesoamerica use terraces as part of their agricultural system?

18 Identify the crops that are included in the 'three sisters' and explain why these were important staple crops.

19 Outline the importance of the cacao plant to the early agricultural communities.

20 List some of the important food grown by the Sumerians in their gardens.

Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

1 Using a table like the one below, identify and compare the types of food available, advantages to the community and challenges in feeding the population of the hunter-gatherer and agricultural food systems.

2 Create an infographic that represents each food system.

3 Identify the food system that you believe is the most reliable in feeding human populations. Justify your answer.

Worksheet

	TYPES OF FOOD AVAILABLE	ADVANTAGES TO THE COMMUNITY	CHALLENGES IN FEEDING THE POPULATION
Hunter-gatherer food system			
Agricultural food system			

Crusty mixed-seed loaf

Wheat was one of the first cereal crops to be domesticated and cultivated in the region of ancient Mesopotamia. This crusty mixed seed loaf uses a mixture of seeds and grains that would have been important ingredients in Mesopotamia. Yeast is the raising agent that gives the loaf its risen shape; it requires moisture, warmth and food to grow.

BREAD

1 cup white bread flour
1 cup multigrain flour
1 tablespoon sunflower seeds
1 tablespoon pumpkin seeds
½ teaspoon salt
¼ teaspoon sugar
1 teaspoon dried yeast
1 cup warm water
canola spray oil for greasing tray

TOPPING

egg-and-milk glaze
1 tablespoon sunflower seeds
1 tablespoon pumpkin seeds

METHOD

1 Preheat oven to 210 °C. Line a baking tray with baking paper.
2 Place the seeds for the bread on an oven tray and toast in the oven for 5–10 minutes. Shake the tray during toasting to allow the seeds to brown lightly and evenly.
3 Sift flours, salt, sugar and yeast into a large bowl, add toasted seeds and make a well in the centre.
4 Add the warm water all at once and mix to a soft dough using a spatula.
5 Turn onto a lightly floured board and knead for 8–10 minutes, until dough is smooth and elastic.
6 Form into an oval, boat-shaped loaf; slash the top with diagonal cuts and place on the lined baking tray.
7 Cover lightly with a clean tea towel or oiled cling wrap and allow to prove in a warm place for 20 minutes.
8 Brush carefully with the egg-and-milk glaze and sprinkle with the topping seeds.
9 Bake in a hot oven at 210 °C for 30 minutes or until loaf is golden-brown and sounds hollow when tapped.

MAKES 1 LOAF

EVALUATION

1 Describe the sensory properties of the finished crusty mixed-seed loaf using descriptive language.
2 Explain the impact of toasting the seeds in the oven on the sensory properties of the finished loaf.
3 Outline the ideal conditions required for the growth of yeast to leaven the crusty mixed-seed loaf.
4 Explain how the process of kneading affects the structure of the dough and the final loaf.
5 Discuss why the dough is brushed with egg-and-milk glaze instead of water before baking.



Mark Fergus Photography

Mini chicken and corn patties with bok choy salad

In the Central American region of Mesoamerica during the time of the Aztecs and the Maya, farmers in the rainforests grew maize in fields. Sweet corn is a variety of maize that is popular in modern-day cuisine. Poultry is one of many meat sources to be domesticated during ancient times, and today chicken is a major source of protein in numerous countries. Bok choy is a popular Asian green which can be substituted for traditional lettuce in a salad, or it can be stir-fried or added to a soup.

MINI CHICKEN AND CORN PATTIES

200 grams minced chicken

100 grams corn kernels, drained, or use the kernels cut from 1 cob cooked corn

½ cup fresh breadcrumbs

3 spring onions, finely diced

⅓ cup parsley or coriander, finely chopped

1 tablespoon soy sauce

1 tablespoon cornflour

1 egg, lightly beaten

1 tablespoon oil

BOK CHOY SALAD

½ bunch bok choy

10 grams butter

2 tablespoons pine nuts

2 spring onions, finely sliced

¼ packet Chinese fried noodles

DRESSING

¼ cup olive oil

2 tablespoons cider vinegar

1 tablespoon soy sauce

2 tablespoons brown sugar

METHOD

Mini chicken and corn patties

1. Mix all of the ingredients, except the oil, together in a medium-sized bowl. If the mixture is too wet, add some extra breadcrumbs.
2. Mould the mixture into small rounds, about 1 tablespoon in size and flatten slightly. If they are too large, they will fall apart during cooking.
3. Refrigerate the patties for 10 minutes before frying.
4. Heat the oil in a frying pan and cook the patties thoroughly, turning once only. Take care when frying as the corn may spit and pop and cause a burn. Drain on a paper towel.
5. Serve the mini chicken and corn patties with the bok choy salad.

Bok choy salad and dressing

1. Wash the bok choy thoroughly, shake dry and shred finely.
2. Heat the butter in a small saucepan and sauté the pine nuts until just beginning to brown.
3. Remove from the heat and drain on a paper towel.
4. Sprinkle the sliced spring onions, pine nuts and Chinese fried noodles over the bok choy.
5. Prepare the dressing by mixing the olive oil, cider vinegar, soy sauce and brown sugar together in a small jug or screw-top jar. Stir thoroughly, or screw the lid on tightly and shake the jar vigorously.
6. Pour the dressing over the bok choy. Serve the salad immediately.

SERVES 2

EVALUATION

1 Describe the sensory properties of the mini chicken and corn patties with bok choy salad using descriptive language.
2 What was the purpose of the breadcrumbs in the recipe for the mini chicken and corn patties? Why was it important to rest the patties in the refrigerator for 10 minutes before frying them?
3 Why is it important to wash the bok choy thoroughly before preparation?
4 Explain the function of each of the ingredients used in the salad dressing:
   - oil
   - vinegar
   - soy sauce
   - sugar.
5 Plot the ingredients for the mini chicken and corn patties with bok choy salad on a diagram of the Australian Guide to Healthy Eating. Evaluate the nutritional quality of the meal according to the guidelines of this food selection model.



Mark Fergus Photography

Old-fashioned cream scones

The cultivation of wheat, a key ingredient used to make scones, dates back more than 10 000 years. These scones are made with cream as well as milk to enrich their flavour and produce a lighter texture than would be achieved by simply using milk. While scones such as these do add a small amount of fat to the diet, eating them with butter, jam or cream significantly increases their fat and sugar content.

---

2 cups self-raising flour

½ teaspoon salt

30 grams butter

150 millilitres thickened cream

150 millilitres full-cream milk

METHOD

1 Preheat oven to 220 °C. Lightly grease an oven tray.
2 Sift the flour and salt. Rub the butter into the flour and salt mixture.
3 Stir in the cream and milk using a spatula. Mix to a very soft dough, adding a little extra milk if necessary.
4 Turn onto a lightly floured bench and knead very gently for 30 seconds until just smooth.
5 Press out with your fingers or roll out very lightly to approximately 2 centimetres thick.
6 Cut out with a plain scone cutter or cut into squares using a sharp knife.
7 Place on the prepared tray and bake for 10–12 minutes until well risen, golden brown and firm to touch.
8 Remove from the tray and wrap in a clean tea towel until cool. This prevents the scones from becoming hard on the outside.
9 Serve with jam and cream.

MAKES 9–12 SCONES

EVALUATION

1 Outline two functions of cream in this recipe.
2 Explain why the recipe recommends using a spatula to stir in the milk and cream rather than a spoon.
3 Explain why it is important to only knead the mixture gently when making scones.
4 Why is it important to cook the scones at 220 °C rather than at 160 °C?
5 Describe one way to test whether the scones are cooked, apart from than those listed in the recipe.



Mark Fergus Photography

TRADITIONAL FOODS EATEN AROUND THE WORLD



ETHIOPIA

- Teff – a staple grain grown in the Ethiopian highlands
- Injera – a spongy, fermented flatbread
- Wat – a hot spicy stew made with either beef, lamb, chicken or goat



SPAIN

- Paella – rice, onion, garlic, tomatoes, shellfish, peas and beans
- Gazpacho – a cold soup with a tomato and garlic base
- Jamón serrano – dry-cured ham
- Churros – a batter-like dough that is usually deep-fried, often rolled in cinnamon and sugar, and sometimes dipped in chocolate



INDIA



Northern India

- Tandoori chicken is chicken roasted with yoghurt and spices.
- Wheat is used in preference to rice, and breads such as naan, parathas, chapatis and roti are eaten with almost every meal.
- Ghee, a clarified butter, is widely used for cooking, and dishes are often enriched with cream.
- Warm spice mixes, rather than hot chilli, are used to flavour foods.



Central India

- Vegetarian dishes are common.
- Rice is a staple dish of the region.
- Fish is widely eaten in coastal regions.

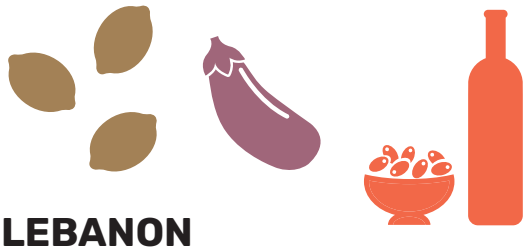
Southern India

- Coconut milk and freshly grated coconut
- Dahl – stewed split pulses and legumes
- Papadums – thin, brittle discs made mainly from the flour of pulses and legumes
- Fresh fish and seafood in coastal regions



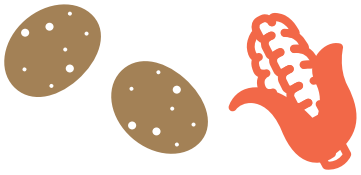
JAPAN

- Rice and noodles – staple ingredients in Japanese cuisine
- Sushi – a dish made using rice and raw, fresh seafood
- Sashimi – thin slices of raw fish
- Gyozas – dumplings made with ground meat and vegetables and wrapped in a thin dough
- Miso soup – made from fermented soybeans and salt



LEBANON

- Kafta – sausage-like skewers of meat made from minced lamb and spices
- Farrouj meshwi – a chargrilled garlic chicken dish
- Tabouli – a salad made with fresh tomatoes, cracked wheat, parsley, mint and onion
- Stuffed vegetables – zucchini, peppers and eggplant
- Baklava – dessert made with filo pastry, and pistachio nuts in the filling and drizzled with a rosewater syrup
- Olive oil, lemon, garlic and spices – used as flavouring in almost every meal
- French-style custard desserts and croissants



PERU

- Potatoes
- Quinoa – the seeds are ground and eaten as a cereal
- Mote – boiled dried corn (maize)

2

DEVELOPMENT OF FOOD CULTURES

KEY TERMS

cuisine the style of food preparation and cooking that reflects the characteristics of a particular country or geographic region

culture the shared or learnt patterns of behaviour or identity of a group of people

Fertile Crescent a semi-circular or crescent shaped region of fertile land to the east of the Mediterranean Sea that forms a 'bridge' between Africa and Eurasia

food system a complex series of activities involving food's journey from the farm, its movement to food processors, then on to the food retailers and finally on to the consumer's plate at home or in a restaurant

Ramadan the Muslim month of prayer and fasting, when Muslims fast each day from sunrise to sunset

Resources
Study Design links
Infographics
Flashcards

The historical development of food systems across the globe

Throughout the history of human populations, food systems have evolved and changed. As small hunter-gatherer communities developed into larger communities and city-states became established, their need for a larger, more reliable food supply became paramount. While these early food systems were relatively simple, they have evolved into the sophisticated food system we know today. Our current **food system** is a complex series of activities involving food's journey from the farm, its movement to food processors, then on to the food retailers and finally on to the consumer's plate at home or in a restaurant.

As discussed in chapter 1, food systems based on agriculture developed simultaneously in different areas across the globe depending on their geographical location and climate. This had a significant influence on their food culture and cuisine.

Food cultures and cuisine around the world

All countries throughout the world have their own particular culture. The term **culture** refers to the shared or learnt patterns of behaviour or identity of a group of people. This group identity includes the characteristics, customs and knowledge of the group, and is based on their shared language, religion, ideas, social behaviour, food, music and arts.

Although it is just one aspect of our culture, food is fundamentally important to our lives. Our day revolves around food, not only because we need it to survive, but because it is a symbol of our friendship and generosity, our position in society and in some cases, our religion. When we think about food, it often evokes memories and sometimes a sense of nostalgia of times past – not only can we visualise the food, but we can sense its aroma and flavour. These memories are the links to our culture.

Cuisine is part of our culture. It is the style of food preparation and cooking that reflects the characteristics of a particular country or geographic region. A cuisine is based on the distinctive ingredients, cooking techniques and traditional dishes of a group of people and it develops over time. It is influenced by locally available ingredients that can be grown or produced in a particular area based on the climate and land formations, or by ingredients that have been obtained through trade. Traditional cooking methods and religious food laws also influence the cuisine of various cultural groups.

Throughout the world, factors specific to a particular region have influenced the development of food production and food culture. This has meant that while there may be some similarities between various cuisines such as the food of countries in sub-Saharan Africa and the food of countries of the Middle East, there are also many quite distinct differences. The foods of the Mediterranean, for example, also differ from the foods in Asia or the Americas as they have different cultures, climatic and geographic conditions and religious beliefs.

Sub-Saharan Africa

The African continent is divided into two main regions – North Africa, which lies north of the Sahara Desert, and sub-Saharan Africa, which includes all the countries south of the Sahara Desert. More than 40 countries make up the region of sub-Saharan Africa. These countries are culturally diverse, and many include a large number of tribes and different ethnic and social groups.

DEVELOPMENT OF FOOD PRODUCTION AND FOOD CULTURE IN SUB-SAHARAN AFRICA

As with other early civilisations, the people who lived in the region south of the Sahara in approximately 7000 BCE foraged for food by hunting, gathering and fishing. The food supply across the continent of Africa was very dependent on the climate and landscape. The savannah-covered regions of central Africa supplied the population with a wide range of game meat for hunting, and nuts, berries, tubers and roots could be easily gathered. However, in the dense rainforest regions of Africa, fresh meat was harder to come by so the people relied on fish from the rivers to supplement the vegetables they were able to collect.

As communities increased in size, it became more difficult for them to move about and to collect enough food for the group based on their traditional hunter-gather lifestyle. In order to be able to support an increasing population, communities developed settlements based on agriculture and the domestication of animals.

REGIONAL INFLUENCES ON FOOD PRODUCTION IN ETHIOPIA

Ethiopia, along with Eritrea, Somalia and Djibouti, lies in the easternmost peninsula of north-east Africa, called the Horn of Africa. This region has an ancient history of civilisation. Evidence shows that in approximately 16 000 BCE, people living in this area gathered grasses, tubers, and nuts as a source of food. By 8000 BCE, agricultural practices had developed, and wheat and barley were cultivated.

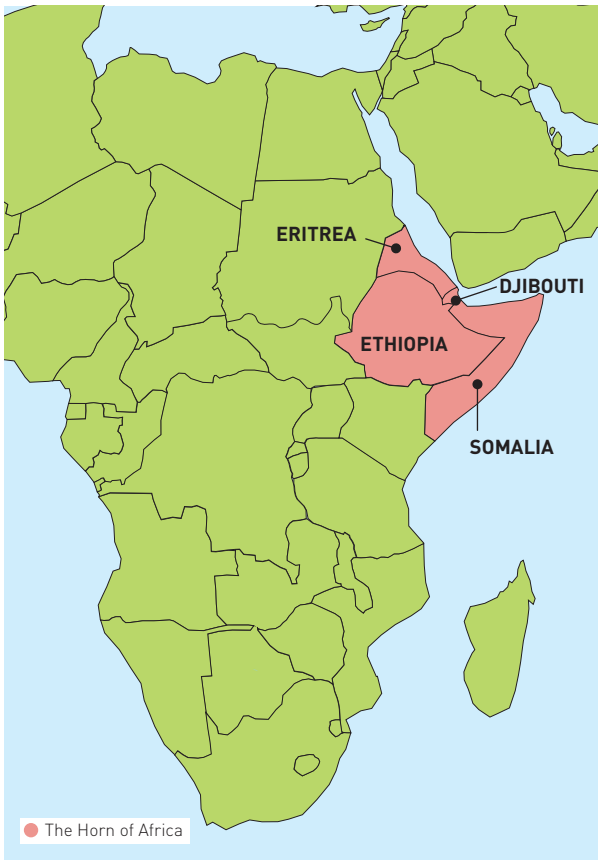


FIGURE 2.1 Ethiopia is part of the Horn of Africa in sub-Saharan Africa.

The mountainous terrain throughout much of Ethiopia has meant that the country remained fairly isolated from its neighbouring countries; therefore, Ethiopian cuisine has not been greatly influenced by other cultures.

One of the biggest influences on the cuisine of Ethiopia has been the influx of exotic spices. Spice traders travelled through Ethiopia from the Far East to Europe over many centuries. Today, spices are still an integral part of Ethiopian cuisine and are widely used to help preserve food in regions where access to refrigeration is limited.

Geography and climate

Ethiopia is located just to the north of the equator and is therefore described as being in the tropical zone of Africa. However, the varying geographical features of the country mean that the climate differs significantly from cool and temperate to hot.

The highland regions are cool climate areas where teff, wheat and barley are widely grown. The central plateau region has a temperate climate and the very fertile land produces much of the country's oat crop. The lowland regions are subject to hotter temperatures; they receive little rainfall and are more prone to drought. In these areas, sorghum, a hardy crop suited to semi-arid areas, is one of the crops most widely grown.

Religion

There are three main religions in Ethiopia – Christianity, Islam and Judaism. Ethiopian Tewahedo Christians are the largest religious group. The members of this church follow a number of fasting traditions. The days of the year when followers can eat meat, eggs, milk, butter and cheese are restricted and these foods cannot be eaten on Wednesdays and Fridays with the exception of the 50 days between Easter and Pentecost or Whitsunday. Several other periods of fasting are also followed by Ethiopian Tewahedo Christians. During periods of fasting, they can only eat vegetarian meals based on lentils, split peas, grains, fruit and a vegetable stew that may be served with injera bread.

Ethiopian Orthodox Tewahedo Christians and members of the Muslim and Jewish faiths are also prohibited from eating pork.

Meal structure

Food is very important in the lives of the Ethiopian people, and they enjoy sharing food with family and friends. All food is served from a communal table and the eldest members of the family are always the first to be served.

Traditionally, Ethiopians eat their food with their right hand. They always wash their hands before the start of the meal and then they are washed again at the end of the meal. Hand washing is an important ritual and involves the diner holding their hands over a basin and then water being poured over their hands from a small jug.

Traditional foods of Ethiopia

Teff is a staple grain grown in the Ethiopian highlands. It has seeds the size of tiny poppy seeds and has a mild nutty flavour. In Ethiopia, teff is ground and made into a spongy, fermented flatbread called injera. Teff is rich in essential nutrients including protein, calcium, iron and silica, and it contains vitamin C, which is unique for grains. It is also high in resistant starch, a dietary fibre that helps to maintain blood sugar levels, weight control and colon health. Teff can be cooked similarly to savoury rice and can be used as a substitute for other grains in salads and in baked goods.

Wat, a hot spicy stew made with either beef, lamb, chicken or goat, is the national dish of Ethiopia. To eat *wat*, Ethiopians tear off small pieces of injera and use it to scoop up the spicy meat stew. *Berbere*, a spicy paste, is widely used in Ethiopian cuisine and is a key ingredient in *wat*.



Alamy Stock Photo/GFC Collection

Harvesting teff in Ethiopia

Practical Activity 2.1

Making teff pancakes

Method

1. Work with a partner to prepare one quantity of teff pancakes following the recipe provided.
2. Undertake a sensory analysis of the appearance, aroma, flavour and texture of the pancakes. Write up your sensory analysis using technical terminology.
3. After tasting the product, rate it using a facial hedonic descriptor (see page 30).

TEFF PANCAKES

½ cup wholegrain teff grain
¼ cup gluten-free flour
¼ teaspoon bicarbonate of soda
¼ teaspoon salt
½ cup plain yoghurt
¾ cup soda water

METHOD

1. Place the teff grain in a food processor or blender, blend on high for a few minutes.
2. Mix the cracked brown teff with the flour, salt and bicarbonate of soda.
3. Mix the yoghurt with the soda water and combine with the flour into a smooth batter.
4. Heat a non-stick pan and spray with canola oil.
5. Spread a thin amount of batter onto the pan and tilt to make a large round pancake.
6. Cook for 1–2 minutes on each side or until colour darkens.
7. Serve with curry, casserole or a stew.

Worksheet



Alamy Stock Photo/Boaz Rottem

Teff pancakes

The Fertile Crescent

The **Fertile Crescent** is a semi-circular or crescent-shaped region of fertile land to the east of the Mediterranean Sea that forms a 'bridge' between Africa and Eurasia. A number of early societies originated in this region including Sumer, Babylonia, Assyria and Egypt. Archaeological evidence shows that these communities were some of the earliest groups to develop agricultural practices such as irrigation systems.

Today, the countries that are part of the Fertile Crescent, now part of the region known as the Middle East, are Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Palestine, Saudi Arabia, Syria and Turkey.



FIGURE 2.2 Countries of the Fertile Crescent

DEVELOPMENT OF FOOD PRODUCTION AND FOOD CULTURE IN THE FERTILE CRESCENT

The region is called the Fertile Crescent as it contains the valley of the Nile River and the valley of the Euphrates and Tigris Rivers. In approximately 9000 BCE, agricultural communities began to develop in these regions because they contained large pockets of fertile land in an otherwise arid landscape. When any of the rivers in these valleys flooded, they provided rich silt deposits that fertilised the surrounding land. The land that bordered the rivers was also flat and therefore ideally suited to farming. As groups began to settle close to the rivers, they developed systems to harvest the water so they could have a regular supply of irrigated water for their crops.

Several staple crops were grown in the Fertile Crescent including barley, einkorn wheat and emmer wheat, with the emmer wheat used by the Egyptians to make bread. As agricultural communities grew, they cultivated other crops such as beans, lentils and chickpeas. With the development of agricultural technology throughout the Fertile Crescent, communities began cultivating indigenous fruits, such as palm dates, grapes and watermelon.

REGIONAL INFLUENCES ON FOOD PRODUCTION IN LEBANON

Lebanon, one of the countries that makes up the Fertile Crescent, is a small sovereign state that lies on the shore of the Mediterranean Sea. It shares a border with Syria and Israel, and is close neighbours with Jordan, Iraq, Saudi Arabia and Turkey. Today, Lebanon has a population of approximately 7 million people.



FIGURE 2.3 Lebanon and neighbouring countries

Archaeological evidence shows that the region now forming modern-day Lebanon was the home of some of the earliest people who lived in quite complex societies and who developed agriculture in the region. Having a sea border meant that many members of these ancient communities became proficient sailors and the port regions along the coastline became key centres of trade. Ancient trade routes passed through Lebanon and many nomadic tribes brought exotic spices and foods such as rice and dates with them on their journeys because these foods did not spoil as they travelled across vast distances. The Lebanese soon incorporated many of these foods into their local cuisine.

Turkey, a close neighbour of Lebanon, also had a big impact on the food culture and cuisine of the country. The Ottoman Turks who controlled Lebanon for almost four centuries from about 1500 CE introduced the Lebanese to a range of ingredients including olive oil, fresh bread, stuffed vegetables and meats, nuts and baklava. The Ottoman Empire also introduced the Lebanese to lamb, which is now considered to be one of the most popular meats in Lebanon. Yoghurt, a popular ingredient used in Lebanese cuisine today, was introduced to Lebanon by the Ottomans.

More recently, the French have influenced the cuisine of Lebanon. Following World War I, Lebanon became a French mandate which continued until 1946. During that short period of history, French-style custard desserts and croissants became an important part of Lebanese cuisine.

Geography and climate

The small Lebanese landmass is varied. The Lebanon Mountain range stretches almost the entire length of the country and has had a big impact on the development of its agriculture. While the thin, porous limestone rocks of the mountains produce poor soil, they allow underground springs to develop. These natural springs meant that although Lebanon has no natural river system, the early farmers could create complex irrigation systems to cultivate the middle and lower slopes of the mountains.

Another key geographical feature of Lebanon is the narrow coastal plain that runs the length of the sea border. This area provided fertile land for horticultural crops to be grown, particularly citrus fruits. Like the coastal plains, the Bekaa Valley in eastern Lebanon is very fertile and early agricultural communities grew grain in this region. Today, fruits and vegetables are widely grown in the fertile lands of the Bekaa Valley. The Mediterranean climate of Lebanon, with its hot, dry summers and cool, wet winters, also enabled fruit and cereal production to flourish in this region.

Religion

Muslim and Christian sects have lived in Lebanon since the 7th century CE, and both religions have influenced the food culture and cuisine of the country.

Followers of the Muslim faith in Lebanon, like Muslims throughout the rest of the world, follow a number of important rituals related to food. One of the most important of these is that under Islamic law, Muslims can only eat halal meat; that is, the meat of animals that have been killed following traditional Muslim practices. Islamic law also forbids the eating of pork or pork products.

Ramadan, the Muslim month of prayer and fasting, is perhaps the most important time in the Islamic calendar. During the month of Ramadan, Muslims must fast each day from sunrise to sunset. Before sunrise they share a meal called the *suhoor*. This meal is meant to sustain believers for the whole day and often includes dates, bread, fruit and vegetables. After sunset, they join in the *iftar* meal to end the daily Ramadan fast. Like *suhoor* meals, the *iftar* meals contain fresh fruit, vegetables and breads, as well as cheeses, soups, halal meats and sweets. To mark the end of Ramadan, Muslims celebrate with the Festival of Eid-ul-Fitr. The Festival of Eid, which lasts for three days, is a time of great celebration for the whole family. A wide range of special snacks, main course dishes and sweet treats and desserts are prepared for the festival, including some that are only prepared to celebrate the Festival of Eid.

The Lebanese Christian community includes Maronites, Orthodox, Melkite and Protestant. Like the Islamic community, Christians have many traditional festivities that centre on food. During Lent and on Good Friday, Christians do not eat meat or any animal products. Easter Sunday is a day of celebration, when the Christian community share an elaborate lunch with their family. Chicken or turkey stuffed with nuts and rice, and sugared almonds that are dusted with icing sugar, are the focus of the celebrations.

One of the key sweet treats associated with the cuisine of Lebanon is called maamoul. It is a sweet shortbread biscuit made with semolina flour, butter and rosewater and filled with a mixture of dates, walnuts, pistachios, sugar and orange blossom water. The baked maamoul are finally drenched in icing sugar before they are eaten. The making of maamoul crosses both the Muslim and Christian traditions. In the Muslim tradition, maamoul are wrapped and given as a gift to visitors who call during Eid to wish the family good fortune.

In the Christian tradition, maamoul is made especially at Easter. The Christian version of maamoul is very similar to the Muslim version, but usually smaller in size. They are generally not wrapped, but are eaten on Easter Sunday as a way of breaking the fasting period of Lent.



iStock.com/Veliavik

Maamoul is a sweet treat, often given as a gift in Lebanon.

Meal structure

Food is central to family life in Lebanon. It is a symbol of hospitality and no one ever eats alone – food is always for sharing! Even a simple family meal will start with a range of small dishes that are placed in the centre of the table for everyone to help themselves. These small portions of food are known as *mezze* and frequently include dips such as hummus, the popular chickpea dip; or baba ganoush, a smoked eggplant dip. These dips are served with flat breads and salads.

Traditional foods of Lebanon

The food of Lebanon shares many common elements with that of other countries in the Middle East and Mediterranean region, such as Turkey and Greece. Its close proximity to these countries has meant that the ingredients and flavours of the Mediterranean region have been infused into the cuisine of Lebanon.

Lamb is the one of the most popular meats included in Lebanese meals. Kafta, sausage-like skewers of meat made from minced lamb and spices, is one of the most popular meat dishes in Lebanese cuisine.

Poultry and goat meat are also popular choices in Lebanese cuisine and are used to make a range of dishes such as a chargrilled garlic chicken dish called farrouj meshwi. Tabouli (also tabouleh and tabbouli), a salad made with fresh tomatoes, cracked wheat, parsley, mint and onion, is also a very popular dish in Lebanese cuisine, as in other Middle Eastern countries. Stuffed vegetables, such as zucchini, peppers and eggplant, are also common in the meals of Lebanon.



iStock.com/Lauri Patterson

Kafta is made from minced lamb and spices.

Olive oil, lemon and garlic are used as flavouring ingredients in almost every meal, as are spices. Zaatar, an essential spice mixture in Lebanese cuisine, is used to flavour both meat and vegetable dishes.

Freekeh also traces its roots back to ancient civilisations in Lebanon and Egypt. Freekeh is not a specific cereal variety; it is the name given to the process of producing the cereal. The wheat grain is harvested while it is young and green, then it is roasted. Traditionally, the grain was harvested in early spring rather than being allowed to fully ripen. The wheat stalks were then dried in the sun and set alight to burn the straw and chaff. The remaining grain was rubbed and cracked, producing a green, chewy, moist cereal with a smoky, nutty flavor. Today, freekeh is considered to be a 'superfood' as it is high in protein and fibre and has a low glycaemic index (GI).

Lebanese desserts are often based on fruit such as melons, persimmons, apples and grapes. Other key dessert ingredients include pistachios, semolina, cheese, sesame seeds and rosewater. Lebanese baklava, while being made with similar ingredients to its famous Greek cousin, has pistachio nuts in the filling and is then drizzled with a rosewater syrup rather than the walnuts and honey used in the Greek version.

Case study 2.1

The A1 Bakery

The A1 Bakery on Sydney Road, Brunswick, is one of Melbourne's leading Lebanese bakeries and Middle Eastern grocers. It was established in 1992 to provide Melburnians with authentic Lebanese cuisine. Today, The A1 Bakery operates a number of bakeries throughout Melbourne – its original store in Brunswick, as well as stores in Dandenong, Fairfield and Werribee.

The A1 Bakery sells a wide variety of breads such as their famous Turkish bread, a popular sourdough bread called juju, pocket breads, qurban bread and a wide range of wholemeal, brown, white and organic seeded breads. In 1997, the owners of the A1 Bakery opened their own bread-manufacturing plant so that their much-loved bread could be purchased in other parts of Melbourne.

Walking into the A1 Bakery is an exciting culinary experience. A vast array of pizzas and traditional Lebanese pies and pide, falafel or chicken wraps, spinach and cheese triangles, salads, and delicious dips with Turkish bread are freshly made each day. The A1 Bakery grocery also sells a wide variety of oils, spice mixes, homemade dips and pickles.

Worksheet



The A1 Bakery, Sydney Road, Brunswick

Ainsley Ryan



A1 Bakery flavoured flat bread

Aleisha Mak

Practical Activity 2.2

Cooking with Freekeh

Tabouli is a dish traditionally associated with Lebanon. This dish originated in the mountain regions of Lebanon where it was originally made from bulgur, a variety of wheat grown in the region. This recipe is based on tabouli and uses freekeh, which also originated in Lebanon.

Method

1 Work with a partner to prepare one quantity of freekeh and tomato salad following the recipe provided on the next page.

2 Serve the freekeh and tomato salad with shop-bought mini pocket bread.

3 Undertake a sensory analysis of the appearance, aroma, flavour, and texture of the freekeh and tomato salad. Write up your sensory analysis using technical terminology.

Worksheet

4 After tasting the product, rate it using a facial hedonic descriptor like the one below.



FREEKEH AND TOMATO SALAD

1 cup water
¼ cup freekeh, washed and drained
1 tomato, finely diced
½ Lebanese cucumber, finely diced
2 spring onions, finely sliced
½ cup parsley, chopped
1 tablespoon mint, finely chopped
½ lemon, zest and juice
1 tablespoon oil
salt and pepper
4 mini pita pockets



Freekeh

Mark Fergus Photography

METHOD

1. Bring the water to the boil in a small saucepan with a tight-fitting lid.
2. Add the freekeh to the boiling water. Cover and simmer over a low heat for 20–25 minutes until tender. Drain if necessary.
3. Combine the freekeh, tomato, cucumber, spring onions, parsley and mint.
4. Mix the lemon zest, lemon juice and oil and stir through the freekeh mixture. Season with salt and pepper.
5. Carefully cut the mini pita pockets open and fill each one with a ¼ of the freekeh and tomato salad.

Understanding the Text

1 Explain the difference between food culture and cuisine.

2 Draw up a diagram to demonstrate the differences in the types of food available in the savannah-covered regions of central Africa compared with those in the dense rainforest regions of Africa.

3 Outline the reason why there was little external influence on Ethiopian cuisine until modern times.

4 Write a short paragraph to explain how geography, climate and religion have influenced food production in Ethiopia.

5 Draw up a knowledge map to demonstrate the importance of including teff in the diet.

6 Explain what is meant by the term the 'Fertile Crescent'.

7 Prepare a table like the one below to demonstrate the factors that influenced the development of agriculture in the Fertile Crescent around 9000 BCE and the staple crops that were grown at this time.

Answers
Understanding the Text

Types of crops grown	Factors influencing the development of agriculture

8 Prepare a table like the one below to compare the characteristics and rituals related to the food of the Lebanese Muslim community and the Lebanese Christian community.

9 Explain how Lebanon's location on the Mediterranean Sea influenced the types of food available to early communities.

10 Draw up a mind map to show the traditional foods that are eaten in Lebanon.

Lebanese Muslim community	Lebanese Christian community

The Mediterranean

The Mediterranean Sea is a large sea that borders three continents – Europe, northern Africa and south-western Asia. The modern-day countries that make up the region of the Mediterranean include Algeria, Croatia, Cyprus, France, Greece, Italy, Lebanon, Malta, Spain, Tunisia and Turkey. All of these countries border the Mediterranean Sea.

THE DEVELOPMENT OF FOOD PRODUCTION AND FOOD CULTURE IN THE MEDITERRANEAN

Archaeological evidence shows that agriculture began in the Mediterranean region approximately 1000 BCE when early farmers began cultivating cereals, particularly wheat and barley, and legumes. They developed colonies in these regions as they had an ideal climate for crop growing; that is, hot summers and cool, wet winters. These communities also began domesticating animals and archaeological finds have shown that they kept sheep, goats and pigs. Many seafaring people also lived around the shores of the Mediterranean so fishing skills soon developed and fish and shellfish became important food sources.

REGIONAL INFLUENCES ON FOOD PRODUCTION IN SPAIN

Spain, along with Portugal and Gibraltar, is situated on the Iberian Peninsula. Spain is the largest country on the Peninsula and takes up approximately 85 per cent of the landmass. It has an extensive coastline that borders the Mediterranean Sea to the south and east, the Bay of Biscay in the north and the Atlantic in the west.

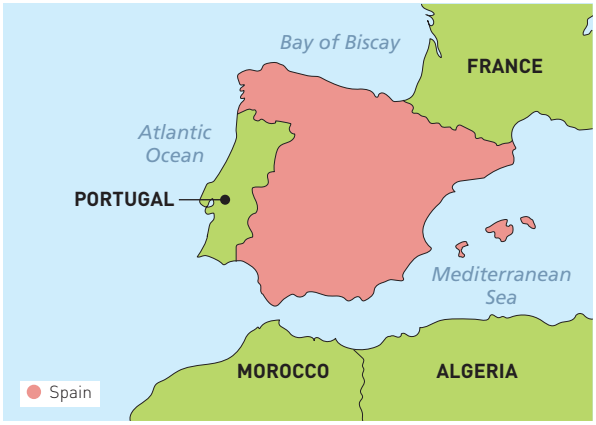
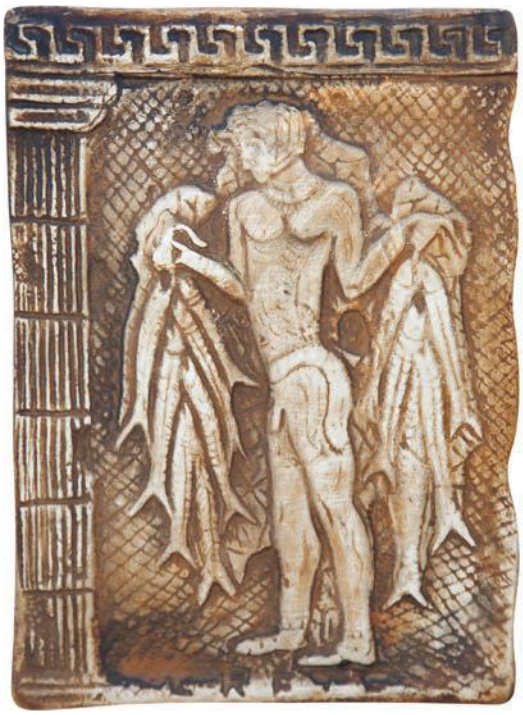


FIGURE 2.4 Spain and neighbouring countries

Throughout its history, the food culture and cuisine of Spain has been influenced by a number of invading forces.

Between the 6th and 7th centuries BCE, the Phoenicians, natives of the Fertile Crescent, arrived on the Iberian Peninsula. The Phoenicians were great maritime traders and brought olive trees to Spain. In the 4th century BCE, the Greeks began moving into the coastal regions of Spain and brought with them highly developed skills in grain production and in methods for storing grain for longer periods of time. This allowed grain production in the area to increase dramatically and enabled the Greeks to export grain back to their home colonies. During this time, the Greeks also brought with them their knowledge of fishing and collecting shellfish; fish and shellfish have become an important part of Spanish cuisine.



Getty Images/imagestock

An ancient Greek wall painting featuring a fisherman with his catch

At the end of the 2nd century BCE, the Romans arrived in Spain. The Romans were well respected for their knowledge and expertise in agricultural production and transportation systems, and consequently had a dramatic impact on food production throughout Spain. During their period of occupation, the Romans established villages as the production of crops intensified and became more extensive. The Romans also developed methods of food preservation particularly salting and air-drying fish, which enabled the fishing industry to flourish. The Romans also introduced stone fruits, such as apricots and peaches, and lemons and melons into Spain.

The Moors, who arrived in Spain in 711 CE, were a nomadic people from North Africa. They remained in Spain for almost 700 years and had a significant influence on the food culture and cuisine of the region. The Moors introduced honey, citrus fruit, almonds and spices, including cumin and saffron, into Spanish cuisine.

Spanish explorers, particularly Christopher Columbus, also brought back many exotic new foods such as tomatoes, potatoes, corn (maize), peppers, chocolate and vanilla from their voyages across the Atlantic to the Americas in the late 1400s.

Geography and climate

The countries that surround the Mediterranean Sea, including Spain, share a climate that can have warm to hot summers and winters that are cool to mild. As a result of these climatic conditions, many of these countries often experience drought in summer; conversely, they can experience periods of high rainfall in winter. These climatic conditions are ideal for growing olives and grapes, and these crops became important in the early development of agriculture in Spain.

The Pyrenees Mountains run across the north of the country and divide Spain from France. Sheep and cattle grazing is widespread throughout the mountain plateaus. The Pyrenees Mountains form a barrier between the oceans of the Bay of Biscay to the north, and the interior valleys of Spain, creating a steppe-like climate. While these valleys have a typical Mediterranean climate, they have rich soils and are therefore important agricultural regions in Spain.

Religion

During the 800 years when the Moors dominated Spain, the Islamic faith was the predominant religion. At about the same time as the Moorish occupation, Spain also had a significant community of Sephardi Jews. However, in the 1400s, Christian forces eventually took control of the country. The Roman Catholic Church became dominant, and Muslims and Jews were forced to convert to Catholicism. During this period, the Catholic Church introduced more than 200 days of fasting as a means of absolving themselves of sin. During periods of fasting, meat was replaced with salted cod, and believers were banned from eating a wide range of other foods. The Catholic Church also required those converting to Catholicism to eat pork to symbolise their loyalty to the church and their rejection of their previous Muslim or Jewish faith.

Today, most of the Spanish population is Catholic, although many other religions are also practised, including Islam, Judaism, Protestantism and Hinduism.

Traditional foods of Spain

Spanish cuisine has been shaped by the influence of the Phoenicians, the Greeks, the Romans and the Moors, who all brought various ingredients, recipes and cooking techniques into the country.

Olive oil, a key ingredient used in Spanish cuisine, was introduced by the Phoenicians, who planted the original olive trees in Spain in approximately 650 BCE. The Romans and Moors also cultivated and used olive oil during their periods of occupation. Today, Spain has over 300 million olive trees under cultivation and is one of the largest producers of olive oil throughout the world.

Rice, which was introduced by the Moors, is another important ingredient used in Spanish cuisine. Some rice-growing areas in Spain still use irrigation systems developed during the 700 years of Moorish rule. Calasparra rice, a Spanish rice highly prized for its plump grains that stay firm during cooking, is considered to be the best rice for making paella.

Paella, one of Spain's most famous dishes, is made from rice, onion, garlic, tomatoes, shellfish, peas and beans. Paella is thought to have originated in Valencia, a major city on the eastern seashores of Spain. Paella is one of those dishes that can vary depending on the ingredients available. Some historians even suggest that paella was originally made from the leftovers of banquets held by Moorish kings.



Shutterstock.com/monticello

Paella

Another famous Spanish dish, gazpacho, a cold soup with a tomato and garlic base, was originally developed in the Andalusia region of southern Spain. Like many other famous Spanish foods, gazpacho is linked to the Romans and Moors. Historically, the soup was prepared by mixing stale bread, oil, garlic and vinegar together with a liquid.

The Spanish are also famous for their dry-cured ham called *jamón serrano*, which is thought to have originated with the Romans. Other important ingredients used in Spanish cuisine include chorizo sausage, seafood, cheese, eggs, garlic, beans and bread.

Churro, a batter-like dough that is usually deep-fried, is also thought to have originated in Spain. Some historians suggest that churros were developed by Spanish mountain shepherds who ate them plain for breakfast as they could not get freshly baked bread. Today, churros are often rolled in cinnamon and sugar and may even be dipped in chocolate.



iStock.com/Veselova Elena

Churros

Meal structure

In Spain, lunch or *almuerzo,* is the main meal of the day. The Spanish start their day with a light breakfast of coffee and a pastry. Lunch is a much more lavish affair and is eaten between 2 p.m. and 4 p.m. It includes a range of courses starting with a light salad or soup. This is followed by a main meal of meat or fish and ends with a cake or Spanish flan. Traditionally, the Spanish would take a siesta following lunch, a tradition that originally allowed farm workers to rest and escape the hot afternoon sun.

The Spanish eat dinner late in the evening, usually not before 9 p.m. Dinner is normally a light meal of salad or some tapas.

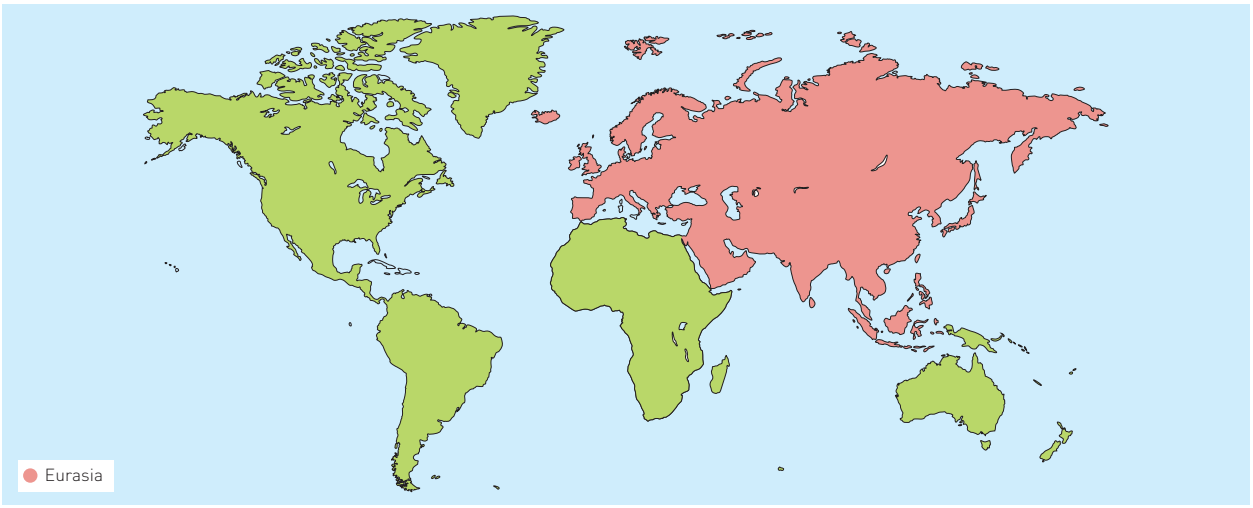


FIGURE 2.5 World map showing Eurasia

Eurasia

Eurasia is the large landmass that includes Europe and Asia. Geographically and politically, a number of the countries that are commonly associated with the Mediterranean region are also included as part of Eurasia. More than 100 countries are included in this region; for example, Greece, India, Indonesia, Italy, Malaysia, the Philippines, Portugal, Spain, Sri Lanka, Russia, the United Kingdom and Vietnam. Seventy per cent of the world's population lives in the countries of Eurasia.

DEVELOPMENT OF FOOD PRODUCTION AND FOOD CULTURE IN EURASIA

The landmass that makes up Eurasia lies along the temperate climatic zone, making it ideal for the development of agriculture. Archaeological evidence shows that agriculture in central Europe was established as a result of both migration and cultural assimilation. Farmers who lived on the eastern shores of the Mediterranean and Anatolia, migrated to central Europe and brought with them their knowledge and skills in agricultural production. As these practices became established, indigenous hunter-gatherer people who lived in more outlying communities in Scandinavia, the Baltic States, Russia and Ukraine, began to adopt many of these practices.

The development of agriculture throughout Eurasia was greatly influenced by both the Roman and Greek empires. The early Roman civilisation used their agricultural produce for trade, both within the empire and for trade with other nations. The Romans grew a wide variety of agricultural produce – cereals such as wheat, barley and millet; peas, beans and lentils; and fruit such as apples, pears and figs. The Romans also kept cows, sheep and goats to provide them with milk and cheese.

During the 5th century CE, the Greeks developed crop rotation systems and moved away from small, family-owned farms, which were the basis of the Roman agricultural system, to large estates.

REGIONAL INFLUENCES ON FOOD PRODUCTION IN INDIA

India is a key nation in Eurasia; with a population of more than 1.4 billion people, it has the second largest population of any country in the world. India shares



FIGURE 2.6 India and neighbouring countries

its land and sea borders with Pakistan, Afghanistan, China, Nepal, Bhutan and Bangladesh, Myanmar and Sri Lanka.

Like all other countries, its climate, geography and the numerous forces that have invaded the country over many millennia have shaped the food customs and cuisine of India.

The Himalayan Mountains form the northern border of India and have had a major influence on the food culture and cuisine of the country. Throughout its history, the rugged nature of the Himalayan Mountains has provided India with a strong defensive wall against invading forces. The snow-covered, high mountain passes have proved to be a natural barrier because they can only be crossed during the summer when the snow melts, thus restricting invading forces coming from the north.

There is a long history of agriculture in India dating back to the 6th century BCE. Evidence shows that wheat, legumes and oranges were grown in the Indus Valley in north-west India during this period. By the 4th century BCE, barley, peas, dates and mangoes were also cultivated. The rich alluvial soils from the Indus River were washed down from the Himalayas, providing fertile ground for crop growing. The people who inhabited this region developed a series of dams that were used for irrigation. As a result, they were able to successfully grow rice from about 3000 BCE. Other crops including tea, bananas, eggplant and apples, were also soon cultivated.

Aryan people, most probably from ancient Iran, invaded India from the north between 1500 and 1000 BCE, bringing with them spices such as cumin and coriander. However, one of the greatest influences on the food culture and cuisine of India has been the Mughals, a Muslim people from Persia. The Mughals (or Moguls), who dominated India for three centuries from 1500 CE, introduced a vast array of spices, cashews, almonds, besan or chickpea flour and rosewater to the cuisine of India.

Geography and climate

The geography and climate of India are major influences on the food customs and cuisine of the country. India lies within the tropics and therefore has a tropical monsoon climate. The northern areas of India have a more temperate climate while the south is much hotter.

One of the key influences on the climate of India is the Himalayan Mountains. These mountains form a natural barrier, preventing the icy winds of central Asia from crossing into India. The monsoons that form in the Indian Ocean are also forced to shed their rain in the north of India, making this a more fertile agricultural area.

Melting snow from the Himalayas feeds into the rivers in northern India, enabling large irrigation systems to be established in these areas. The river also carries sediment from the Himalayas to the northern plains of India, providing the region with some of the world's most fertile soil.

Religion

India is the birthplace of two of the world's most important religions – Hinduism and Buddhism. Today, approximately 80 per cent of the Indian population is Hindu. The remainder is made up of Muslims, Jains, Sikhs and Christians.

The cow is considered sacred in the Hindu religion and therefore most Hindus do not eat beef, and follow a vegetarian diet. Jainism, which arrived in India in 6000 BCE, also follows the principles of non-violence and therefore Jains are strict vegetarians. Sikhs are mainly found in the Punjab region of northern India and while some choose to follow a vegetarian diet, this is not a requirement of the Sikh religion.

Meal structure

Traditionally, Indian families would sit on the floor to eat their meals; however, today many families follow the Western custom of sitting at a table. Most Indian families have three or four meals a day. Throughout the country it is common for Indians to use the fingers of their right hand to eat their food. They always ensure that they wash their hands and mouth before they begin to eat.

Indian dishes such as rice, curries, vegetable dishes and condiments are all served in small bowls. They are placed on the table for family members to help themselves. In the northern and north-western states, a flat bread such as chapati made from wheat is served at most meals. In these regions, diners break off a small portion of the bread and scoop up the food. In the southern and eastern states, rice is commonly served as the staple food of every meal, topped with dahl or other dishes, such as curries. Diners use their fingertips to make a small ball from the food so that they can easily pop it into their mouth.

Traditional foods of India

The food culture and cuisine of India is largely determined by the religion of the people and the area in which they live.

The cuisine in the northern areas of India is heavily influenced by the Punjabi and Moguls. Here, wheat is used in preference to rice, and breads such as naan, parathas, chapatis and roti are eaten with almost every meal. Ghee, a clarified butter, is widely used for cooking, and dishes are often enriched with cream. Warm spice mixes are used to flavour foods, rather than hot chilli flavours. Tandoori is a cooking style common in the north of India.

In central India, vegetarian dishes are more common, and rice is a staple dish of the region. The vegetarian dishes are spiced with cumin, coriander, turmeric, curry leaves and chilli. Fish is a key ingredient used along the coastal regions of central India. In other regions of central India around Hyderabad where the Moguls were influential, meat is more widely eaten.



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Tandoori chicken is a popular dish in northern India.

The cuisine of the southern states of India is based on more vegetable and rice dishes. The food here is much lighter and uses a wide range of fresh ingredients. Chilli is commonly used in the south, along with coconut milk and freshly grated coconut. Pulses and legumes are made into dahl or ground into flour for papadums. Fresh fish and seafood are also widely used in the cuisine of the southern states of India.

Understanding the Text

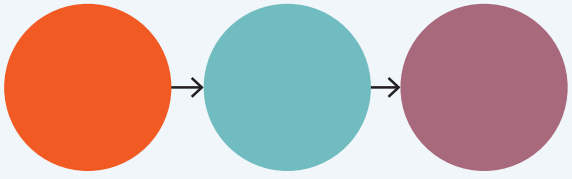
11 Draw a timeline of the key stages in the development of food production in Spain from 1000 BCE to 1500 CE.

12 Explain how its geography and climate have influenced the development of food production in Spain.

13 Outline three points to summarise the impact of Roman Catholicism on the food habits of early inhabitants of Spain.

14 Explain how olive oil and rice became key ingredients in Spanish cuisine.

15 Draw a flow chart similar to the one below to demonstrate the meal pattern followed by most Spanish citizens.



16 Explain how both the Roman and Greek Empires influenced the development of food culture in Eurasia.

17 Prepare a PMI (plus, minus, interesting) chart on the regional influences on food production in India.

REGIONAL INFLUENCES ON FOOD PRODUCTION IN INDIA		
Plus	Minus	Interesting

18 Outline the differences in the food rituals of the Indian religions of Hinduism and Jainism.

19 Outline four key characteristics of the meal structure of most Indian families.

20 Prepare a table like the one below to summarise the differences in the food of the northern, central and southern states of India.

NORTHERN INDIA	CENTRAL INDIA	SOUTHERN INDIA

Answers
Understanding the Text



FIGURE 2.7 East Asia and Oceania

East Asia and Oceania

The countries that make up East Asia include China, Indonesia, Japan, North Korea, South Korea, Mongolia and Taiwan. The region of Oceania centres around the countries in the Pacific Ocean, including Australia, Fiji, New Zealand, Papua New Guinea and the islands of Polynesia, Micronesia and Melanesia.

DEVELOPMENT OF FOOD PRODUCTION AND FOOD CULTURE IN EAST ASIA AND OCEANIA

The development of food production in East Asia and Oceania, like that of Eurasia, began as communities became more settled. Throughout Mongolia and north-eastern China, millet seems to have been cultivated by 8000 BCE. Like other communities, early agricultural production in China took place beside rivers and lakes that could provide a reliable water supply. This was particularly important in the development of cultivated rice, as fields close to the water would be inundated during wet seasons. By 600 BCE, Chinese farmers were growing millet and wheat using a crop rotation system. The Chinese introduced rice into Korea in 4000 BCE.

In the region of Oceania, evidence shows that Papua New Guinea was a centre for early agricultural production. In approximately 11 000 BCE, Papua New Guinean communities began to deliberately grow taro, making it one of the earliest cultivated food crops. Banana and sugarcane production also developed around 6500 BCE.

REGIONAL INFLUENCES ON FOOD PRODUCTION IN JAPAN

Japan is a nation of East Asia that is made up of approximately 6000 islands in the Pacific Ocean. The four largest islands are Honshu, Hokkaido, Kyushu and Shikoku.

Archaeological evidence shows that the Japanese began to cultivate millet by about 4000 BCE. Some of the earliest influences on Japan appear to have come from Korea. Rice, a staple food crop of Japan today, appears to have been brought into the country by migrating tribes from Korea in about 2500 BCE. The Koreans introduced



FIGURE 2.8 Japan

paddy agriculture into Japan during this period. At this time, the Japanese also started growing wheat, barley, soybeans, adzuki beans, peaches and persimmons. The Chinese also influenced the food culture of Japan, introducing chopsticks, tofu and soy sauce.

By 1200 CE, trade with other countries had increased and a range of new foods were introduced into Japan. The use of tempura batter, a cooking method now synonymous with Japanese cuisine, was introduced by the Portuguese, and potato, sweet potato and corn were brought into Japan by the Dutch.



Getty Images/Heritage Images

Wet rice farming in ancient Japan

Geography and climate

One of the most important geographical features of Japan is that it is an island nation surrounded by the Sea of Japan, the Sea of Okhotsk and the East China Sea. The Sea of Japan separates the country from the mainland of Asia and has acted as a barrier to most invading forces for much of its history. However, Japan's close proximity to the Korean Peninsula has meant that many trading vessels used this as a route between Japan and Korea, China and even Siberia. As Japan is surrounded by water, the early Japanese became expert fishers, so fish became an important part of Japanese cuisine.

The islands that make up Japan are generally quite mountainous and take up more than 70 per cent of the total land area. This has meant that the only land suitable for agriculture in Japan is around the lower levels of its many mountains and hills. As arable land was in such short supply, the Japanese carved terraces into the mountainsides so that they could build paddies for growing rice.

The climate of the northern islands of Japan varies greatly from that of the south. In the north, the islands have a cool temperate climate while the southern islands are more subtropical. Rice growing is mainly confined to the south of Japan where the weather is hot and wet during the summer months. The mild, more temperate climate of the northern islands of Japan is more suited to growing vegetables and fruit. The prized Japanese green tea is mainly grown on the two islands of Shikoku and Kyushu. These islands have a humid climate that is moderated by sea breezes. The main island of Hokkaido and the northern part of Honshu are too cold to produce tea.

Religion

The Japanese follow two main religions: Buddhism and Shintoism. Buddhism arrived in Japan from China in the 2nd century BCE. In 700 CE, followers of the Buddhist religion were banned from eating meat. Instead, they began to eat rice with raw fish, a dish that today is called sushi. Many Buddhist monks follow a vegan or vegetarian diet, but other Buddhists regularly eat meat depending on their sect.

The Shinto religion is an ancient Japanese religion. It has coexisted along with Buddhism throughout Japan's history. Like Buddhism, followers of Shintoism do not eat meat. Many of the vegetarian dishes associated with Japanese cuisine are attributed to the influence of Shintoism.

Traditional foods of Japan

The Japanese prefer to use fresh ingredients in their meal preparation and often shop daily. They also like to use ingredients that are in season and look forward to the change of seasons and the new ingredients they bring. The Japanese consider there to be six flavours – bitter, sour, sweet, hot, salty and umami.

Rice and noodles are staple ingredients in Japanese cuisine. Steamed or boiled rice forms the basis of every meal, as does miso soup. The Japanese eat a variety of noodles; for example, soba noodles made from buckwheat flour, and udon and ramen noodles made from wheat flour. Fresh fish forms a very important part of Japanese cuisine and is eaten either raw in sushi or sashimi, or it may be grilled. Other staple Japanese foods include fresh tofu, soy sauce, pickled vegetables, ginger, seaweed, bamboo shoots, daikon and sesame seed products. Sushi, a dish made using rice and raw, fresh seafood, and sashimi, thin slices of raw fish, are popular Japanese dishes. Nori, an edible seaweed used to make sushi, dates back to the 8th century CE. Gyozas, dumplings made with ground meat and vegetables and wrapped in a thin dough, are another popular Japanese food.

Practical Activity 2.3

Cooking miso soup

Miso soup is a traditional dish of Japan. The Japanese serve miso soup at breakfast and lunch, and may include it as a first course at dinner. Miso paste, a key ingredient in the soup, is made from fermented soy beans and salt. The flavour of miso paste varies in intensity – red miso has a strong, deep flavour; white miso has a lighter, sweeter flavour.

Worksheet



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Miso soup

Method

1. Work with a partner to prepare one quantity of miso soup (serves 1–2) using the recipe that follows.
2. Prepare one quantity of a commercially available instant miso soup.
3. Undertake a sensory analysis of the appearance, aroma, flavour and texture of the two types of miso soup. Write up your sensory analysis using technical terminology in a table similar to the one below.
4. After tasting each of the products, rate them using a facial hedonic descriptor (see page 30).
5. Which type of miso soup did you prefer? Justify your answer by discussing the sensory properties and the time taken to prepare each type of miso soup.

	HOMEMADE MISO SOUP	COMMERCIAL INSTANT MISO SOUP
Appearance		
Aroma		
Flavour		
Texture		
Hedonic descriptor		

MISO SOUP

2 centimetres fresh ginger, peeled and finely sliced
3 cups water
1 rounded tablespoon red miso paste
100 grams udon noodles
⅓ bunch baby bok choy, washed and finely sliced
4 shiitake mushrooms
2 teaspoons mirin
100 grams silken tofu, cut into 2-centimetre cubes
1 spring onion, finely sliced

METHOD

1. Place the finely sliced ginger, water and miso paste into a medium-sized saucepan and bring to the boil.
2. Reduce the heat to low, cover with a lid and simmer for 5 minutes.
3. Add the udon noodles, bok choy, shiitake mushrooms and mirin. Cover and simmer for a further 5 minutes.
4. Add the tofu cubes. Turn off the heat and allow to stand for 1 minute.
5. Serve the miso soup topped with the finely sliced spring onion.

Meal structure

The Japanese, like many other cultures, eat three meals a day. Breakfast is generally a light meal of miso soup, rice and sometime an egg or grilled fish. At lunchtime, many workers have a bowl of noodles, or a bowl of broth flavoured with vegetables, fish or seaweed. Bento boxes, which include small portions of rice, vegetables, fish or meat are also popular for lunch.

Dinner might be a more substantial dish such as a chicken teriyaki or beef sukiyaki served with rice. The Japanese serve individual portions of food to each diner. Small serves of each course are placed in an individual bowl and rice is also served in its own small bowl to accompany the main dish. All meals are eaten with chopsticks.



iStock.com/whitewish

A bento box

The Americas

The Americas comprise the countries that make up the landmass of North America, Central America and South America. The United States of America, Canada and Mexico make up North America. Central America is the narrow strip of land that links North America to South America, where Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama are located. South America is a large continent that lies mainly in the Southern Hemisphere with 12 nations – Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela. The Caribbean Islands, including Cuba and Jamaica, are also considered to be part of the Americas.

DEVELOPMENT OF FOOD PRODUCTION AND FOOD CULTURE IN THE AMERICAS

Archaeological evidence suggests that the development of various methods of food production throughout the Americas occurred at various times. Early agricultural development seems to have begun in South America in approximately 5000 BCE when potatoes were first cultivated. Quinoa, lima beans, squash and peanuts were also grown specifically as a food in many regions of South America.

Corn, beans, chilli peppers, squash and cocoa were also being cultivated in Central America in approximately 4000 BCE. The people of Central America developed irrigation systems to produce crops that could support the large communities that were being established.

In approximately 3500 BCE, corn, gourds and squash were cultivated in Northern America by early Mexican communities. Corn seems to have domesticated in the south-west of northern America in about 3200 BCE. In approximately 2500 BCE, indigenous tribes in the north-eastern region of North America cultivated sunflower, squash, amaranth and other seed plants. By 1600 BCE, corn was being grown in some parts of Canada.

REGIONAL INFLUENCES ON FOOD PRODUCTION IN PERU

Peru lies on the Pacific Ocean in western South America. The country is bordered by Ecuador, Columbia, Brazil, Bolivia and Chile.

One of the oldest civilisations in the Americas was established on the north-central coast of Peru in approximately 5000 BCE. Although archaeological

records are unclear, agricultural production seems to have begun in this region not long afterwards. These early inhabitants were mainly fishers, who cultivated cotton, beans, maize, and squash. They used the cotton to make fishing nets and fishing lines and the gourds were used as floats to mark their lines. Later, the early Peruvian communities moved into the fertile river valleys where there was more suitable land for their developing agricultural production, especially growing crops such as corn.



FIGURE 2.9 Peru

The empire of the Incas was established in the Andes Mountains in south-eastern Peru in 1200 CE. The Incas are renowned for the development of a sophisticated agricultural system and an extensive series of roadways. They were very proficient farmers who grew corn, quinoa, potatoes and squash. They were very ingenious and built irrigated terraces on the mountainside to maximise the amount of land they had available for growing their crops. Remains still exist of special warehouses they built to store their corn and potatoes. The Incas also domesticated llamas and alpacas and used them as pack animals to transport goods between villages.

The arrival of the Spanish conquistadores in early 1532 CE led to the demise of the Inca Empire. The Spanish, with the help of Indigenous tribespeople, overthrew the Incas. The Europeans introduced exotic diseases, such as smallpox and measles, which wiped out more than half of the Inca population. The Spanish introduced a variety of meats previously unknown in Peru including chicken, lamb and pork, and took potatoes and chillies back to Spain. The Spanish also established new crops not previously cultivated in Peru, such as wheat, barley and beans.

Geography and climate

The climate of Peru is affected by its location on the Pacific Ocean, the Andes Mountains and its tropical latitude. The climate of Peru is described as tropical, with wet and dry seasons.

The Andes, one of the longest mountain chains in the world, extend along the western seaboard of South America. The Central Andes, which run through Peru, are very dry, particularly on the lower slopes, but receive more rainfall in the higher regions. In these higher regions, where the rainfall is more reliable, ancient communities grew a variety of crops. The coastal areas of Peru are quite arid and little agricultural development is possible in these areas. Instead, the cold ocean currents that run along the coast of Peru provided a great source of fresh fish to communities that lived in the coastal regions.

The Amazon basin in the east of Peru is an area of dense rainforest. However, while it has supported small Indigenous communities, the rainforest is too extensive and dense to allow for large-scale agriculture.

Religion

The arrival of the Spanish into Peru in 1532 CE brought the Catholic religion to the country. Today, Catholicism is the main religion in Peru, although there is a blend of ancient Indigenous beliefs. Most Peruvians pay respect to the Pachamama or Mother Earth, a goddess revered by the Indigenous tribes of Peru for her generosity during the year.

The Roman Catholic community in Peru follows the same traditions as other Catholics throughout the world during Easter, Christmas and All Saints' Day. However, many of their religious celebrations coincide with traditional festivals held by the Indigenous community.

Traditional foods of Peru

The cuisine of Peru is based not only on those foods that are indigenous to the country – such as potatoes, quinoa and corn – but also on foods that are synonymous with Spain. Peruvian foods are often quite spicy, and chilli is a common ingredient in many dishes. Other herbs and spices such as mint, basil, oregano and parsley are

also used to flavour their soups and stews. Rice, beans, guinea pigs and fish are also staple foods in Peru.

Potatoes, another staple food of Peru, are indigenous to the Andes. Evidence shows that potatoes were grown in this region in about 400 BCE. It is believed that more than 2500 varieties of potatoes are produced in Peru. Avocadoes have also been grown in Peru since ancient times, and archaeological sites show evidence of avocadoes from about 750 BCE.

Quinoa, an important part of the Peruvian diet, is often referred to as a grain, however it is in fact a seed. It is thought to have been first cultivated approximately 5000 years ago, originating around Lake Titicaca on the border of Peru and Bolivia. It is prized for its nutritional properties, particularly as it is gluten-free and high in protein and dietary fibre. It also contains folate, iron, zinc, magnesium and calcium. Today, half of the world's quinoa is produced in Peru, where it is an important commodity.

Meal structure

The meal structure of Peru is similar to that of Spain. Peruvians start their day with a simple breakfast called *desayuno*, often simply bread served with butter, ham or jam. In the villages, the people might eat a dish of boiled dried corn called 'mote'. In Peru, lunch or *almuerzo*, is the main meal of the day, as it is in Spain. In the country, farm workers may have a substantial meal of a thick soup made with potatoes, corn and barley followed by a vegetable, avocado and chilli dish. In some areas, Peruvians have a siesta in the afternoon and return to work at about 3 p.m. Dinner, or *cena*, is often served quite late, usually after 8 p.m. Peruvians who live in the highlands might have a meal based on potatoes or corn, while city dwellers normally have a simple meal of bread with ham, cheese, olives or eggs.

Understanding the Text

21 Create a timeline of the key stages in the development of food production in East Asia and Oceania from 8000 to 600 BCE.

22 Outline three key regional influences on food production in Japan.

23 List three ways in which Japan's island status has influenced the availability of food to its inhabitants.

24 Explain how the differing climates in the north and south of Japan have influenced the types of food grown in these regions.

25 Explain why rice, noodles and fish are considered essential ingredients in Japanese cuisine. Use examples to support your answer.

26 Create a timeline of the key stages in the development of food crops in the Americas.

27 Prepare a list of four interesting facts about the agricultural developments of the Incas.

28 Explain how the Andes mountain range influences the climate of Peru.

29 What is quinoa and why is it considered to be an important food?

30 Draw a diagram to highlight the foods that the people of Peru would eat for *desayuno*, *almuerzo* and *cena*.

Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

1 Select three of the world regions that you have studied in this chapter.

2 Prepare a table like the one opposite to identify the characteristics of the development of food in your chosen regions.

3 Write a paragraph outlining the key characteristics of each region.

4 Compare the characteristics of the three regions – how are they similar and different?

5 Draw a conclusion about the main characteristic(s) that have influenced the development of food culture and cuisine across the globe.

Worksheet

	REGION 1	REGION 2	REGION 3
Geography and climate			
Religion			
Traditional foods			
Meal structure			

Potato and spinach quesadillas

Quesadilla (pronounced 'keh-sah-dee-yah') is a flour tortilla filled with a savoury mixture, which includes cheese, and then folded in half to form a half-moon shape and heated. It is a traditional recipe of Mexico. Cooking methods such as roasting, steaming and frying are used in the preparation of the quesadillas.

½ red capsicum
oil spray
1 medium waxy potato (approximately 125 grams)
2 tablespoons olive oil
½ medium red onion, thinly sliced
1 rasher bacon, diced
4 × 20-centimetre flour tortillas
salt and pepper
1 cup spinach leaves
½ cup grated tasty cheese

METHOD

1. Preheat the oven to 200 °C. Line an oven tray with baking paper.
2. Remove the seeds and pith from the red capsicum and place it skin side up on the lined oven tray. Lightly spray with oil.
3. Roast for approximately 20 minutes, or until the skin has blistered and is starting to brown.
4. Remove from the oven, cover with foil and allow to cool. Remove the skin from the capsicum and cut into thin slices.
5. Cut the potato into slices 0.5 centimetres thick.
6. Bring water to the boil in the base of a steamer. Place the potato slices in the top of the steamer, cover with a lid and cook for approximately 10 minutes or until tender.
7. Heat 1 tablespoon of the olive oil in a frying pan and sauté the onion and bacon until the onion is soft and starting to brown, and the bacon is cooked.
8. Add the cooked potato slices to the onion and bacon and toss gently to coat in the oil and brown slightly. Take care that the slices do not break up.
9. Place one of the tortillas on a board and spoon a quarter of the onion, bacon and potatoes on one half, leaving approximately 1.5 centimetres of space around the curved edge. Season with salt and pepper.
10. Top with a quarter of the slices of roasted capsicum, spinach and finally a quarter of the grated cheese.
11. Brush one half of the curved edge of the tortilla with a little water and fold the unfilled side over to form a lid. Press firmly around the edges.
12. Repeat the process with the remaining ingredients to make the other quesadillas.
13. Heat the remaining 1 tablespoon of oil in a clean frying pan. Place the filled quesadillas in the pan and cook over a medium heat for approximately 3–4 minutes or until browned underneath.
14. Turn carefully and cook the second side for a further 3–4 minutes until the cheese has melted and the base is brown.
15. Remove the quesadillas from the pan and cut into triangles. Serve warm.

MAKES 4 QUESADILLAS

EVALUATION

1 Describe the sensory properties of the finished potato and spinach quesadillas using descriptive language.
2 Explain how roasting changes the sensory properties of the red capsicum – appearance, aroma, flavour and texture.
3 How does double cooking the potato – that is, steaming and frying – improve the sensory properties of the potato?
4 Quesadillas are a traditional Mexican food that are held in the hand to eat. List some other ingredients that could be used to fill the quesadillas that would still allow them to be eaten as a hand-held snack.
5 Plot the ingredients for the quesadillas on a diagram of the Australian Guide to Healthy Eating, and make a judgment about their nutritional value as a snack food.



Mark Fergus Photography

Quinoa, brown rice and roasted carrot salad

This salad is made with quinoa, an ancient grain from Peru and Bolivia. The combination of quinoa, which is high in protein, folate, zinc, magnesium and calcium, and wholemeal rice, makes this a very nutritious dish. Roasting the carrot in the spices provides a great contrast to the subtle flavours of the quinoa. The salad can be used as a base for the quinoa crumbed chicken tenderloins.

1 large carrot
2 teaspoons olive oil
1 tablespoon honey
½ teaspoon ground cumin
½ cup brown rice
¼ cup quinoa
1 tablespoon almonds or pistachios
½ lemon, zested
50 grams marinated feta, crumbled
½ cup mint leaves

DRESSING

2 tablespoons olive oil
½ teaspoon sweet paprika
½ teaspoon ground cumin
½ lemon, juiced
1 tablespoon honey

METHOD

1 Preheat oven to 200 °C. Peel the carrot and slice thinly on the diagonal then toss to coat with olive oil, honey and cumin. Place in a single layer on a lined baking tray and roast for 15 minutes. Turn the carrot slices after 10 minutes. Remove from the oven when they begin to caramelise and set aside.
2 To cook the brown rice: in a medium-sized saucepan, add 1.5 litres of cold water and the rice. Bring to the boil and cook for 25 minutes until the rice is tender. Drain and set aside.
3 To cook the quinoa: select a small saucepan with a tight-fitting lid, add the quinoa and ¾ cup of water. Bring to the boil, cover and reduce heat to simmer. The quinoa is cooked when the water has been absorbed – about 15 minutes. Drain to ensure all the moisture is removed.
4 Spread the almonds or pistachios on a tray and toast for 5 minutes. Cool and roughly chop.

Making the dressing

1 Heat the oil and spices over low heat for 1 minute or until they become fragrant.
2 Remove from heat and stir in lemon juice and honey.

Assembling the salad

1 Combine the roast carrot, brown rice, quinoa, lemon zest, feta and almonds and toss together. Stir through the dressing.
2 Spoon into serving bowl and sprinkle with mint leaves.

SERVES 2

EVALUATION

1 Describe the sensory properties of the finished quinoa, brown rice and roasted carrot salad using descriptive language.
2 Explain why brown rice takes longer to cook than white rice.
3 Describe the changes in the physical properties of the quinoa when it is cooked.
4 Why is it important to only cook nuts such as almonds for a short time?
5 Explain why the spices are fried in the oil when preparing the dressing for the salad.



Mark Fergus Photography

Quinoa-crumbed chicken tenderloins

This recipe is gluten-free and is suitable for crumbing foods such as chicken tenderloins and fillets of fish that are not too thick so cook quickly when shallow-fried. The quinoa flakes add a delicious crunch and flavour to the recipe. You can substitute the chicken tenderloins with 4 fillets of white fish, such as flathead. The quinoa crumbed chicken tenderloins can be served with the quinoa, brown rice and roasted carrot salad on page 46 to make a delicious, healthy meal.

6 chicken tenderloins or 4 fillets of white fish
1 cup quinoa flakes
¼ cup grated parmesan cheese
2 tablespoons parsley, finely chopped
½ lemon, zested
2 tablespoons rice flour
1 egg
¼ cup milk
3–4 tablespoons olive oil for frying

METHOD

1 For chicken tenderloins: place the chicken between two sheets of baking paper and use a rolling pin to gently flatten the chicken so it is even in thickness.
2 Combine the quinoa flakes, grated parmesan cheese, chopped parsley and lemon zest in a small food processor or use a stick mixer, and whiz to combine until a fine crumb is formed. Transfer to a plate for crumbing.
3 Place the rice flour and chicken tenderloins in a plastic bag and shake to coat the chicken.
4 Whisk the egg and milk in a bowl.
5 Dip the coated chicken in the egg and milk then coat with the crumb mixture. Place on a tray lined with greaseproof paper. Repeat the process until all the chicken is coated.
6 Cover the tray lightly with cling wrap and refrigerate for 20–30 minutes before frying.
7 In a frying pan heat the oil over medium heat and fry the crumbed chicken for 2–3 minutes on each side. Drain on paper towel before serving.

SERVES 2

EVALUATION

1 Describe the sensory properties of the finished quinoa crumbed chicken tenderloins using descriptive language.
2 What impact will rolling the chicken tenderloins to an even thickness have on cooking the chicken and on the sensory properties of the finished recipe?
3 Why is it important to allow the crumbed chicken tenderloins to rest in the refrigerator for 20 minutes before frying?
4 Outline the benefits of using quinoa rather than breadcrumbs to coat the chicken tenderloins.
5 Evaluate the nutritional properties of a meal that comprises the quinoa-crumbed chicken tenderloins served with quinoa, brown rice and roasted carrot salad (page 46) by plotting the ingredients on a diagram of the Australian Guide to Healthy Eating.



Mark Fergus Photography

Shanxi sliced noodles with pork, spring onion and chilli

Shanxi sliced noodles are a flat noodle, usually about 1 centimetre in width, made from wheat. The noodles have a very chewy texture and, because they are so wide, they hold onto the sauce. This recipe uses a range of ingredients that give it a delicious, spicy flavour and fragrant aroma. Shanxi sliced noodles are available in many Asian groceries.

400 grams Shanxi sliced noodles
1½ tablespoons cornflour
2 tablespoons vegetable oil
250 grams minced pork
2 teaspoons ginger, finely grated
2 garlic cloves, finely grated
½ teaspoon chilli flakes
2 teaspoons raw caster sugar
½ cup Shaoxing wine
2 tablespoons soy sauce
2 teaspoons sweet chilli sauce
200 millilitres chicken stock
½ teaspoon salt
2 teaspoons sesame oil
1 spring onion, cut into fine julienne
½ long red chilli, cut into fine julienne

METHOD

1 Bring a large saucepan of water to the boil. Add the noodles, return the water to the boil then reduce the heat and cook for approximately 10 minutes until al dente. Drain and set aside.
2 Mix the cornflour with 1½ tablespoons of water to make a paste. Set aside.
3 Heat the oil in a wok or large frying pan over a moderately high heat. Add the minced pork and stir-fry until brown and no pink colour remains.
4 Add the ginger, garlic and chilli flakes and cook for 1 minute until fragrant.
5 Add the sugar, Shaoxing wine, soy sauce, chilli sauce and vegetable stock and bring to the boil. Carefully add the cornflour mixture and stir thoroughly until the sauce thickens.
6 Season with the sesame oil and salt.
7 To serve, divide the noodles between two serving bowls. Spoon the sauce over the top and garnish with julienne of spring onion and chilli.

SERVES 2

EVALUATION

1 Describe the sensory properties of the Shanxi sliced noodles with pork, spring onion and chilli using descriptive language.
2 Draw a simple annotated diagram to demonstrate how to crush the garlic using a cook's knife and chopping board.
3 Complete an online search to discover how Shanxi noodles are made and create an annotated flow chart of the key production steps.
4 Explain why Shanxi noodles are very strong.
5 List some vegetables that could be added to the recipe for the Shanxi sliced noodles with pork to improve the nutritional value of the dish.



Mark Fergus Photography

TRADING COMMODITIES



3

GLOBAL GROWTH OF FOOD PRODUCTION AND TRADE



KEY TERMS

global food system the production of food and its processing and distribution throughout the world

spices seeds, flowers, bark, roots, berries and fruit that are used as flavouring ingredients in food, medicines, perfume and incense

sugar produced from both sugar cane and sugar beet

corn (maize), rice and wheat important cereal crops grown in various regions throughout the world

wild einkorn and emmer ancient varieties of wheat

Resources
Study Design links
Infographics
Flashcards

Patterns in the global spread of food production and trade

From as early as 10 000 BCE, humans began the transition from a hunter-gatherer lifestyle towards cultivating and domesticating crops and animals. The development of agriculture made a more settled lifestyle possible, and set humans on the path to the modern world. Wheat and barley were originally grown in the Fertile Crescent in the Middle East (see page 27); millet and rice in Asia; and maize and potatoes were the main crops grown in the Americas. Later, fruit trees were cultivated and vegetables and other crops followed. By 5000 BCE, agriculture was practised across most continents and the animals we know today were domesticated by 6000 BCE. Agriculture became a driving force in the growth of civilisation and global food systems soon developed. A **global food system** is one that involves the production of food, and its processing and distribution throughout the world.

GROWTH OF TRADE IN FOOD COMMODITIES

Collaborative Activity

Once civilisations began to emerge in different parts of the world, food helped make connections between different cultures and global food systems developed. Along with the development of city states in various parts of the world, came improvements in the ability to preserve and store food, and the use of animals to transport food long distances. Further developments in transportation enabled larger volumes of food to be moved further afield using sailing ships to expand trade routes. Trade routes acted as international communications networks and helped link people, fostering not just a commercial exchange of food, but also an exchange of cultural and religious ideas.

The trade in food, and especially in spices, led to the establishment of shipping routes, and eventually to the arrival of Europeans in the Americas or the 'New World'. New shipping routes facilitated trade between world regions, including Europe, Asia and the Americas. The new trade routes also led to the establishment of European colonies and colonial outposts.

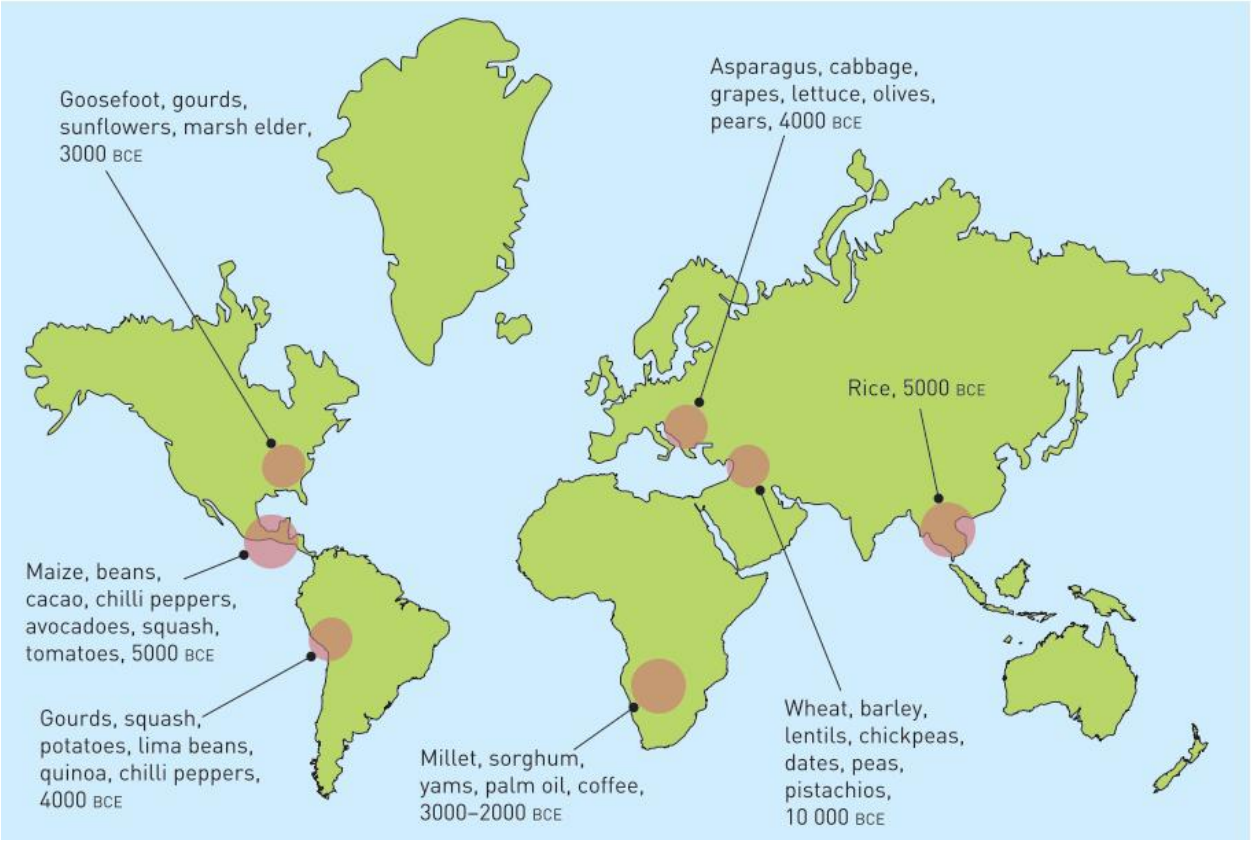


FIGURE 3.1 Where the first agricultural crops were grown

As people moved around the world and European seafaring explorers such as Christopher Columbus and Vasco da Gama returned home from their voyages, they brought with them new seeds for crops, exotic spices and different types of animals. Agriculture and livestock production began to spread across the globe.

A primary reason for the exploration and colonisation of new lands was to gain access to raw materials and agricultural products that could not be produced in explorers' home countries. Another reason for adding territories was to find new markets for the country's own produce.

The arrival in America in 1492 of Christopher Columbus and the opening of a sea route from Europe to India by the Portuguese explorer Vasco da Gama in 1498 ensured the establishment of trade routes to the Far East. In 1595, a Dutch convoy returned from India with spices and East Indian products. The success of this convoy led to the establishment of the Dutch East India Company in 1602.

One of the most important developments in the trade and exchange of plants and animals across the globe was the Columbian Exchange or Grand Exchange. This trade began with Christopher Columbus, who is believed to be directly responsible for two of the most important exchanges of food crops with the Americas. The first took place in 1492 when Columbus arrived on the island of Cuba and saw fields of corn (maize) growing. Columbus took some of the corn seeds back to Spain and by the 1520s, corn was a valuable crop in both Spain and Portugal. From there, corn soon spread through countries in the Mediterranean and Central Europe. On another voyage in 1493, Christopher Columbus recognised that the climate in the new lands, particularly in Hispaniola in the Caribbean, would be suitable for sugar-cane seedlings.

Grains

Three domesticated plants – **corn (maize), rice and wheat** – are of great significance in the development of agriculture as they laid the foundations for civilisation and continue to be a valuable food source for humans to this day. Corn, rice and wheat are important grain crops grown in various regions throughout the world.

CORN (MAIZE)

Farmers in ancient Mesoamerica (modern-day Mexico) were the first to domesticate and cultivate corn. The cultivation of corn soon spread into the southern states of America and south to Peru. As the Mesoamerican people migrated north to present-day North America, they took corn with them. When European explorers such as Christopher Columbus made contact with people living in North and South America, they collected corn seeds and took them back to Europe. Corn is now the most widely cultivated crop in the world.



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Corn ready for harvest

RICE

Rice is the second most important cereal crop grown throughout the world and was first domesticated in the Pearl River valley of China. From East Asia, rice spread to South-East Asia and southern Asia, and was introduced to Europe through western Asia and to the Americas through European colonisation. Chinese gold prospectors bought rice seeds to Australia around 1850.

WHEAT

Wheat was one of the first grains to be domesticated and it was originally grown in an area known as the Fertile Crescent in 10 000 BCE. **Wild einkorn and emmer** wheat varieties were cultivated in ancient times by selective breeding from wild and cultivated grass varieties. The cultivation of wheat began to spread beyond the Fertile Crescent during the Neolithic period, about 10 000 BCE, and by about 3000 BCE had reached Ethiopia, India, Ireland and Spain. The spread of wheat occurred as people migrated to other countries, taking wheat seeds with them. As they established new farming communities in different parts of the world, the cultivation of wheat spread. Today, wheat is the third most cultivated cereal crop and is grown in many countries throughout the world.



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Wheat ready for harvest

GROWTH OF TRADE IN GRAINS

The trade in grains such as wheat, corn and rice can be traced back to the ancient world. The movement and growth of the grain trade began with corn in Mexico, rice in ancient China and wheat and barley from Egypt, Syria, and Jordan. Between 1000 BCE and 600 CE, cereals became an important commodity in China. During this period the Romans also introduced cereals into the Mediterranean region. These two developments enabled cereals to spread throughout Eurasia.

The expansion of the wheat industry and the trade in wheat grew enormously with the British colonisation of America in 1492 and Australia in 1788.



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Rice growing in terraced paddies

Following colonisation, large areas of land were developed for wheat production and wheat became a key trading commodity in both countries. Today, China, the United States of America and India are the largest producers of cereals.

The development of the railways and steamships meant that grains could be traded from local areas to international markets, and grain growing and trading expanded further. Grain elevators and silos were built to store grain after harvest, ready to be moved to flour mills or to international ports for trade.

Between the 15th and 20th centuries, tariffs and free trade in grain was fierce and farmers encouraged governments to give them a higher price for their grain to protect them from cheap imports. Today, farmers in the European Union, the United States of America and Japan benefit from agricultural subsidies that protect the sales of local grain from cheaper overseas imports.

Unlike corn and wheat, rice was traditionally consumed in countries where it is grown. However, today international trade in rice has increased because many countries are not able to produce sufficient rice for their rapidly increasing populations, so they rely on imported rice. The main exporters of rice are India, Thailand and Pakistan. The main importers of rice in the world are China, Nigeria, Iran and the Philippines.



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Grain is shipped around the world in huge container ships.

Understanding the Text

1 Explain the relationship between the growth in agriculture and the development of global food systems.

2 Draw up a simple timeline to demonstrate the early spread of agriculture across the globe.

3 Why was the discovery of new shipping routes an important factor in the growth of trade?

4 Outline the key reasons for exploration and colonisation of lands.

5 Why was the Columbian Exchange or Grand Exchange so important in the spread of trade?

6 Describe how the production of corn spread throughout the world and outline the role that Christopher Columbus played in this spread.

7 Draw a flow chart to demonstrate the spread of rice across the globe.

8 Explain how the early varieties of wheat were domesticated and cultivated.

9 Describe the way wheat spread across the world.

10 Draw a flow chart to demonstrate the development in global trade of grains.

Answers
Understanding the Text

Tea and coffee

Tea and coffee have always been considered valuable commodities and they were some of the first food items traded between city states. They were such valued food items that rulers have gone to war to gain control over the territories that produced these precious commodities. Tea drinking appears to be a much more ancient art than that of coffee, preceding coffee drinking by some 3000 years.

TEA

The cultivation of tea began in China and legend has it that in 2737 BCE the Chinese Emperor accidently discovered tea when he was sitting beneath a tea plant, *Camelia sinensis*, when some leaves from the plant blew into the bowl of hot water that he had been drinking. Tea drinking became well established in China and spread to Japan where the tea ceremony became an important part of Japanese culture. By the 6th century CE, tea drinking had spread to Asia and to the Middle East. In the latter part of the 16th century, tea drinking was first mentioned in Europe.

The growth of trade in tea

International trade in tea from China began to emerge in the late 16th century. The Portuguese established a trading centre in Macau where the sale and purchase of tea was a major activity. It took another fifty years for the Dutch to establish trading routes and a trading post in Java, Indonesia. It is from here that the first tea made its way back to Europe and was shipped to Holland by the Dutch East India Company. In 1600, Queen Elizabeth 1 founded the English East India Company to ship Chinese tea to England. The drink became fashionable and soon spread to throughout Europe. British colonisers took tea to North America, India and Australia in the 18th and 19th centuries. When the First Fleet sailed to Australia, they had on board several cases of tea. Today, tea is a global commodity, with China, India, Kenya and Sri Lanka the main exporters.



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Preparing for a Japanese tea ceremony

COFFEE



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Coffee beans being picked

The first coffee plants or *kafa* were discovered in Ethiopia in about 800 CE. Legend has it that an Ethiopian goat herder, Kadi, discovered the cherries from the coffee plant when tending his goats. This 'magical' plant was boiled in water and the resulting liquid was thought to have medicinal properties. Coffee drinking was quickly spread by the pilgrims of Islam through to the Arabian Peninsula and, in the 14th century, to Yemen near Saudi Arabia. Yemen's climate and fertile soil offered ideal conditions for cultivating coffee. The Ottoman Governor of Yemen introduced coffee to Turkey in 1555. Through merchants and travellers to Turkey, coffee soon spread to Europe and became a popular drink in Italy, France, Austria, United Kingdom, Holland and Germany. Coffee reached America in 1668. The Dutch planted coffee saplings in Java, the French in the Caribbean Islands, the Portuguese in Brazil and the English in Jamaica. By the 19th century, coffee had become one of the most important commodities in world trade.

The growth of trade in coffee

Coffee is believed to be the second-most globally traded commodity after oil. Coffee was initially traded in the Middle East between Ethiopia and Yemen. The Venetians brought coffee to Europe through their trade with the Muslims in North Africa and Egypt. Coffee seems to have arrived in Britain in about the

16th century through the then British East India Company and the Dutch East India Company. Coffee drinking soon spread through London and over 3000 coffee houses were established. The first coffee arrived in the capital of Austria, Vienna, in 1683 and soon became a popular drink when the Viennese combined it with milk and sugar. Later, coffee spread to other European countries including France, Germany and the Netherlands.

According to the International Coffee Organisation, the demand for coffee is strong, with an export market of 142 million bags in 2021. Ethiopia is one country that relies greatly on its export and trade in coffee. Coffee is Ethiopia's largest export commodity and generates 60 per cent of the country's export earnings. Ethiopian coffee is exported to countries such as Italy, the United Kingdom, the Netherlands, Germany, Saudi Arabia, France, the United States of America and Japan.

Spices, sugar and chocolate

Spices, sugar and chocolate are three commodities that have been desired by people for thousands of years. Spices have been a global commodity throughout human history, and their trade became one of the world's biggest industries. Sugar and chocolate were also items that were greatly desired and became important products that quickly spread across the globe.

SPICES

The word 'spice' comes from the Latin word meaning 'special' and denotes a valuable or luxury item. **Spices** are seeds, flowers, bark, roots, berries and fruit that are used mostly as flavourings in food. Today, spices are plentiful, but in ancient and medieval times, they were rare and precious products, used for flavouring food and in medicines, perfume and incense. The Egyptians used spices such as anise, mustard, saffron and cinnamon as medicines and to embalm bodies before burial.

In India, spices, particularly indigenous spices such as cardamom and turmeric, were cultivated and used as early as the 8th century BCE. The Indians used many of these spices to ward off evil spirits and as medicines to heal wounds. In the 3rd century BCE, Chinese courtiers carried cloves in their mouths to make their breath fresh when speaking to the Emperor. The Arabs began trading spices in the 1090s CE and used spices for flavouring and syrups.

The Greeks are believed to have pioneered the use of culinary spices in the cooking of food in Europe. Spices also played an important role in ancient Greek medical science and Hippocrates, a Greek physician often considered the founder of medicine, wrote about important spices for medical use. By the Middle Ages, food was being covered in spices, often to mask the aroma and flavour of rotting food. Throughout Europe, peppercorns were used as a substitute for money and were counted out to pay taxes and rent; many towns kept accounts in pepper. This trading practice is the origin of the term 'peppercorn rent'.

Growth of trade in spices

In the ancient world, the domestication of camels made it possible to undertake long-distance trade, particularly in spices. The Egyptians used camels to develop trade routes in the region of the Red Sea, importing spices from Arabia. The Silk Road, an overland route that linked eastern nations with those of the Mediterranean, was established and allowed goods to be transported from China to India and on to the Roman Empire.

Pepper, along with other spices such as cinnamon, cloves and nutmeg, was such a valuable commodity five centuries ago that it drove nations to sail across vast oceans searching for new routes to the spice-rich Orient. Trading spices helped to establish vast empires, as well as make merchants rich, and opened up new continents to Europeans, tipping the balance of world power.

When Alexander the Great conquered Egypt in 332 BCE, he established the Egyptian port of Alexandria to use in the spice trade. After the 1st century CE, Rome established a direct trade with India via the Red Sea, and effectively broke the Arab monopoly on the spice trade.



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Spices became a valuable trading commodity.

In the 5th century CE, a 25 per cent duty was payable on spices including cinnamon, cassia, ginger, white pepper and cardamom. This import duty was payable at Alexandria, the main city through which the spices flowed into the Mediterranean and on to Europe. Early Romans expanded the use of spices in foods, medicines and luxury items such as lotions and perfumes. During these times, large amounts of gold and silver were traded for spices. This made spices a highly desirable commodity and including them in the menu was a way to demonstrate wealth and power.

The pursuit of spices was a motivating factor for the early explorers such as Christopher Columbus and Vasco Da Gama as they sought access to the Indies and established rival trading empires. The development of newly discovered sea routes led them to the Maluku Islands (or 'Spice Islands'), an archipelago in Indonesia that contained ancient groves of clove trees and where nutmeg was also grown. The Dutch East India Company took control of these islands in 1602 and held a monopoly on trade of these spices. In 1815, the first load of nutmeg arrived in Europe from Sumatra in Indonesia. At much the same time, the United States of America also entered the spice trade and American businessmen began dealing directly with spice growers in Asia. As the spice trade grew and spices became much more common commodities throughout the world, their value began to decline. In later years, the trade in tea and coffee surpassed the importance of the spice trade in economic value.



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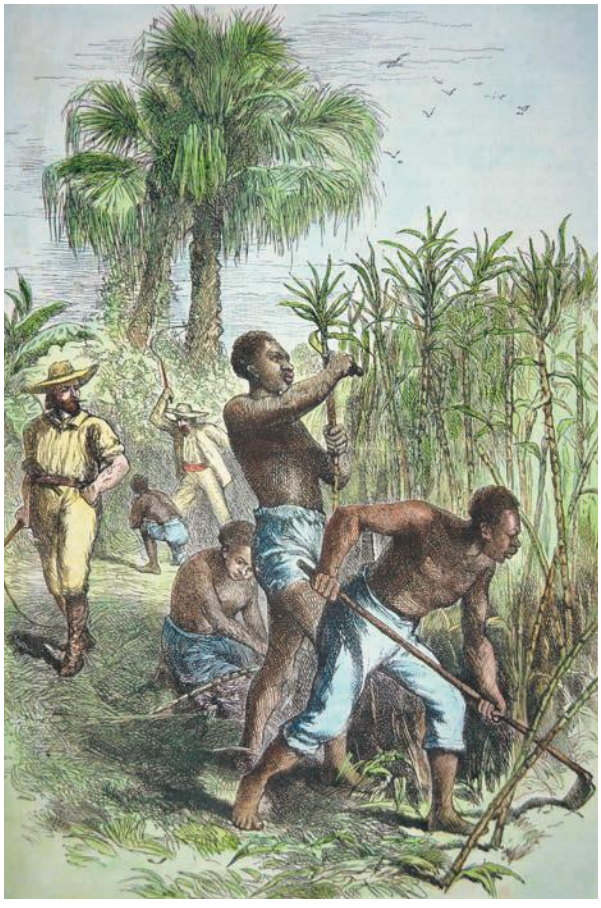
A 15th-century depiction of a cinnamon vendor

SUGAR

It is thought sugar cane was first cultivated in New Guinea in approximately 6000 BCE and a slightly different species was cultivated in India a little later. In approximately 700 CE, the Arabs learnt how to cultivate sugar cane after invading Persia. They then established sugar-cane production in North Africa and Spain following their invasion of these regions. The expansion of sugar cane continued into Europe as a result of the Crusades in the 11th century. When Columbus sailed to the Americas and to the Caribbean, he took sugar-cane plants with him. This 'white gold' was a much sought-after food commodity and quickly spread throughout the globe as consumers began to enjoy its sweet flavour and versatility in food preparation.

Sugar beet was first identified as a source of sugar in 1774. It began to replace sugar cane as a source of sugar in England and Europe, as it was more suited to the cold climates of these areas.

Sugar cane was bought to Australia on ships with the First Fleet, but its cultivation was not immediately successful because the soil and climate in



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A late 19th-century depiction of slaves working in a sugar-cane plantation in the Americas

New South Wales were not suitable. Between 1863 and 1904, about 60 000 Pacific Islanders were transported to establish sugar plantations in Queensland, where the soil and the climate were more suited to growing sugar cane.

Growth of trade in sugar

Sugar was a rare and costly commodity in Europe and the growth of sugar production soon spread from New Guinea and India, first to the Mediterranean and then to the Atlantic. By the middle of the 17th century, sugar was no longer considered a luxury item and was widely consumed in Britain and the United States. Sugar colonies were established in Barbados, Jamaica, Grenada and Trinidad in the 19th century. The trade in sugar became important to the United Kingdom's development as a trading nation, and sugar from the colonies became their largest import. Trade in sugar spanned the Atlantic, touching the three continents, and the trade in sugar was a force in the development of industrialisation.

Practical Activity 3.1

Analysing different types of sugar used in baking

Australian manufacturers have developed a variety of natural sugars and sugar replacements for use in baking.

Aim: To investigate the sensory properties of varieties of sugar products used in baking.

Worksheet

Materials

- Four varieties of CSR sugar available from the supermarket, such as dark muscovado sugar, unrefined rapadura sugar, raw caster sugar and demerara sugar
- Three varieties of sugar replacements made from natural ingredients available from the supermarket, such as coconut sugar, stevia and monk fruit



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Australian manufacturers have developed a variety of natural sugars and sugar replacements for use in baking.



Mark Fergus Photography



Mark Fergus Photography

Method

1. Place a small quantity of each CSR sugar and natural sugar replacement in small separate containers.
2. Undertake a sensory analysis of appearance, aroma, flavour and texture of each type of sugar variety and natural sugar replacement and record your findings in tables similar to those below.
3. Access the baking section of the CSR website and select a recipe for using each sugar variety.
4. Search online for recipes that can be made using each of the natural sugar replacement products.
5. Examine the packaging of the natural sugar replacement to determine the kilojoule comparison with sugar.

Analysis

1. Which sugar had the darkest colour? What reasons can you suggest for this?
2. What impact would this sugar have on the flavour of a food product?
3. Which sugar had the largest crystals? How would this impact on the process of cake making using the creaming method?
4. Suggest one reason why food manufacturers have developed other sweetening products to replace sugar.
5. Which sugar replacement product would you choose to replace sugar when baking a cake? Justify your answer.
6. Why might the kilojoule comparison of these natural sugar replacements attract a consumer to try these products?

Conclusion

What advice would you give a consumer about their choice of a sugar variety when cooking?

Results

	DARK MUSCOVADO SUGAR	UNREFINED RAPADURA SUGAR	RAW CASTER SUGAR	DEMERARA SUGAR
Appearance				
Aroma				
Flavour				
Texture				
Use in a recipe				

	COCONUT SUGAR	STEVIA	MONK FRUIT
Appearance			
Aroma			
Flavour			
Texture			
Use in a recipe			
Kilojoule comparison with sugar			

CHOCOLATE

Mesoamerica is the birthplace of chocolate – it is here the cacao tree is thought to have been cultivated in around 1900 BCE. It is believed that some 500 years later, Mesoamericans fermented the cacao beans and served the liquid as an alcoholic beverage. The Mayans and the Aztecs thought that the cacao had special powers. The Mayan people believed that cacao was the food of the Rain God Kon, while the Aztecs linked it to their God of Wisdom. For the Aztecs, the cacao bean was so important that they used it as a form of currency.

Cacao beans were brought to Europe in the 16th century. The Spanish sweetened the cacao with sugar and it quickly became a popular drink.



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Cacao actually tastes bitter without the addition of sugar.

Growth of trade in chocolate

Christopher Columbus is said to have brought the first cacao beans back to Europe from his fourth visit to the 'New World' between 1502 and 1504. However, far more exciting treasures on board his sailing ships meant the humble cacao beans were ignored.

It was his fellow explorer, the Spanish Conquistador Hernán Cortés, who landed on the Mexican coast in 1517 and tasted the drink 'chocolat'. He brought the cacao beans and chocolate-drink making equipment with him back to Spain in 1528. Soon chocolate became a fashionable drink enjoyed by rich Spaniards. Drinking chocolate was Spain's secret for almost 100 years before other European countries caught on to the chocolate craze. Very gradually, the custom of drinking the chocolate spread across Europe, reaching England in the 1650s.



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A 16th-century European engraving of Aztecs making chocolate

Practical Activity 3.2

Analysing the sensory properties of a variety of drinking chocolates

Aim: To analyse the sensory properties of a variety of drinking chocolates.

Materials

- Cadbury drinking chocolate
- Coles hot chocolate sachets
- Lindt hot chocolate flakes
- Raw organic cocoa drinking chocolate
- Full cream or reduced fat milk for preparing the hot chocolate drinks

Worksheet

Method

1. Prepare each hot chocolate drink according to the instructions on the package.
2. Complete a taste test of each chocolate drink.
3. Record the results of the taste test in a table similar to the one below.
4. Rate each chocolate drink on a scale of 1 to 10.

Analysis

1. Describe the similarities and differences in the sensory properties of the hot chocolates.
2. What reasons can you suggest for these similarities and differences?

Conclusion

Based on your sensory analysis, which hot chocolate did you prefer? Justify your answer.

Results

SENSORY PROPERTIES	CADBURY DRINKING CHOCOLATE	COLES HOT CHOCOLATE SACHETS	LINDT HOT CHOCOLATE FLAKES	RAW ORGANIC COCOA DRINKING CHOCOLATE
				
Appearance				
Aroma				
Flavour				
Texture				
Ratings				
1 = dislikes very much 5 = neutral 10 = likes very much				

Mark Fergus Photography

SALT

For much of human history, salt has been a highly valued commodity and today it is used around the world in the cooking and seasoning of food; it is one of the five basic tastes.

Salt is an essential element in the diet of not only humans, but of animals, and even of many plants. It is one of the most effective and most widely used of all food preservatives.

The ancient hunters of the Stone Age obtained their salt from eating animal meat. Animals instinctively seek out naturally occurring salt sources to satisfy their need for salt; for example, by eating salty vegetation and licking salty deposits on rocks. When the human diet changed to a more plant-based diet in approximately 10 000 BCE, people found that grains and vegetables tasted better when salt was added. Enjoying the taste, they then began to add salt to animal foods by salting meat and fish and making pickled vegetables.

By 6000 BCE, salt was being mined in China and became one of the necessities of peasant life. They used salt to pickle vegetables and eggs, and to produce soy sauce that has a very salty flavour. For thousands of years, salt has been of major importance to the Chinese economy.

As early as 6050 BCE, salt was an important part of the world's history. Rome became established as a salt-trading centre and the Romans used salt to preserve fresh foods such as olives.

The early Greeks, Hebrews and Romans used salt during sacrifices and offerings in their temples and to preserve their food.

Growth of trade in salt

Salt was one of the first food commodities to be traded. In many countries, salt was used as a form of currency. Bars of salt were carried from the west coast of Africa to inland cities of the Middle East where Arab merchants traded precious jewels and silk for salt. It was such a valuable commodity that in some places, its value was equal to that of gold.

Early trade in salt began when the ancient Greeks traded salt for slaves and this led to the saying 'not worth one's salt'. The word 'salary' is derived from the word 'salt'. Early Roman soldiers were paid with salt instead of money.

The Phoenicians, members of an ancient civilisation composed of independent states along the Mediterranean, including modern-day Syria, Lebanon and Israel, began trading in salt with the Egyptians. Later, they imported and traded large quantities of salt from the lake beds in North Africa and traded salted fish for other goods across the Mediterranean.

As early as the 6th century, Rome's political leaders controlled the trade of salt by placing a tax on its sales. It soon traded across the Roman Empire and to the United Kingdom, France, Spain and Turkey.



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In Roman times, slaves were used to work the salt mines.

Oil

Vegetable oils have been produced for thousands of years for use in cooking or to flavour food. The type of plants used to make oil differed from region to region, depending on the oil-bearing plants available in the area. Seeds such as sunflower, safflower and poppyseed were used to produce oils. Other plants including olives, soy beans and peanuts were also commonly used by early civilisations to produce oil for cooking and food preparation purposes, as well as to fuel lamps. Early civilisations used the sun, fire or an oven to heat the plant and extract the oil.

Olive oil is considered to be one of the most important ingredients used in food preparation and cooking; it is sometimes described as 'liquid gold'. Olive trees have always been synonymous with Mediterranean countries as they flourished in the climate of the region with hot, dry summers and mild winters. However, some researchers suggest that wild olive trees may have originated in Syria, or even in sub-Saharan Africa. The first signs of domestication of olive trees date back to the eastern Mediterranean region more than 6000 years ago. From there they spread to city states in the western Mediterranean where olive trees became important and olive groves flourished.

Olive oil was widely prized in ancient Greece where it was an important part of religious ceremonies. It was also used to anoint the dead before burial. In ancient Greece, olive oil was also commonly used as a medical treatment. Hippocrates, considered to be one of the most outstanding physicians in ancient Greece, noted its uses as a treatment for burns, wounds and various skin and ear infections.

The peanut or ground nut has been used to produce a mild-tasting vegetable oil for thousands of years. Peanuts were thought to have been cultivated in South America, particularly in Brazil and Peru, approximately 3500 years ago.

In Mexico and North America, peanuts were processed into oil by beating them into a paste and then boiling the paste in water. As the water and paste boiled, the oil rose to the surface where it was skimmed off and collected.

Sesame is an ancient crop that was thought to have been first domesticated more than 5000 years ago by the Indus Valley Civilisations (the area that today includes parts of Pakistan and north-western India). From here, sesame was introduced into Mesopotamia and Asia in approximately 2500 BCE. Sesame seeds are believed to have been the first plant to be cultivated annually for use as an oil in cooking, as well as being widely used as a condiment in many cuisines.

Although the history of sunflower oil is unclear, sunflowers are thought to have originated in the southern parts of the United States of America and Mexico where it was growing as a weed. The Spaniards took the wild sunflower seeds to Spain in the 16th century, and from there it spread throughout Europe.

The first efforts to produce larger quantities of oil occurred in China, Egypt, Greece and Rome. These countries began to employ more sophisticated methods, such as mill stones and mortars, to increase the amount of oil extracted from the fruit.

Today, cooking oils are processed by extracting oil from a wide range of vegetable sources such as olives, peanuts, safflower and sunflower seeds, rapeseed (canola) and rice bran. Unlike animal fats, vegetable oils, excluding coconut oil, are liquid at room temperature and are used for frying foods, used as a dressing for salads or in the processing of a range of food products.



Alamy Stock Photo/Ian Rutherford

A stone roller or press was used to extract the oils from olives.

Growth of trade in oil

Research shows that olive oil was being produced by the Greeks during the Mycenaean era in approximately 1400 BCE and became a major export product. The Greeks traded olive oil and olive trees with the Phoenicians in the eastern Mediterranean, and with city states in North Africa and Egypt. The olive oil was shipped from the Port of Piraeus, the port city of Athens. This port became an important trading centre in the Mediterranean as Greek merchant ships took exported goods across the seas to places such as Egypt and Asia Minor. Olive trees were also grown in parts of Italy that had a similar Mediterranean climate to Spain. The Italians traded olive oil with France, the Middle East and North Africa.

The Greeks and Romans stored and transported their olive oil in tall, two-handled, ceramic containers called amphorae.



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Amphorae were used for transporting olive oil.

Practical Activity 3.3

Sensory analysis of a variety of olive oils

Aim: To compare the sensory properties and cost of a variety of olive oils.

Complete a blind taste-testing of three olive oils. This means the samples are not labelled so you can taste them without any bias or preconceived ideas about the oils.

Materials

1. Three different olive oils to sample; for example, extra virgin olive oil, an everyday olive oil, and an infused extra virgin olive oil, such as lemon-infused extra virgin olive oil
2. 1 breadstick cut into small pieces
3. 1 red apple such as Pink Lady, thinly sliced – as a palate cleanser

Method

1. Pour the three samples into small bowls.
2. Record the colour of the oils.
3. Swirl the oil slightly to release the aroma of the oil and write down your description of the aroma into a table similar to the one below.
4. Take a small piece of bread and dip the sample into the oil.
5. Taste the bread. Notice the mouthfeel as well as the flavour of each oil.
6. Repeat this process with samples 2 and 3. In between tasting each of the three samples, cleanse your palate with a small piece of Pink Lady apple and rinse your mouth with water.
7. Record the results of the taste test.
8. Record the cost of each olive oil per 100 millilitres.
9. Rate each type of olive oil on a scale of 1 (dislike very much) to 9 (like very much). Score 5 if you neither like nor dislike the flavour.



Analysis

1. This tasting has used just a small sample of the many different types of oils available to the consumer. Research the difference between extra virgin olive oil and an everyday olive oil.
2. Describe the similarities and difference in the sensory properties of the different types of olive oil.
3. What are the health benefits of consuming olive oil?
4. Explain the relationship between the cost of each olive oil and its sensory properties.

Conclusion

Using all of the information you have gathered, which olive oil did you prefer? Justify your answer.

Results

SENSORY PROPERTIES	EXTRA VIRGIN OLIVE OIL	EVERYDAY OLIVE OIL	INFUSED EXTRA VIRGIN OLIVE OIL
Appearance			
Aroma			
Flavour			
Mouthfeel			
Cost per 100 millilitres			
Ratings			
1 = dislikes very much 5 = neutral 9 = likes very much			

Understanding the Text

11 Prepare a table like the one below to compare the key features in the global spread of tea and coffee.

TEA	COFFEE

12 Describe the early use of spices other than for culinary or cooking purposes.

13 Draw a knowledge map to demonstrate the key issues in the development of the spice trade.

14 Describe the role of the Arabs in the global spread of sugar.

15 Explain how cacao spread from Mesoamerica to the rest of the world.

16 Outline the role of Hernán Cortés in the global trade in chocolate.

17 Explain why, historically, salt was one of the most important and valued commodities. What are some of the ways the early Chinese and Romans used salt?

18 Why was salt considered to be such an important commodity in the ancient world? Explain the origin of the word 'salary' and its link to salt.

19 Draw a knowledge map to demonstrate the key issues in the establishment of olive oil as an important product throughout the Mediterranean.

20 Outline two key factors in the trade of olive oil throughout the world.

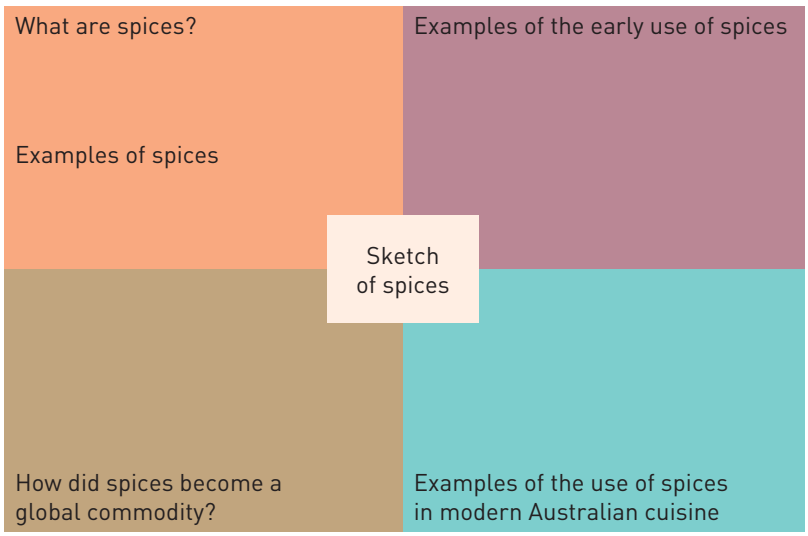
Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

Worksheet

Prepare a summary frame on spices like the one below.



Methods of cooking rice

Rice is usually cooked in one of four ways, depending on its final use in a recipe.

Rapid boil method

Bring a large saucepan of water to the boil. Add ⅓ cup of rice per person. Stir once or twice only. Boil the rice uncovered for 15 minutes. Drain the rice through a sieve and rinse under running water. Allow the rice to drain completely.

Absorption method

Allow 1 cup of rice to ¾ cup of stock or water. Place the rice and stock or water into a saucepan which has a tight-fitting lid. Bring the rice to the boil. Reduce the heat to very low and allow the rice to simmer gently for 15 minutes. Remove from the heat and allow the rice to rest for 10 minutes.

Microwave

Rice can be cooked successfully in a microwave oven. Read the instructions on the packet of rice as cooking times vary for different varieties. Also remember to check the instructions in your microwave manual, as power levels vary considerably between models.

Rice cooker

Use equal quantities of rice to water. Rinse the rice and place in the rice cooker. Add the water and switch on the cooker. Allow the rice to rest for 10 minutes when the rice cooker has switched off and the cooking is complete. Some rice cookers have a warming element that will keep the rice warm for several hours.



Shutterstock.com/Africa Studio

Rice cooked by the absorption method



Mark Fergus Photography

Rice cooked in a rice cooker

Spiced rice

Three methods of cooking spiced rice

Spiced rice can be used to accompany a curry, meat or vegetable kebabs, chargrilled chicken or as a light lunch dish with yoghurt and mango chutney. It can be cooked in a microwave oven, on the cook top or in a rice cooker. Work in small teams to prepare the rice by each of the three methods.

Note: The cooking time and amount of water required may vary slightly between methods.

---

1 tablespoon vegetable oil
½ onion, finely diced
½ teaspoon mustard seeds
½ stick cinnamon
1 star anise
3 cloves
1 cardamom pod
¼ teaspoon turmeric
1 cup basmati rice, washed and drained
2 teaspoons pistachio nuts or roasted cashews
2 teaspoons sultanas
1 piece thin orange peel, without the pith
1¾ cups water
pinch of salt

METHOD

Microwave method

1 In a microwave-proof bowl, heat oil on high for 30 seconds.
2 Add onion and spices and cook on high for about 2 minutes or until the onion is soft.
3 Add the rice, nuts, sultanas, orange peel, water and salt.
4 Cook uncovered for 15–20 minutes on high. After 12 minutes check and stir with a fork; add more water if necessary. Cover and stand for 5 minutes before fluffing with a fork.

Rice cooker method

1 In a frying pan, gently heat oil, then add onion and sauté for 3 minutes without browning. Add spices and cook for a further 30 seconds.
2 Transfer the spiced onion to the rice cooker and add the washed rice, nuts, sultanas, orange peel, salt and 1¾ cups of water.
3 Put the lid on the cooker, turn on. Allow to rest for 10 minutes once the cooking time is complete.
4 Fluff up with a plastic spatula and serve.

Absorption method

1 Select a medium-sized saucepan with a tight-fitting lid.
2 Gently heat oil then add onion and sauté for 3 minutes without browning. Add spices and cook for a further 30 seconds.
3 Add the washed rice, nuts, sultanas, orange peel, salt and water.
4 Put the lid on the saucepan, bring to boil for 1–2 minutes then reduce heat to the lowest possible temperature. Cook for 10 minutes or until the water has been absorbed. Remove from heat.
5 Sit closed saucepan on a damp dishcloth and rest for 10 minutes. This will prevent the rice from sticking to the bottom of the saucepan.
6 Fluff up with a fork and serve.

SERVES 2–3

EVALUATION

1 Describe the sensory properties of each of the finished spiced rice dishes using descriptive language.
2 Was there a difference in the cooked volume and the texture of the three spiced rice dishes? Discuss.
3 What sensory property of the dish is improved by washing the rice before cooking?
4 Why is it important to rest the rice before serving?
5 Which method of cooking produced the best-quality dish? Explain your answer.



Mark Fergus Photography

Dry potato curry

This potato curry could be a filling for dosa, a thin pancake from Southern India, made from a fermented batter which incorporates lentils and rice. Alternately, it could be part of an Indian meal and served with naan bread, a spicy chutney such as tomato kasundi or a yoghurt relish, and with grilled meats or fish. Waxy potatoes such as chats or Dutch creams hold their shape during cooking so are ideal for this recipe. Leftovers reheat very well.

8–10 chat potatoes (approximately 500 grams)
¼ teaspoon salt
2 tablespoons coconut oil
½ teaspoon yellow mustard seeds
½ teaspoon cumin seeds
½ red onion, finely sliced in half moon shapes
8 fresh curry leaves
pinch of chilli flakes
2 tablespoons roasted cashew pieces
3 centimetres fresh ginger, finely grated
½ long green chilli, deseeded and chopped
¼ teaspoon ground turmeric
¼ teaspoon salt
½ cup frozen peas
2 tablespoons water
2 teaspoons lemon juice
1 tablespoon coriander leaves
tomato kasundi to serve

METHOD

1. Place the potatoes and a ¼ teaspoon of salt in a large saucepan and cover them with cold water.
2. Bring the potatoes to the boil, reduce the heat to simmer and cook for 10–12 minutes until the potatoes are tender. Drain and allow to cool.
3. Cut the potatoes into quarters or bite-sized pieces.
4. Heat the coconut oil in a frying pan over medium heat. Add the mustard and cumin seeds and cook for 30 seconds until they just begin to pop.
5. Add the onion slices, curry leaves, chilli flakes and cashews and sauté until the onion is golden in colour. Add in the ginger, green chilli, turmeric and salt and cook for 30 seconds.
6. Add the frozen peas, stir and cook until they defrost – about 2–3 minutes.
7. Add the potato pieces and 2 tablespoons of water to the frying pan and cook until the potatoes are heated through.
8. Remove from the heat and stir through the lemon juice, then spoon into a serving dish.
9. Top with coriander leaves and serve with tomato kasundi.

SERVES 2–3 AS PART OF A SHARED TABLE

EVALUATION

1 Describe the sensory properties of the dry potato curry – appearance, aroma, flavour and texture – using descriptive language.
2 What are waxy potatoes and why are they recommended for this recipe?
3 Describe the difference between boiling and simmering methods of cooking food.
4 List the ingredients that are classified as spices in this recipe and explain why they are only cooked for a very short time before the addition of other ingredients.
5 Search online to find a recipe for a 'wet' curry that could be served along with the dry potato curry as part of a shared table. Justify why the recipe you have selected would be suitable to accompany the dry potato curry.



Mark Fergus Photography

Hot cross buns

Hot cross buns are traditionally linked with Easter celebrations. Traditionally, they were baked and eaten on Good Friday. The dried fruit in the buns is similar to the dried fruit grown throughout Mesopotamia when it would have been dried on racks in the sun to preserve it. The oats in this recipe add fibre to the buns and keep them moist. The sweet, spiced bun mix can be adapted to other sweet dough recipes such as those for scrolls or a sweet plait.

BUNS

40 grams butter, melted

approximately 300 millilitres warm water

¼ cup quick oats

2½ cups bread flour

1 tablespoon freeze-dried yeast

2 teaspoons bread improver

1 teaspoon salt

2 tablespoons sugar

½ teaspoon cinnamon

1 teaspoon mixed spice

2 tablespoons skim milk powder

½ cup sultanas

1 egg, beaten

½ teaspoon oil

PIPING MIXTURE

3 tablespoons plain flour

2 tablespoons caster sugar

1½ tablespoons water

BUN GLAZE

¼ cup sugar

¼ cup water

1 teaspoon gelatine

1 teaspoon mixed spice

METHOD

1. Melt the butter in 100 millilitres of the water in a small saucepan. Bring to the boil. Take off the heat, add the quick oats and stir gently.
2. Sift all of the dry ingredients together in a large bowl.
3. Add the sultanas to the flour mixture.
4. Add the butter, quick oats and water mixture, egg, oil and enough of the remaining warm water to mix to a soft dough.
5. Cover with plastic wrap and leave to cool in a warm place until doubled in size.
6. Turn onto a floured board and knead lightly.
7. Divide the dough into 12 even pieces and knead and shape each into a bun. Place on an oven tray.
8. Cover loosely with plastic wrap and prove in a warm place for 10 minutes or until doubled in size.
9. Make the piping mixture by mixing the flour and sugar together with the water until a smooth, thick paste forms. Pipe a cross on the top of each bun.
10. Bake in the preheated oven at 200 °C for 10 minutes. Reduce the temperature to 180 °C and continue cooking for a further 5–10 minutes or until golden brown.
11. Make the bun glaze by combining all of the ingredients in a small saucepan. Stir over the heat and bring to the boil.
12. Brush the glaze over the buns while they are still warm.

MAKES 12 HOT CROSS BUNS

EVALUATION

1 Describe the sensory properties of the finished hot cross buns using descriptive language.
2 What is bread flour and why is it used in this recipe?
3 Draw a flow chart to explain the changes that take place in the dough when it is left to rest in step 5 of the recipe.
4 What is meant by the term 'kneading' and why is this an important step in yeast baking?
5 Spices are critical ingredients in hot cross buns and are readily available in supermarkets. Discuss how, in ancient times, they were a highly valued commodity to trade around the world.



Mark Fergus Photography

Oaty choc-chip biscuits

These delicious biscuits combine the nutty flavour of hazelnuts with the richness of chocolate. The butter and oats give them good keeping qualities.

70 grams hazelnuts
60 grams unsalted butter, softened
¼ cup caster sugar
¼ cup brown sugar
¼ teaspoon vanilla essence
1 small egg, beaten
½ cup rolled oats
½ cup plain flour
¼ teaspoon baking powder
¼ teaspoon bicarbonate of soda
50 grams good-quality dark chocolate, chopped

METHOD

1 Preheat the oven to 170 °C. Line a baking tray with baking paper. Toast hazelnuts in the oven for 5–6 minutes until golden brown.
2 Remove nuts from oven and place on a clean, dry tea towel. Fold the tea towel in half and rub the hazelnuts to remove the skins. Allow to cool. Chop roughly with a large knife.
3 Place unsalted butter, caster sugar and brown sugar in a large bowl and beat until the mixture is light and fluffy.
4 Beat in the egg and vanilla until just combined then fold through the rolled oats.
5 Sift the flour, baking powder and bicarbonate of soda and fold into the mixture.
6 When almost incorporated, stir in the chocolate and chopped nuts.
7 Place heaped teaspoons of mixture on the lined baking trays. They should be about 4 centimetres apart to allow for spread during baking. Slightly flatten the teaspoons of mixture.
8 Bake for approximately 10 minutes or until golden brown. The biscuits will feel soft straight from the oven but will crisp as they cool on the tray.

MAKES 12–14 BISCUITS

EVALUATION

1 Describe the sensory properties of the finished oaty choc-chip biscuits using descriptive language.
2 Why is dark chocolate selected for this recipe?
3 Why is it important to toast the hazelnuts before using them to make the biscuits?
4 Name the process of beating the butter and sugar together until light and fluffy. How does this affect the sensory properties of the finished biscuits?
5 Explain the role that the baking powder and bicarbonate of soda play in the biscuit mixture.



Mark Fergus Photography

IMPORTANT TECHNOLOGICAL DEVELOPMENTS IN PRIMARY FOOD PRODUCTION

#1 IRRIGATION



#2 INVENTION OF THE PLOUGH



#3 MACHINERY FOR SOWING & HARVESTING CROPS



#4 SYNTHETIC AGRICULTURAL CHEMICALS



KEY FACTORS CONTRIBUTING TO GLOBALISATION

TRANSPORTATION OF PERISHABLE FOODS

COLD-CHAIN TECHNOLOGIES



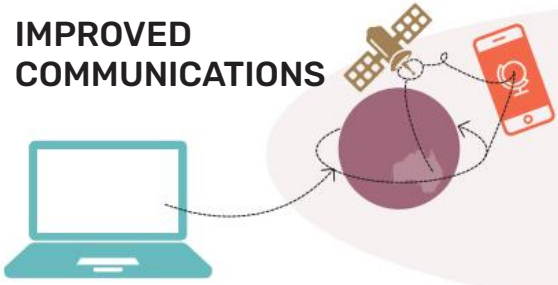
REFRIGERATION



DEVELOPMENT OF MULTINATIONAL CORPORATIONS



IMPROVED COMMUNICATIONS



4

INDUSTRIALISATION AND FOOD PRODUCTION

IMPACT OF GLOBALISATION ON HEALTH

POSITIVES

INCREASED FOOD AVAILABILITY



MORE NUTRITIOUS & CONSISTENT FOOD SUPPLY



INCREASED LIFE EXPECTANCY



NEGATIVES

INCREASED CONSUMPTION OF FAST FOODS HIGH IN FAT, SALT & SUGAR LEADING TO HIGHER LEVELS OF OVERWEIGHT & OBESITY



KEY TERMS

fertilisers chemical compounds applied to soil to promote plant growth

globalisation a process by which the world has become interconnected as a result of increased trade and cultural exchange

Green Revolution a large increase in crop production in developing countries achieved by the use of artificial fertilisers and high-yield crop varieties

industrialisation a process in which a country or society is transformed from a primarily agricultural society to one based on the manufacturing of good and services

irrigation the artificial application of water to the land to enable agricultural crops to grow

multinational corporations companies that operate and do business in more than one country, with headquarters in their home country

nitrogen fixing the use of nitrogen-fixing bacteria in certain plants to change nitrogen gas from the atmosphere into solid nitrogen usable by plants

Resources
Study Design links
Infographics
Flashcards

The impact of industrialisation on food availability and production

Collaborative Activity

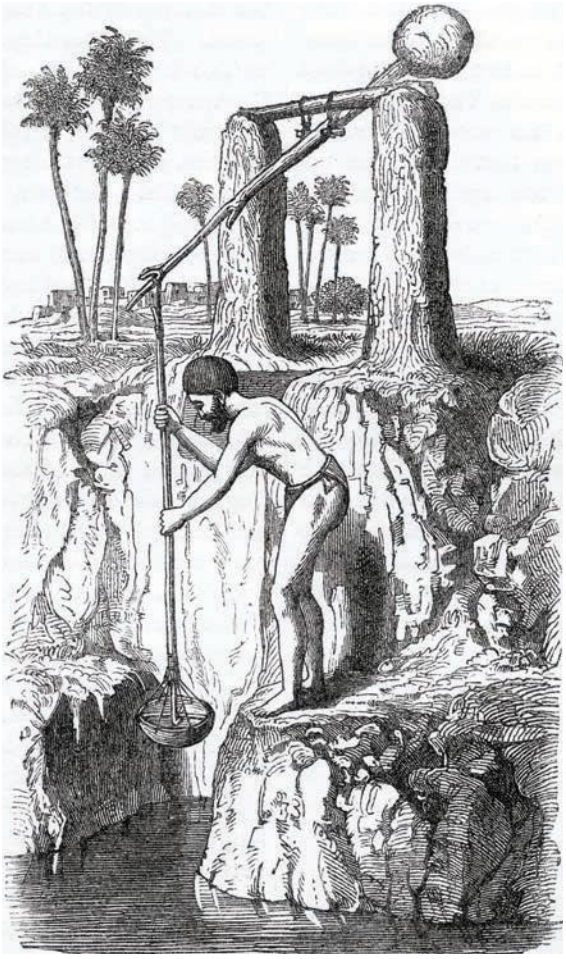
Throughout history, technological developments, or the application of scientific knowledge for practical purposes, have had a major impact on the industrialisation of the agricultural industry and on food production and processing. **Industrialisation** is a process by which a country or society is transformed from a primarily agricultural society to one based on the manufacturing of goods and services. A common consequence of industrialisation is that manual labour performed by individuals, is replaced by technology, including highly mechanised machinery and assembly-line processes to produce goods on a mass scale.

The development of technology maximised crop yields and enabled new food products to be developed, ensuring the production of a greater amount of food for an increasing world population. The agricultural revolution began in the United Kingdom in the early 18th century and spread throughout Europe and North America by the 19th century. This period marked huge developments in agriculture, with new farming techniques and inventions in farm equipment and food-manufacturing processes leading to greater food production.

TECHNOLOGICAL DEVELOPMENTS IN IRRIGATION

Water is one of the most important inputs required for plants to grow to produce food. **Irrigation** is the artificial application of water to the land to enable agricultural crops to grow. The first attempts to control water to grow crops took place in about 6000 BCE in Mesopotamia and Egypt, where canals were used to divert water from the rivers such as the Nile, Tigris and Euphrates to water crops.

Farmers in Mesopotamia and Egypt used a shadoof, an early irrigation tool, to draw water for crops. This tool consisted of a crossbeam on a frame that was fixed to the ground. A large pole was balanced on the crossbeam with a bucket or lifting device at one end and a counterweight at the other. The workers would use the shadoof to draw water from the river and then they could swing it around to water their crops.



Alamy Stock Photo/Lakeview Images

A shadoof, an early irrigation tool for drawing water

Later in Persia, a tunnel or qanat was used to bring water from an underground source in the hills, down to the foothills. This meant farmers no longer needed to lift water from the river as they had previously done. This system was replaced later with new canal systems called aqueducts, built using brick, stone or concrete.



Alamy Stock Photo/agefotostock

An early aqueduct for conveying water

As technology advanced, storage dams were constructed with blocks mortared together to prevent leakage. Spillways and flood gates were built to release water to a series of canals to allow flood watering of paddocks.

In 3000–2000 BCE, a sakia, or Persian water wheel, began to be used. The sakia is a water wheel device that uses a series of buckets to scoop up water and then divert it to crops by very small channels. The sakia wheels were initially driven by animals and later by simple engines.



Alamy Stock Photo/Historical Images Archive

A sakia

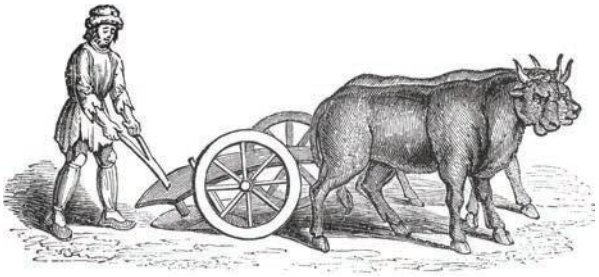
As technology developed, so did the sophisticated irrigation systems that we know today. These systems can supply an entire paddock with a uniform quantity of water using automated sprinklers and dripper systems that supply water just to the root system of individual plants.

All these technological developments in irrigation enabled farmers to increase the productivity of their land and to increase the amount of food available to feed the growing population.

TECHNOLOGICAL DEVELOPMENTS IN FARM MACHINERY

The mechanisation of farm processes allowed the replacement of human and animal labour with machinery, including machines to cultivate the soil, sow the seeds and harvest the crops. Mechanised farming allowed farmers to work larger areas of land with fewer farm workers.

The invention of the plough had a major impact on food production; using ploughs, farmers became more efficient and could provide a better quality and quantity of crops to sell.



Alamy Stock Photo/De Luan

An early plough drawn by oxen

Advances in technology also saw significant changes in the way that crops were sown and harvested. When crops were first domesticated, seed was sown by broadcasting; that is, they were simply thrown onto the ground by hand. The move to a more systematic, less random approach to planting occurred in Mesopotamia in 1500 BCE when farmers used a tube to drop seeds evenly into a channel.



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A modern spray irrigation system



Getty Images/Science & Society Picture Library

Jethro Tull demonstrating his seed drill

In 1701, Jethro Tull, an English agriculturist, invented the first seed drill, which made it much easier to drop the seeds in rows and channels. The seeds were then covered with soil which prevented the birds from eating the seeds, a problem which occurred when the seeds were simply broadcast across the fields.

In 1834, an American inventor, Cyrus McCormick, developed a mechanical reaper, a machine for cutting and harvesting grain. This invention saved many backbreaking hours of labour in the fields during harvest time.

All these farming machine inventions made farming easier, requiring less time and labour, and made large-scale agricultural production and an increased food supply possible.

TECHNOLOGICAL DEVELOPMENTS IN AGRICULTURAL CHEMICALS

In the early civilisations, farmers overworked the land, depleting the fertility of the soil. By the 17th century, European farmers had learnt to regenerate the fertility of the soil through the use of animal manure and crop rotation, which led to increased crop yields. In the north and west of England, farmers used clover and turnips in rotation with wheat and barley to increase their cereal yields.

Nitrogen is a vital building block of all plant and animal tissue, in particular, the protein component of grains. In 1885, it was discovered that a process called nitrogen fixing also replenished and regenerated soil fertility. **Nitrogen fixing** is the use of nitrogen-fixing bacteria in certain plants to change nitrogen gas from the atmosphere into solid nitrogen usable by plants. Microbes that live in the soil invade the root hairs of legumes where they stimulate the growth of nodules that convert the free nitrogen in the air to ammonia.

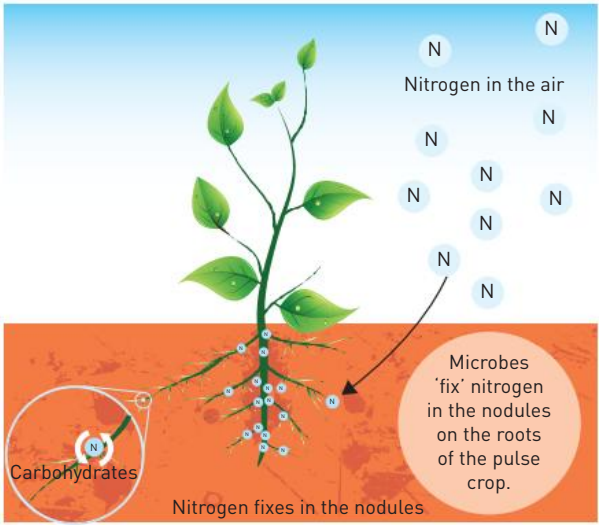
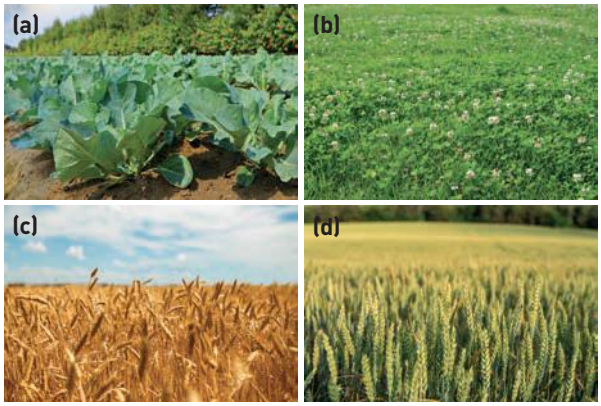


FIGURE 4.1 A pulse crop with root nodules for fixing nitrogen in the soil



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Turnips **(a)** and clover **(b)** in rotation with wheat **(c)** and barley **(d)** – this is an example of a crop rotation system used to increase crop yield.

Nitrogen is necessary for plants as a nutrient, and legume crops such as peas, lentils, clover and beans contain nitrogen in nodules in their root system, making it available to other plants through the soil. Planting these crops in rotation regenerates the soil's quality after grain crops have been grown.

In 1909, a German laboratory made a major technological breakthrough when it developed ammonia. The manufacture of ammonia in factories established a much-needed fertiliser, which enabled farmers to dramatically improve food production, especially of crops. **Fertilisers** are chemical compounds applied to promote plant growth. The new artificial fertilisers, pesticides and high-yield seed varieties and an expansion of irrigation techniques led to what became known as the **Green Revolution** – a huge increase in crop production in developing countries in the 1960s. With this increase in crop production, the human population rose dramatically during the 20th century, from 1.6 billion to 6 billion. This Green Revolution transformed agriculture practices around the world and led, not only to the increased production of food, but to the spread of new technologies such as the application of pesticides and synthetic or artificial fertilisers, an expansion of irrigation techniques and improved crop varieties.

With fertiliser, it was now possible to grow crops from high-yield seed varieties, and new varieties of wheat and maize were developed to feed the growing population that otherwise could have faced malnutrition or starvation. The Green Revolution helped to lift hundreds of millions of people out of poverty and created a resurgence of the Asian economies, particularly in China and India. However, this process had some negative environmental impacts because many traditional farming practices were rejected: environmental damage such as soil acidification developed, and farmers became dependent on expensive seeds and chemicals.

The application of fertilisers produced cereals crops of wheat, maize and rice with larger and heavier heads of grain, which in turn meant higher yields. However, this also meant that the crops were more likely to topple over or 'lodge', so farmers had to strike a balance between fertilisers that produced a high yield, and producing plant stalks that could support the grain heads. This balance required short or 'dwarf' varieties to be developed that put less energy into growing long stalks and diverted this energy into the seed head. This led to the development of high-yielding varieties of wheat.

Technological developments in food production

Significant developments in technology have meant that food can be processed and distributed to meet consumer demands and the demands of the marketplace. These developments were essential to ensure the availability of a greater quantity of food to feed an increasing world population.

Collaborative Activity

THE GRAIN INDUSTRY

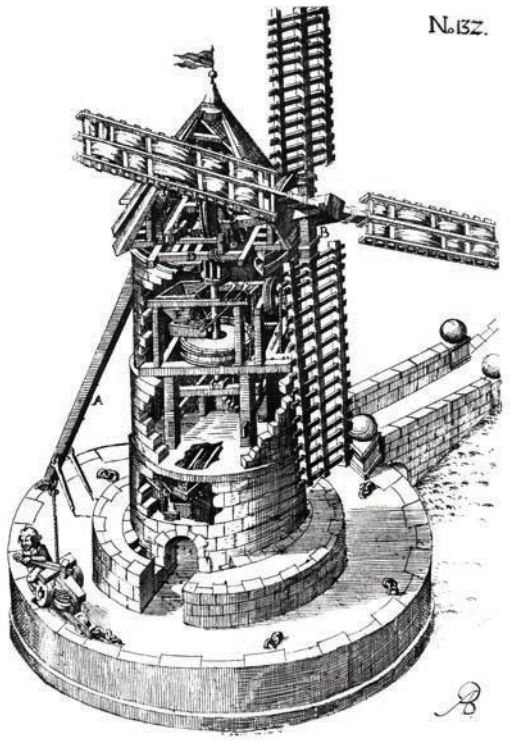
In 6000 BCE, it was discovered that wheat seeds could be crushed between simple stones to make flour. This earliest method used a saddle stone or quern, and an upper movable stone known as a hand stone. The technology of early milling was based on the principle of a fixed bed stone and a rotating runner that ground the grain into flour.



Getty Images/Science & Society Picture Library

A saddle stone and hand stone

By approximately 70 BCE, a water-powered grain mill had been developed in Asia, which was also used throughout the Roman Empire. Such mills used steel rollers or gristmills that turned the millstones using a gearwheel driven by water or, later, by wind.



Getty Images/Photo 12

An early windmill for milling flour

By 1086, water-powered flour mills were in use throughout England and much of Europe.

In Hungary in the early 1870s, a new process of milling was developed using a series of rollers. The grain was passed between sets of spinning rollers to break down the grain. This process was followed by a series of rollers and sieves that removed the bran layer and wheatgerm, leaving behind the endosperm, or fine white refined flour.

Today flour milling is an important industry, and through the constant growth in technology, it has become a sophisticated process using computer-operated machinery and systems.



iStock.com/romaset

A modern computerised system for milling grain

Practical Activity 4.1

Sensory analysis of grissini

Aim: To compare the sensory properties of commercial and home-made grissini sticks.

Method

1. Make one quantity of grissini using the recipe that follows.
2. Purchase two commercial grissini stick products from the supermarket.
3. Complete a sensory analysis test each of the products and record your description of the appearance, aroma, flavour and texture of each grissini.
4. Record the sensory properties of grissini in a table similar to the one on the next page.

After testing, rate it using a facial hedonic descriptor (see page 30).

Analysis

1. Outline the physical changes in the dough after kneading it for 2–3 minutes.
2. How did the dough change after microwaving? Explain the impact of this process on the final sensory properties of the grissini.
3. Compare the similarities and differences in each of the sensory properties of the homemade and commercial grissini.

Worksheet

Conclusion

Which type of grissini did you prefer? Justify your answer based on the results of your sensory analysis.

GRISSINI

This is a quick and easy bread dough that is proved in the microwave. This method can also be used to make a focaccia or pizza base.

1½ cups plain flour
1 teaspoon dry yeast
1 teaspoon sugar
1 tablespoon oil
¾ cup warm water, approximately
1 tablespoon olive oil or egg wash, for glazing

A selection of sea salt, sesame seeds, parmesan cheese and herbs can be used for toppings.

METHOD

1. Place the flour in a bowl with the yeast, sugar and oil.
2. Add enough warm water to mix to a soft dough.
3. Bring the dough into a ball and knead the dough lightly for 2–3 minutes until smooth.
4. Place in a lightly oiled microwave-proof bowl and cover with plastic wrap.
5. Place the bowl in the microwave and cook on high power for 15 seconds.
6. Rest for 5 minutes and repeat heating in the microwave on high power for 15 seconds.
7. Remove from the bowl and divide into 12 pieces.
8. Roll each piece into a long, irregular log about 25 centimetres long and place on a lined baking tray.
9. Glaze the dough and finish with your desired topping.
10. Bake at 200 °C for 10 minutes until golden brown.

Results

	COMMERCIAL PRODUCT 1	COMMERCIAL PRODUCT 2	HOMEMADE PRODUCT
			
Appearance			
Aroma			
Flavour			
Texture			
Facial hedonic descriptor			

Mark Fergus Photography
Mark Fergus Photography
Shutterstock.com/Steve Cukrov

Understanding the Text

1. Outline the impact of industrialisation on society.
2. Draw a simple diagram to show the development of irrigation systems.
3. Why was the invention of the plough a breakthrough for farmers?
4. Describe early methods of sowing grain and explain how the invention of the seed drill improved this process.
5. What is crop rotation and why was it of benefit to European farmers?
6. Explain the role of nitrogen fixing bacteria and the importance of planting legumes and bean crops in rotation with cereal crops?
7. What is meant by the 'Green Revolution'?
8. Explain the impact of the Green Revolution on world food supplies and the world population.
9. Describe an early method of milling wheat grains and compare this to later methods.
10. Explain how the new milling process using rollers and sieves was able to create white flour.

Answers
Understanding the Text

THE DAIRY INDUSTRY

The origin of the dairy industry began in Mesopotamia about 6000–7000 BCE when cattle were domesticated and their milk used for drinking and cheese making.

Traditionally, cows were hand-milked and the milk was placed in barrels and bought to the market by wagon to be sold. Dairy herds were small, as hand-milking was a very time-consuming process.



iStock.com/DavideMottarella

Hand-milking a cow

As dairy herds grew in size, milking machines were developed. The early milking device consisted of cups that were attached to each of the cow's teats. This device sat on the top of a milking bucket on the floor under the cow. After milking, the bucket was emptied into a holding tank.

In the 19th century, a milk pipeline system was introduced. The milk pipeline was a milking device that allowed the milk to be transferred by pipe and gravity to a storage tank. This pipeline system greatly reduced the physical labour of milking and allowed more cows to be milked in less time, increasing the quantity of milk that could be produced and available to consumers. Later innovations included the use of herringbone and parallel bails, which are structures in a cowshed that secure the head of the cow during milking, and allow a row of cows to be milked at once.



iStock.com/yadamons

A herringbone dairy

Later, a rotary system was developed whereby cows were loaded onto a platform one at a time. Once the cow was on the platform, the platform rotated. By the time the platform had completed a full rotation, a machine removed the cups from the cows, and the cow stepped off the platform and walked to its feeding lot.



Shutterstock.com/Vladimir Mulder

A rotary dairy

In the 1980s and 1990s robotic milking systems were introduced into the dairy industry. In this automated system, the cow enters a bail where it is fed and its collar scanned to record that it has been milked. These advances in technology have led to the development of large dairy farms that house hundreds of cows and can produce large volumes of milk. As a consequence, these farms are rapidly replacing small family-run dairy farms.

Preserving milk

Storing milk at a cool temperature has been the main method of preserving the freshness of milk. Before the advent of electricity and refrigeration, water from underground wells was used to cool milk until it could be transported to the town market. This naturally occurring cold water was pumped into a cooling tub and the vat of milk was placed in the cold water. When refrigeration arrived in the early 19th century, cans, which were filled by hand-milking, could be stored in a refrigerated chamber. Later, vats were used to store bulk milk on the farm before the refrigerated tanker arrived to collect the milk.

Milk is a highly perishable food that is easily spoiled; it also contains disease-causing bacteria. In the 19th century, Louis Pasteur invented pasteurisation, a process that kills bacteria in liquid foods, particularly milk. This process involves heating milk to 72° C and then rapidly cooling it, a process known as high-temperature, short-time processing. This process kills the disease-causing microbes but does not change the sensory properties of the milk. Pasteurisation has had a major impact on the dairy industry and is now widely used throughout the world.

The development of milk-processing technologies includes packaging techniques such as UHT or ultra-heat treatment, an aseptic packaging technique. This process sterilises the package and the milk separately and then brings them together in a sterile environment. This process extends the shelf life of the milk, and the package does not require refrigeration until it has been opened.

There have also been significant advances in membrane technology used for processing milk. This process commonly uses two methods – ultrafiltration and reverse osmosis – and involves the use of a porous membrane or filter to separate the particles in milk. Membrane technology has allowed the dairy industry and milk processers to produce nutrient-modified dairy products such as reduced-fat milks, low-fat cheeses and yoghurt, and products with increased levels of protein, vitamin D and calcium. Many of these nutrient-modified dairy products have improved health outcomes for many people. Consuming dairy products that contain fewer kilojoules enables some people to reduce their energy intake. For others, they may reduce the likelihood of developing conditions such as osteoporosis by drinking milk containing higher levels of calcium.



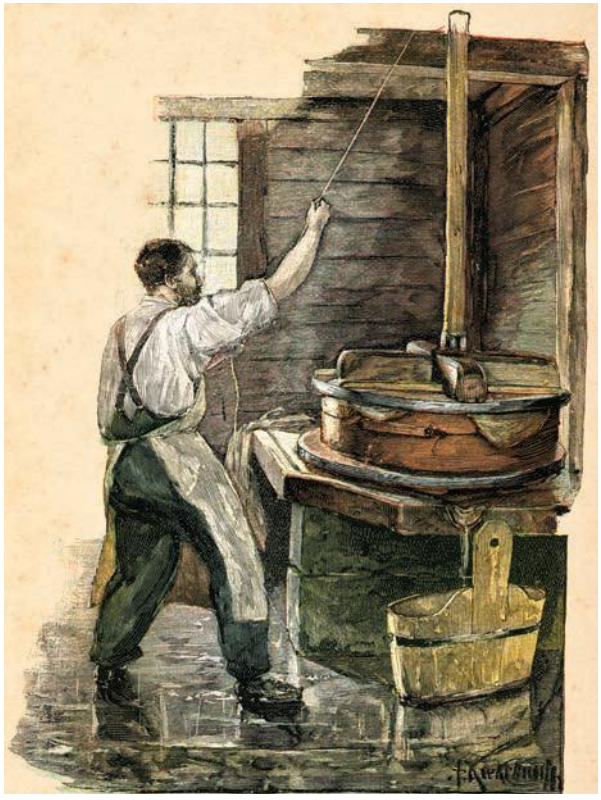
Mark Fergus Photography

Developments in membrane technology have led to the production of nutrient-modified milk.

Cheese making

According to ancient records, cheese making dates back more than 4000 years. Legend has it that an Arabian merchant, travelling in the desert, accidently created the first cheese by putting a supply of milk into a pouch made from the stomach of a sheep. When he stopped a few hours later for a drink, curds and whey had formed. The rennet, an enzyme found in the lining of the stomach of some animals, assisted the digestion of milk by breaking down the casein in the milk and causing it to curdle. This process is used in cheese making as it allows the curds to form and to separate from the whey by curdling the milk. The curds are then pressed to form cheese.

As cheese making spread around the world, new processing and manufacturing methods improved the process. Mass production of rennet began in the 1800s and later, microbial cultures began to be produced. These processes made it possible to make cheese more widely available and in larger quantities. Factory-made cheese overtook traditional cheese making methods during World War II.



Getty Images/Grafissimo

An early method of making cheese by hand

The development of science and technology has bought efficiency and standardisation to cheese making, enabling the production of many different types of cheese.

Modern factories now use an automated computer-operated production system to manage the many complex processes involved in cheese making.



Shutterstock.com/OVKNHR

Modern cheese factories are highly automated.

21ST-CENTURY TECHNOLOGICAL DEVELOPMENTS IN FOOD PROCESSING

In recent years, innovation and developments in technology, including the use of genetic engineering, the introduction of ultrasounds and shockwaves and 3D printing have had an influence on the development of food production, processing and manufacturing in Australia.

Genetic engineering	Ultrasound and shockwaves	3D printing of food
• A wide range of applications to improve plant yield and provide health benefits • GM tomato that contains a neurotransmitter linked to lowering blood pressure • GMO Golden Rice and Golden Bananas containing increased levels of pro-vitamin A to overcome vitamin A deficiencies in children • GMO lettuce containing high levels of folate to address neural tube defects in the developing foetus and low levels of folate in adults	• Ultrasound technology is being developed to increase the amount of oil extracted in processing olives, coconuts and soybeans. • Shockwaves can be transmitted to alter the structure of food. For example, they can be used to tenderise tougher cuts of meat or change the structure of grains to increase the yield when milled.	• Plant-based protein and plant fats can be combined to print a plant-based meat product that contains the same proportion of protein, a higher fibre content, but with no cholesterol and less fat than meat from animals. • Major environmental advantages: uses less water and land, and produces 90 per cent less carbon dioxide than meat from animals

FIGURE 4.2 21st-century technological developments

Practical Activity 4.2

Making your own cottage cheese

Aim: To compare and contrast the similarities and differences between homemade and commercial cottage cheese.

Method

1. Work with a partner to prepare one quantity of homemade cottage cheese.
2. Before adding flavourings to the cheese, undertake a sensory analysis of the appearance, aroma, flavour and texture.
3. Using a results table like the one below, write up your sensory analysis using technical terminology and rate the cottage cheese by drawing a facial hedonic descriptor (see page 30).
4. Complete a similar sensory evaluation using a commercial cottage cheese.



Getty Images/Евгения Матвеец

Draining the whey from the curds

Analysis

Describe the similarities and differences in the homemade and commercially made cottage cheese.

Worksheet

Conclusion

Which cottage cheese did you prefer? Justify your answer.

HOMEMADE COTTAGE CHEESE

½ cup full cream milk
2 teaspoons boiled water, cooled
1 junket tablet

METHOD

1. In a saucepan, carefully heat milk to 38 °C (body temperature). Be careful not to allow the milk to boil.
2. Pour the warmed milk onto the dissolved junket tablet.
3. Allow to stand for 20 minutes in a warm place.
4. Slice the curd into cubes and wait 5 minutes until the whey begins to appear.
5. Place a large sieve over a bowl and line with a large square of muslin cloth. Make sure the cloth overhangs the sieve.
6. Tip the curd into the lined sieve and allow the whey to drain into the bowl below.
7. Cover the sieve loosely with plastic wrap and place in the refrigerator overnight.
8. Remove the curd from the cloth and place in a clean bowl. Discard the whey.
9. Cut the curd up with the tip of a knife.
10. Serving suggestion: Stir flavouring ingredients through the curd; for example, chopped herbs such as chives, coriander or mint, salt and pepper or honey and chopped fruit.

Results

	HOMEMADE COTTAGE CHEESE	COMMERCIAL COTTAGE CHEESE
Appearance		
Aroma		
Flavour		
Texture		
Facial hedonic descriptor		

Impact of globalisation on food availability

The global demand for food has had a major influence on food systems and the diversity and availability of food.

Globalisation is a process by which the world has become interconnected as a result of technological developments in both transport systems and communication, leading to increased trade and cultural exchange. It has also led to greater economic cooperation and financial investment between countries and the ability for labour to move across national borders.

After World War II, there was a strengthening of international ties and trade markets, and the foundation was laid for today's economic global economy. Gradually the economies of most countries became interconnected and formed part of an interdependent global economy.

Today, globalisation of food production is evident in Australian supermarkets and the opportunity to obtain produce from more countries than ever before. Fruit from New Zealand, asparagus from Peru, tea from Sri Lanka or cheese from France are all available in the local food store. Food is no longer tied to the seasons, and it is now possible to buy food anywhere in the world, at any time of the year.

The food supply chain in Australia is complex. For example, rice may be grown in Thailand, packaged in India and sold in a supermarket in Australia. As populations increase and people in countries such as Brazil and China are becoming wealthier, there is greater demand by these countries for more imported meat and dairy products.



Alamy Stock Photo/Igor Prahin

The impact of globalisation has meant that products such as olives from Greece and Italy are available to Australian shoppers.

TECHNOLOGICAL IMPROVEMENTS IN THE TRANSPORTATION OF PERISHABLE GOODS

One of the key factors contributing to the globalisation of food is the advancement that has been made in the transportation of perishable goods.

The development of refrigerated and container transport, bulk shipping and improved air transport have enabled the easy mass movement of goods throughout the world. During the latter half of the 19th century, a number of cooling devices were applied to food when it was shipped. Advances in refrigeration began to be used and, together with increases in sailing speeds, it became possible to export perishable foods such as citrus fruits, bananas, meat and seafood around the world. This meant that many seasonable foods were available all year round. Further advances in technology, such as controlled atmosphere packaging or modified atmosphere packaging, were used in storage and transportation and allowed for the export of perishable fruit. This process involved changing or modifying the gas inside the package, slowing down the respiration and decomposition of the product, and extending its shelf life.

The development of cold-chain technologies – that is, temperature-controlled food supply chains – has had a major impact on the globalisation of food products. These processes have helped extend the shelf life of food products such as fruit, seafood and frozen foods.

The cold-chain infrastructure allows food to be kept in cool stores at between 2–8 °C as it waits for transportation. It is then kept at this temperature during shipping or air transport until it reaches its destination. The cold-chain system is analysed, measured, controlled, documented and validated to ensure the product arrives in its best condition. This temperature-sensitive system allows food products that are sensitive to changes in temperature to be transported to distant markets.



Shutterstock.com/mnimage

Australia uses cold-chain technology to supply fresh abalone to the Japanese market.

The export of highly perishable fresh produce to overseas markets involves the use of specialised packaging along with insulated shipping containers. New food packaging systems and shipping containers use technology such as big data and the Internet of Things so that the produce can be tracked at every stage of its journey. This enables the collection and analysis of data in real time so that decisions can be implemented if any problems occur in maintaining a safe food supply.



Shutterstock.com/EvrenKalinbacak

A loaded container ship

IMPROVED COMMUNICATIONS

The development of communication technologies such as the Internet, email and smartphones has been vital in the growth of globalisation as communication can now be made quickly and efficiently. Social media networks have also provided worldwide marketing avenues. Video calls, conferencing calls and video meetings mean that trade deals can flow freely and instantly throughout the world.

THE GLOBALISATION OF MULTINATIONAL CORPORATIONS

The agricultural and food processing industry employs a significant proportion of the global workforce, but only a small number of companies control the industry. **Multinational corporations** are large companies that operate and do business in more than one country, with headquarters in their home country. These corporations are very influential as they control much of the world's food supply.

The *Coca-Cola* Company is a US multinational beverage corporation, producing soft drinks and a range of other beverages such as sports drinks and flavoured teas. It is a global leader in the beverage industry and sells its products in more than 200 countries. The company has a long history of acquiring many brands, and in Australia they have taken over ownership of one of Australia's iconic brands, SPC Ardmona.

Today, Coca-Cola Australia, together with Coco-Cola Amatil, offer 165 varieties of drinks and 25 brands in their Australian product line.



Mark Fergus Photography

Brands owned by Coca-Cola Amatil

Kellogg's owns many well-known cereal brands and it is the world's leading cereal company and the second largest manufacturer of biscuits. The company also own a large number of brands of snack foods and frozen foods.



Mark Fergus Photography

Cereal brands owned by Kellogg's

Nestlé is one of the world's largest companies, with approximately 291 000 employees across the globe. The company produces products in almost every food and beverage category, including baby foods, drinks, cereals, coffee, chocolate, confectionery, ice-cream and pet care.



Mark Fergus Photography

Brands owned by Nestlé

The rapid growth of other multinational corporations, such as *McDonald's*, has allowed these companies to sell their goods and services on a massive scale throughout the world. The McDonald's brand has spread around the globe and today they operate more than 36 000 restaurants in over 120 countries. While the restaurants offer very similar products, their menus vary slightly and are often customised to meet the religious or cultural requirements of a country. For example, in India, customers can purchase a Maharaja McMeal made of lamb instead of beef, while in Israel, McDonald's serves a kebab on flat bread rather than the hamburgers popular in the United States of America.



Alamy Stock Photo/david pearson

Many multinational companies such as McDonald's have outlets across the world.

IMPACT OF GLOBALISATION ON HEALTH

Industrialisation is considered to have largely had a positive impact on people's health. Developments in technology led to an increase in food availability and fewer people faced the prospect of starvation and malnutrition as many countries were able to provide their populations with a more nutritious and consistent food supply. This in turn led to an increase in life expectancy.

Conversely, industrialisation had a negative impact on some aspects of health, particularly in relation to the increased use of chemicals in agricultural production, which research shows can have a carcinogenic effect on humans. Nitrogen fertilisers release ammonia, which can cause heart and pulmonary diseases. Spraying chemicals on crops has also been linked to poor health outcomes as herbicides and pesticides can drift in the air and settle on homes. Pesticides can also leach and run off into rivers and creeks, contaminating ground water supplies.

Increased globalisation of the world's food supply and the rise in the consumption of fast food has had a significant impact on the health of populations. Highly processed foods, especially fast foods, are high in saturated fat, salt and sugar, and as a result are a concentrated source of energy. These foods can lead to the development of overweight and obesity and associated lifestyle diseases including cardiovascular disease, heart disease and type 2 diabetes. Of concern is the link between the rise in fast food outlets in developing countries and the increasing impact this has on the health outcomes of local populations, particularly the rise in the rates of childhood obesity.

Understanding the Text

11 Draw up a simple flow chart to demonstrate the technological developments in the Australian dairy industry.

12 What is pasteurisation and why was it an important discovery for the dairy industry?

13 Describe the benefits to the consumer of UHT milk and modified milks produced by membrane technology.

14 What is rennet and why is it important in cheese making?

15 Identify two developments in technology and explain the impact they have had on the health of populations.

16 What is meant by the term 'globalisation'? Provide two examples to help explain your answer.

17 Explain the role of cold-chain technologies in the transportation of perishable foods and how new technologies have improved food safety.

18 Describe the impact that companies such as Coca-Cola, Kellogg's and Nestlé have on global food supplies.

19 Why has it been necessary for multinational corporations setting up fast food outlets around the world to adjust their product types and ingredients?

20 Discuss the consequences of globalisation on health, particularly in relation to the expansion of the fast-food industry.



Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS



Worksheet

1 Search online for digital images to demonstrate the development of technology in agricultural food production; for example, the use of the plough. Place images in a table, like the one below.

2 In the third column of your table, explain how the changes in the design of the equipment have impacted on food production.

ORIGINAL EQUIPMENT	CURRENT EQUIPMENT	IMPACT OF DESIGN CHANGES ON FOOD PRODUCTION

Sweet corn and bacon quiche

Having recipes that can be prepared in advance and simply reheated can be a very valuable time-saving resource for a busy family. The following recipe for sweet corn and bacon quiche is a great example of a recipe that can be prepared in advance. The pastry case for this recipe can be made well ahead of time and chilled or even frozen until needed. The whole quiche reheats very easily or is just as delicious served cold.

SHORTCRUST PASTRY

125 grams flour

2 tablespoons self-raising flour

pinch of salt

90 grams butter, at room temperature

1 egg yolk

1–2 tablespoons iced water

SWEET CORN AND BACON FILLING

½ onion, finely diced

2 rashers bacon, finely diced

2 teaspoons olive oil

½ cup drained canned corn kernels

⅓ cup sour cream

¼ cup milk

2 eggs

½ cup tasty cheese, grated

2 teaspoons parsley, finely chopped

METHOD

Making the shortcrust pastry

1 Sift flours and salt into a large bowl.
2 Cut the butter into small pieces then rub into the flour with fingertips. Lift your hands high to aerate the mixture. Continue rubbing in until the mixture resembles fresh breadcrumbs. Alternatively, the rubbing-in process can be done in a food processor.
3 Combine the egg yolk and iced water and sprinkle over the flour mixture. Use a metal spatula to cut through the mixture to bring the ingredients together.
4 Use your fingertips to bring the dough together, adding a little more liquid if required. The pastry should leave the bowl clean.
5 Cover the pastry with plastic wrap and rest in the refrigerator for 30 minutes. Use as required.

Will line an 18- to 20-centimetre flan tin

Blind-baking the pastry case

1 Preheat oven to 180 °C.
2 Roll out pastry and line an 18-centimetre foil pie tin. Cover pastry with baking paper and fill with loading such as dried beans or rice.
3 Place pie flan on a baking tray and bake for 7 minutes. Remove loading and baking paper and bake for another 7 minutes.

Making the sweet corn and bacon filling

1 Sauté the diced onion and bacon in the oil, then cool and combine with corn kernels. Spread the mixture over the blind-baked pastry case.
2 Whisk together the sour cream, milk and eggs, then pour into the pastry case.
3 Sprinkle over the grated cheese and parsley and bake for 20–30 minutes or until golden brown and the filling has set.

EVALUATION

1 Describe the sensory properties of the finished sweet corn and bacon quiche using descriptive language.
2 Outline the advantage of using a food processor to rub the butter into the flour instead of using your hands.
3 Explain the importance of resting the pastry in the refrigerator before rolling it out.
4 What is the purpose of blind-baking the pastry before adding the filling?
5 Identify the process and describe the changes that occur to the egg mixture during baking that alter the physical properties of the filling.



Mark Fergus Photography

Vegetable fritters with yoghurt sauce

A variety of vegetables are used in this tasty snack. Preparation processes include peeling, grating, chopping and mixing, making this an ideal recipe for children to help in the kitchen. The yoghurt sauce adds a tangy flavour to the fritters. The mixture is quite moist, so it is not suitable for large-sized fritters.

VEGETABLE FRITTERS

½ cup grated zucchini
1 cup grated carrot
¾ cup corn kernels, fresh, canned or frozen
2 spring onions, finely sliced
1 tablespoon parsley, finely chopped
1 tablespoon mint, finely chopped
½ cup self-raising flour
½ cup plain flour
½ teaspoon curry powder
pinch of salt
1 egg
½ cup coconut milk
4 tablespoons oil for frying

YOGHURT SAUCE

½ cup Greek-style yoghurt
½ lemon, juiced
1 clove garlic, crushed
salt and pepper

METHOD

Vegetable fritters

1 Place the grated zucchini in a sieve with a pinch of salt and leave to stand while you prepare the remaining ingredients.
2 Prepare the vegetables and herbs and combine in a large bowl.
3 Squeeze out the excess moisture from the zucchini then add to other vegetables.
4 Sift in the dry ingredients – the flours, curry powder and salt.
5 Add the egg and coconut milk to the bowl and stir until combined.
6 Heat two tablespoons of oil in a frying pan and fry off small portions of the mixture. Use a ¼ measuring cup or a metal tablespoon to measure out the batter so the fritters are of equal size.
7 Cook the fritters for 5 minutes on each side or until golden brown. Add the remaining oil into the frying pan as needed.
8 Drain the cooked fritters on a paper towel before serving.

Yoghurt sauce

1 Mix the yoghurt, lemon juice and crushed garlic together.
2 Season with salt and pepper to taste.
3 Cover and refrigerate until required.

MAKES 12–15 FRITTERS

EVALUATION

1 Describe the sensory properties of the vegetable fritters with yoghurt sauce using descriptive language.
2 Which section of the box grater did you use to prepare the zucchini and carrot? Explain why it was the most appropriate section to use.
3 Why is it necessary to salt the grated zucchini and rest it in a sieve?
4 Describe how you tested the oil to determine when it was hot and ready for frying.
5 Explain how draining the fritters on a paper towel improves their sensory properties.



Mark Fergus Photography

Focaccia

Focaccia is an Italian, thick pizza-like bread that is flavoured with a variety of toppings such as herbs, spices, salt crystals and parmesan cheese. The cooked focaccia can accompany soup, or be split and filled with ingredients such as ham, cheese and tomato and served as a snack. It is sometimes toasted or cooked in a sandwich press.

FOCACCIA

2 cups bread flour

1 teaspoon salt

2 teaspoons dried yeast

1 teaspoon oil

1 cup warm to hot water (not boiling)

1–2 teaspoons olive oil

TOPPING OPTIONS

1 tablespoon of mixed fresh herbs such as basil or parsley

2 tablespoons parmesan cheese

2 cloves crushed garlic

2 tablespoons chopped olives

sprinkle of lemon pepper

METHOD

1. Preheat oven to 220 °C.
2. Lightly grease a baking tray.
3. Sift the flour, salt and yeast into a bowl.
4. Make a well in the centre of the dry ingredients and add oil and almost all the water. Mix to a soft dough, adding the rest of the water if necessary.
5. Turn onto a floured surface and knead for 5 minutes.
6. Divide the dough in half and roll and shape each into an oval 2 centimetres thick.
7. Place on a baking tray and cover each oval loosely with a piece of plastic food wrap and prove in a warm place until it doubles in size.
8. Make indents in the top of each oval every 3–4 centimetres by pushing down firmly with your fingertips. Brush each oval with olive oil and sprinkle with one of the selected toppings.
9. Bake for 15 minutes at 220 °C, then reduce the oven temperature to 200 °C and bake for a further 5 minutes.
10. Place on a rack to cool.

SERVES 2

EVALUATION

1 Describe the sensory properties of the focaccia using descriptive language.
2 Why is it important to use bread flour and sift the dry ingredients when making this recipe?
3 Outline the impact kneading has on the dough before it is left to prove.
4 Describe the changes that occur when the risen dough is placed in the hot oven.
5 Explain why bread is usually served as an accompaniment to an Italian meal.



Mark Fergus Photography

Pita bread

Pita bread can be baked in the oven or fried on the cooktop. Pita cooked in the oven puffs up and makes a larger pocket. They stay pale in colour and have a mild flavour. The pita cooked on the cooktop doesn't usually puff very much, but it develops a more golden colour and a crunchier texture.

1½ cups bread flour
1 teaspoon salt
1 teaspoon dried yeast
½ cup warm water
2 teaspoons honey
2 teaspoons extra virgin olive oil
flour for dusting
semolina for dusting

METHOD

Making the pita bread

1. Sift 1½ cups of the flour, salt and yeast into a large bowl.
2. Combine the water, honey and olive oil in a jug and mix together. Pour two-thirds of the liquid into the flour and stir until a shaggy dough is formed. Use the remaining liquid to adjust the dough until all the dry ingredients are collected into the dough. Form the dough into a ball in the bowl.
3. Cover the bowl with oiled cling wrap and sit in a warm place for the dough to prove and double in size.
4. Sprinkle the flour for dusting on the bench and turn out the dough. Knead until the dough is smooth and springs back when gently pressed with your finger.
5. Divide the dough into 4 equal portions and knead into individual balls.
6. Dust the bench with semolina and roll out the balls until they are 5 millimetres thick. Dust a baking tray with semolina and place the discs on the tray in a single layer. Prove on the bench for 10–20 minutes until slightly risen before cooking.

Oven-baking the pita

1. Preheat oven to 230 °C. Place the pita in a single layer on a baking tray. Position the baking tray in the middle of the oven and bake for 3 minutes.
2. Remove the tray from the oven and flip the pitas. Return to the oven and bake for 1–2 minutes or until the pita have puffed up like a balloon.
3. Remove from the oven and cover with a clean tea towel until cool.

Pan-frying the pita

1. Heat a frying pan over medium heat. Lightly spray with oil or drizzle in a little oil then wipe out the frying pan. Prick the pita with a fork then cook for 2 minutes on each side or until golden brown.
2. Cover with a clean tea towel until cool.

MAKES 4 PITA BREADS

EVALUATION

1 Describe the sensory properties of the pita bread using descriptive language.
2 List three conditions yeast needs to grow and then explain the functional role of honey in this recipe.
3 Explain why the pita bread puffs up when baked in the oven.
4 Explain why pita cooked in a frying pan on the cooktop would have a crunchier texture than pita cooked in the oven.
5 Filled pita bread is a popular school lunch item with both primary and secondary students. Explain why.



Mark Fergus Photography

Carrot dip and edamame bean dip

Dips such as this carrot dip and edamame bean dip are similar to those served as part of a Greek *mezze* platter. Both the chickpeas used in the carrot dip and the soy beans that are the basis of the edamame bean dip are high in dietary fibre and protein and are low in saturated fat. These beans also have a low glycaemic index, making them an ideal food to eat as a snack. The olive oil used in edamame bean dip is a monounsaturated or 'heart-friendly' fat. Both dips are delicious spread over homemade pita bread or as an accompaniment to grissini.

CARROT DIP

400 grams canned chickpeas
½ teaspoon ground cumin
½ teaspoon ground coriander
½ teaspoon curry powder
2 carrots
2 tablespoons tahini paste
½ orange, zest and juice
salt

EDAMAME BEAN DIP

200 grams frozen edamame beans, defrosted
1 teaspoon ground cumin
½ teaspoon ground coriander
2 tablespoons tahini paste
¼ cup fresh coriander leaves, roughly chopped
½ lemon, juiced
1 clove garlic, crushed
1 tablespoon olive oil
toasted sesame seeds to serve

METHOD

Carrot dip

1 Drain the chickpeas and set aside.
2 Combine the ground cumin, coriander and curry powder in a bowl. Peel the carrots and cut into 1.5-centimetre pieces and toss through the spice mix.
3 Set up a steamer and steam the spice-coated carrots for 15–20 minutes until the carrots are tender.
4 Place the chickpeas, cooked carrots, tahini paste and zest and juice of the orange into a food processor and whizz until a smooth paste is formed.
5 Season with salt to taste.

Edamame bean dip

1 Place all the ingredients in a food processor and whiz until a smooth purée is formed.
2 Sprinkle with toasted sesame seeds to serve.

EVALUATION

1 Describe the sensory properties of the carrot dip and edamame bean dip using descriptive language.
2 Draw a simple flow chart to demonstrate how to crush the garlic using a cook's knife and chopping board.
3 In both dip recipes, spices make an important contribution to the flavour profile of the products. Explain how to store spices to retain their sensory properties.
4 Identify an alternative method of cooking the carrots if you did not have a steamer.
5 Discuss your success in the preparation of these recipes. Focus on your knife skills, your cooking and processing of the ingredients to the right degree of doneness, and the final presentation of the dips.



Mark Fergus Photography

FOODS EATEN BY INDIGENOUS AUSTRALIANS AND FIRST NON-INDIGENOUS SETTLERS



AUSTRALIAN NATIVE FOODS

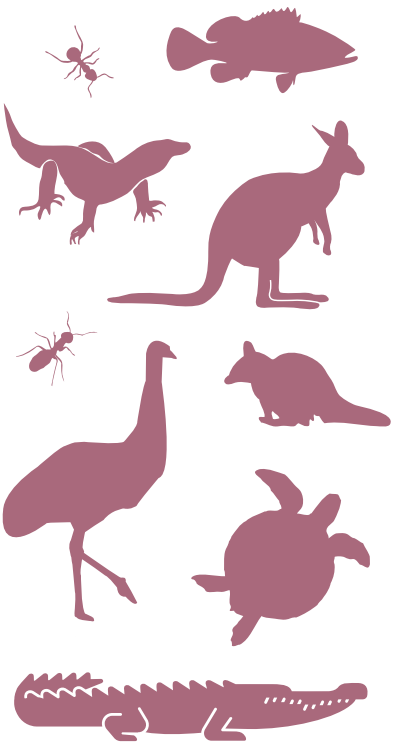


ANIMAL FOODS

- Fish
- Goannas
- Kangaroos
- Possums
- Witchetty grubs
- Emus
- Ants
- Crocodiles
- Turtles









PLANT FOODS

- Yams
- Bush tomatoes
- Quandong fruits
- Kakadu or green plums
- Macadamia nuts

FLAVOURINGS

- Gum from the bark of eucalyptus trees
- Nectar from the flowers of native trees
- Honey
- Wattleseed
- Mountain pepper
- Lemon myrtle



5

AUSTRALIAN NATIVE FOODS

KEY TERMS

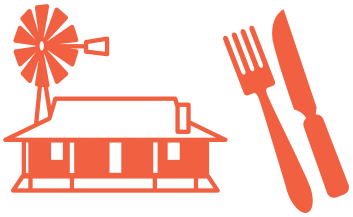
First Nations peoples Aboriginal and Torres Strait Islander Australians. Also referred to as Indigenous peoples

fire-stick farming regularly burning vegetation to facilitate hunting and to change the plant and animal species in an area

Aboriginal Victorians Indigenous peoples who inhabited Victoria prior to European settlement

native foods foods that are native to Australia; they include animals, birds, fish, seafood, reptiles, insects, fruits, flowers, vegetables, mushrooms and herbs and spices

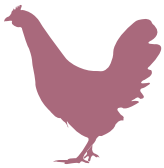
Resources
Study Design
links
Infographics
Flashcards

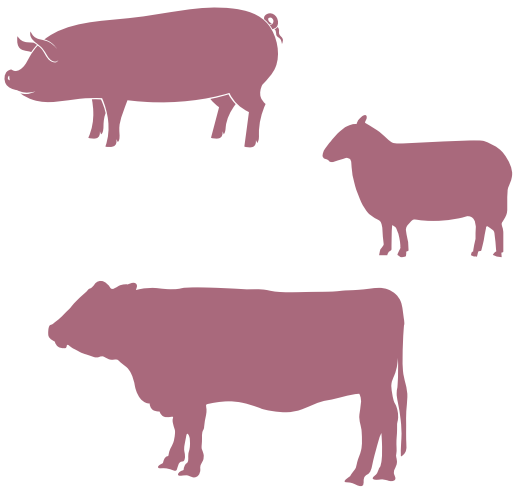


FOODS EATEN BY EARLY NON-INDIGENOUS SETTLERS

ANIMAL FOODS

- Pigs
- Chickens
- Sheep
- Cows





PLANT FOODS

- Wheat
- Corn
- Vegetables
- Rice



First Nations Australians peoples prior to European settlement

Aboriginal and Torres Strait Islander peoples – **First Nations peoples** – are thought to be the oldest surviving culture in the world and have lived on this continent for more than 60 000 years. Before the arrival of European colonisers in 1788, First Nations peoples were (and still are), traditional owners of their lands. They inhabited the whole of Australia and the Torres Strait Islands – those islands between Australia and Papua New Guinea. There were many different communities or clans, whose members spoke different languages and had differing cultural beliefs and practices.

The main focus of this first section of the chapter is on 'indigenous food prior to European settlement', as outlined in the VCE Food Studies Study Design. Therefore, we often use the past tense when writing about this topic. However, it is important to acknowledge that the rich culture of First Nations Australians peoples, including their food, continues to this day.

AUSTRALIA'S FIRST NATIONS PEOPLES – HUNTER-GATHERERS OR FARMERS?

Australia's First Nations peoples were originally considered to be hunter-gatherers; that is, people who obtained their food from naturally occurring wild plants and animals. The hunter-gather lifestyle is also referred to as a foraging lifestyle, or one where people have little control over their source of food. They are at the mercy of nature – not only in times of plenty, but also in times of flood and drought.



State Library of Victoria [H92.101/101], with thanks to the Elders of the Wurundjeri Tribe Land & Compensation Cultural Heritage Council Incorporated.

The housing of First Nations people varied, sometimes consisting of a simple shelter made from bent-over stringybark.

However, there is considerable debate today about whether First Nations Australians relied solely on hunting and gathering their food or whether they also employed forms of farming. Some researchers have found evidence that some First Nations peoples were involved in the development of extensive agricultural practices and very effective aquaculture systems. Bill Gammage, in his 2011 book *The Biggest Estate on Earth: How Aborigines Made Australia*, argues that Australia's First Nations peoples developed well-organised farming and land management practices across the entire continent. He also states that they 'burnt, tilled, planted, transplanted, watered, irrigated, weeded, thinned, cropped, stored and traded'. Therefore, rather than simply relying on hunting and gathering as the means of obtaining food, Gammage says that for First Nations Australians, 'the gathering is really the end point of a very sophisticated farming process'.

This view is supported by Bruce Pascoe who, in his 2014 book *Dark Emu*, claims that First Nations Australians were not merely hunters and gatherers, 'but were early farmers who tilled the soil, sowed crops that they irrigated, harvested and stored, altered the course of rivers, built dams, sewed clothes, and lived for long periods in substantial dwellings, sometimes made of stone'.

However, in their 2021 book *Farmers or Hunter-Gatherers? The Dark Emu Debate*, archaeologist Keryn Walshe and anthropologist Peter Sutton challenge Pascoe's interpretation that Australia's First Nations peoples were sophisticated farmers. Sutton and Walshe argue that many hunter-gatherer communities were complex and that '*Dark Emu* understates the complexity of hunter-gatherer life'. Through their research and observation of traditional Indigenous Australian life over many decades, Sutton and Walshe are of the opinion that Australia's First Nations peoples were highly successful hunter-gatherers and fisher people. Sutton agrees that First Nations peoples did 'occasionally deliberately scatter seeds', but maintains that they did not deliberately plant or water them, as occurs in traditional agricultural communities. Sutton goes on to argue that there is little evidence of vocabulary associated with farming in any of the 260 distinct languages in use in Australia when the First Fleet arrived in 1788.

The debate about whether Australia's First Nations peoples were hunter-gatherers or farmers continues.

Wurundjeri people of Victoria

The Wurundjeri people of the Kulin Nations are the traditional owners of the land in the Birrarung Valley, known today as the Yarra Valley. The traditional lands of the Kulin Nations include all of the area now encompassed by the City of Melbourne and the City of Yarra, and extend south-east to Mordialloc and north into central Victoria. The Wurundjeri people speak the Woiwurrung language as well as other languages of their Nations.

For thousands of years before Melbourne was settled by Europeans in 1835, the Wurundjeri people had a special relationship with the land and, rather than owning it, they felt they belonged to the land as their ancestors had done. The Wurundjeri people had specific boundaries within which they could set up camp and hunt and gather food. When they had depleted the supply of food in one area, they moved on to the next site to allow the plants to regenerate during the following season.

As the clan members had been born and raised in the area, they knew the land well. They understood the seasons and when food would be plentiful. In winter, they camped on the higher areas around the river in case the river flooded. During spring and summer, they travelled long distances, often up to 16 kilometres each day to hunt animals and wildfowl or to catch fish or eels in the rivers and streams. The Wurundjeri people also knew the best times and locations to gather fruit, dig for roots or yams, or collect birds' eggs.

As European colonisation continued, the traditional lands of the Wurundjeri people were cleared to make way for farms for growing crops and grazing livestock, as well as new buildings and roads. The Wurundjeri people were not only dispossessed of their land, but they also lost their traditional sacred sites, and their culture was upturned. Diseases introduced by the settlers and frequent clashes that occurred between the First Nations peoples and the European colonisers also had a devastating effect on the population of the Wurundjeri people.

Today, the Wurundjeri people are very active in the community and have built a strong, vibrant community organisation. They perform ceremonies such as the 'Welcome to Country' ceremony and pass on their knowledge to younger generations as a means of preserving their cultural heritage.

Source: Adapted from aboriginalhistoryofyarra.com.au



State Library of Victoria (H15473), with thanks to the Elders of the Wurundjeri Tribe Land & Compensation Cultural Heritage Council Incorporated.

Detail of a painting showing members of the Wurundjeri clan on the banks of the Merri Creek, which led to the Birrarung River (today's Yarra River)

Case study

Aboriginal Victorians: life along the rivers and waterways

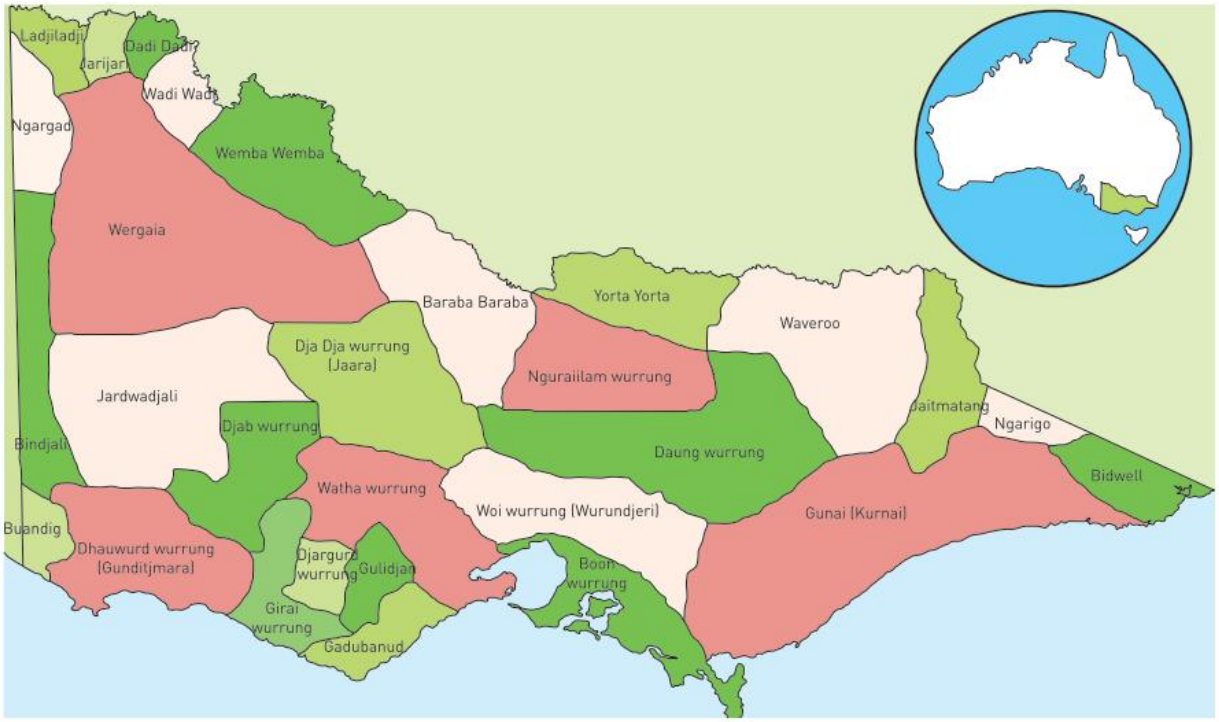


FIGURE 5.1 Aboriginal Victorian tribes

Read the text below, then answer the following questions.

1. Identify one (or more) Aboriginal tribes in the area of Victoria.
2. Describe the food available to Australia's First Nations peoples who lived along the Murray and Wimmera rivers.
3. Describe the methods used by Victoria's first peoples to capture fish and other animals.
4. Why were shellfish an important part of the diet of Australian First Nations peoples?
5. What are middens and how were they created?

Victoria's first peoples have long had a deep connection with rivers and waterways, not only as a source of food but also in their spiritual and cultural practices. Thousands of years before European settlement, the Murray River, between Mildura and Swan Hill, was home to clans such as the Latje Latje, Wemba Wemba and Wadi Wadi, while the Wimmera River was home to the Wotjobaluk, Wergaia and Jardwadjali peoples. Aboriginal clans and tribes settled and made homes along the banks of these rivers, nearby flood plains and billabongs. The waterways provided an abundant source of food such as fish, yabbies and mussels.

First Nations people who lived along Victoria's rivers, lakes and streams would spear fish and rays in the shallow water or dams, or trap them in fishing nets woven with reeds or cane. Some of these traps had a larger opening on one side to allow fish and other marine animals to swim in, and a smaller opening on the opposite side so that babies could swim out and reach their full size. Fish were the main foods eaten, but water birds such as ducks were also hunted with spears. Emus and kangaroos were hunted using nets strung between trees, to capture the animals as they came to the river to drink.

First Nations Australians made their fishing line from a plant-based material, and the hook from stone or shell. Larger animals such as turtles and dugong were speared or harpooned. (A harpoon is a heavy spear with a rope attached to the end.)

Shellfish provided a supplementary food source when other animal and plant foods were scarce. A shellfish was usually roasted on an open



Alamy Stock Photo/Ken Griffiths

A midden in a riverbank

fire, which caused the two halves of the shell to separate, leaving the moist flesh inside ready to eat. The shells were traded and used as tools, such as fishhooks.

Freshwater middens are accumulations of shells left behind by Victoria's first peoples after collecting, cooking and eating freshwater shellfish. A midden could be made up of the shells from just one meal, or from many meals eaten over thousands of years. The remains of middens are still found along riverbanks and flood plains, in sand dunes, and near swamps and lakes in Victoria.

Middens are protected today as they are an important part of the heritage of Victoria's first peoples and provide an insight into past economy, customs and land use.

Foods and flavourings used by Australia's First Nations peoples

Before the catastrophic disruption caused by European settlement, the diet of Australia's First Nations peoples was traditionally varied and rich in nutrients, and it very much depended on where they lived. For those who lived near the sea or a river, the diet was rich in fish and yabbies, as well as mussels and other shellfish. In desert areas, lizards or goannas provided protein. In more temperate areas, the diet included kangaroos, witchetty grubs, possums, and emus and other birds and their eggs. Across the country the First Nations peoples supplemented their diet with roots, yams, nuts, seeds, native greens, vegetables, nectars and bush fruits. However, the quality and quantity of food eaten varied from day to day depending on the climate, water supply and the area they were moving through.



Alamy Stock Photo/Bill Bachman

Digging for witchetty grubs

Native foods are foods that are native to Australia and include animals, birds, fish, seafood, reptiles, insects, fruits, flowers, vegetables, mushrooms and herbs and spices. Today, these foods are commonly referred to as 'bush tucker'. The foods eaten by Indigenous Australians are generally classified as being either from animal or plant sources.

FOODS FROM ANIMAL SOURCES

As noted above, Australia's First Nations peoples relied on varied animal foods, including kangaroo.

Kangaroos are culturally, socially and spiritually significant for First Nations Australians. Hunting, killing, preparing, cooking and feasting on kangaroo was traditionally an important part of their customs and beliefs. When a larger animal was hunted and killed, it was shared among the group and sometimes with neighbouring groups. During these times, when a lot of meat was available, people ate large quantities at one time and these feasts provided excess energy, to be stored as fatty tissue for periods of food shortage.

The prime time for hunting or collecting mammals was when the animals were fat. Although some larvae and insects such as witchetty grubs and green ants have a relatively high fat content, most land animals are very lean. The small fatty deposits found in some parts of the animals were shared between many people. Every part of the animal was eaten or used to make things such as clothing, tools and weapons.



Alamy Stock Photo/Genevieve Vallee

A brush-tail possum



iStock.com/Brisbanecolours

A bush turkey



Shutterstock.com/Photodigitaal.nl

A brown snake



Alamy Stock Photo/fStop Images GmbH

A witchetty grub



Shutterstock.com/Josef Szeles

A freshwater yabby

FOODS FROM PLANT SOURCES

Many plant foods were traditionally considered staple foods by First Nations Australians, including yams, bush tomatoes, figs and quandong fruits. These plant foods provided an important supplement to animal foods rather than being eaten as an alternative food source. Bush vegetables, seeds and fruits are



Getty Images/Auscape

Green plums (Kakadu plums)

very rich in vitamins and minerals, and the green plum or Kakadu plum has the highest concentration of vitamin C of any known plant. Seeds of the acacia species are high in the essential oil omega-6, and wattleseed is now recognised as being a rich source of protein with a low glycaemic index.

Macadamia nuts

Before European settlement, when much of eastern Australia was covered in rainforest, macademia nuts grew on the wet slopes of these areas. First Nations peoples feasted on these native nuts, which were considered a delicacy.

Macadamia nuts have a high oil content and so they added an important energy source to the diet of First Nations peoples. They were collected in dilly bags, which were used for gathering food. The macadamia nuts were then eaten raw or roasted in hot coals. Breastfeeding mothers ate the bitter nuts that had begun to germinate as they believed they stimulated breast milk production.



Shutterstock.com/SOMMAI

Macadamia nuts

FLAVOURINGS

The traditional diet of First Nations peoples was low in sugar, but some foods such as honey ants were a good source of sugar; they were considered delicacies and were highly sought-after.

The honey ant was harvested by digging open the nest and dragging the ants out with a stick. The lucky people who found them did not swallow them, but placed them on their tongue, bit into the abdomen and sucked the honey out.

Other sweet foods included the gum from the bark of gum trees and nectar from the flowers of native trees. Honey was gathered from sugar bag hives found in hollow trees by women and children. It was carried in a coolamon (a multipurpose shallow bowl for collecting seeds) or a basket.



Photo: Dr Natasha Fijn

A member of the Yolngu community collecting sugar bag honey from a hollow tree

Wattleseed

Wattleseeds are edible seeds produced by a large number of species of the Australian acacia tree. The seeds and pods of wattles are traditionally a popular food source. The dried seeds of the wattle were collected, ground into flour and mixed with water to make a damper or bush bread. This bush bread was then cooked in the coals of the fire – it produced a loaf with a rich, toasted, nutty and coffee-like flavour. The young pods of the wattle tree were often eaten raw as a snack or roasted or steamed. Wattleseed grows in the Grampians region of Victoria as well as in the arid regions of the Northern Territory and South Australia.

Mountain pepper

The native mountain pepper plant, or pepperberry plant, is found in the cool high country in southern New South Wales, Victoria and Tasmania. The leaves and berries of this plant feature in traditional indigenous cooking as a flavouring ingredient. The berries turn a deep red-black colour when ripe and have a spicy, peppery flavour.



Shutterstock.com/Miriam Newitt

A mountain pepper plant

Lemon myrtle

Lemon myrtle is a flowering plant that is grown on the coastal rainforests in northern New South Wales and Queensland. The plant is a natural source of citral, which has a citrus flavour without high levels of acidity. First Nations peoples extracted the oil from the leaves of the lemon myrtle and used it as a sweetener for foods. The leaves were also used as a valuable herb. For example, when ground ovens were used for cooking foods, such as fish in paper bark, leaves of the lemon myrtle were added to enhance the flavour. Sometimes, the leaves were infused in boiling water to make a refreshing, flavoursome drink.



Shutterstock.com/KarenHBlack

Lemon myrtle

Practical Activity 5.1

Getting to know bush spices

Aim: To understand the properties and uses of bush spices in food preparation.

Method

1. Complete online research on a range of bush spices. You could visit websites that supply native Australian ingredients.
2. Research the following ingredients and record your results in a table like the one below.
   - Mountain pepper
   - Old man's saltbush
   - Lemon myrtle
   - Strawberry gum
   - Aniseed myrtle

Worksheet

Analysis

1. Which bush spice do you think has the strongest aroma and flavour?
2. Which bush spice do you think has the most appealing flavour?
3. Compare the similarities and differences in two of the bush spices you would use in a savoury recipe.
4. Compare the similarities and differences in two of the bush spices you would use in a sweet recipe.

Conclusion

Explain which bush spice you would prefer to try and use in a recipe based on your research. Which recipe would you choose to make? Justify your choice.

Results

BUSH SPICE	DESCRIPTION OF THE FLAVOUR OF THE BUSH SPICE	BEST USED IN SWEET OR SAVOURY DISHES OR BOTH	A RECIPE SUITABLE FOR USING THIS BUSH SPICE
Mountain pepper			
Old man's saltbush			
Lemon myrtle			
Strawberry gum			
Aniseed myrtle			

Practical Activity 5.2

Comparing the flavour profile of two styles of raita

Raita is a traditional Indian dish made with yoghurt and spices that can be used as a palette cleanser between dishes, or to cool the palette when served alongside spicy dishes. This activity compares a traditional raita with one that has been flavoured with bush spices.

Aim: To compare the sensory properties of a traditional raita and a raita with bush spices.

Method

1. Preheat the oven to 200 °C.
2. Place the pita bread in the preheated oven and bake for approximately 10 minutes until crisp.
3. Work in pairs to prepare one quantity of each raita recipe.
4. To complete the taste test, place a small amount of the traditional Indian raita on a piece of crisp pita bread. Record your sensory analysis in the table below.
5. Repeat the taste test using a small amount of the indigenous raita on a piece of crisp pita bread.

Analysis

1. Which raita had the most appealing colour? Justify your answer.
2. Which raita had the strongest aroma and flavour? What reasons can you suggest that account for this?
3. Was there a difference in the texture of the two raitas? What ingredients could account for the difference in the texture you observed?

Conclusion

1. Based on your sensory evaluation, which raita did you prefer? Explain why.
2. Research a dish that you could serve the raita with. Could this dish be adapted to include any of the bush spices used in the indigenous raita? Explain your answer.

TRADITIONAL INDIAN RAITA

½ cup natural yogurt
½ cup Lebanese cucumber, chopped
2 tablespoons fresh coriander, chopped
2 teaspoons spring onions, chopped
¼ teaspoon ground coriander
¼ teaspoon ground cumin
salt and pepper
1 pita bread

METHOD

Gently mix all the ingredients together.

INDIGENOUS RAITA

½ cup natural yogurt
½ finely grated Lebanese cucumber
1 teaspoon river mint
1 teaspoon ground cumin
1 teaspoon ground coriander
1 teaspoon lime juice
⅛ teaspoon mountain pepper
1 pita bread

METHOD

Gently mix all the ingredients together.

Results

Record the sensory properties using technical terminology in a table like the one below.

SENSORY PROPERTIES	INDIAN RAITA	INDIGENOUS RAITA
Appearance		
Aroma		
Flavour		
Texture		
1 = dislikes very much 5 = neutral 9 = likes very much		

ABORIGINAL VICTORIANS' FOOD PRACTICES AND THEIR IMPACT ON HEALTH

Aboriginal Victorians, before European settlement, were healthy, physically strong and lean, as they enjoyed a varied diet of fresh animal and plant foods. Their diet was rich in a wide range of nutrients and was high in protein, which was obtained from animal foods along with large quantities of plant-based grains and seeds.

Animal foods formed a major part of their diet, but despite this, the diet was not high in fat. The meat was extremely lean, as wild animal carcasses contain very little stored fat throughout most of the year. Wild meats also tend to be lower in saturated fats when compared to domesticated animals. This meant that there was less saturated fat consumed, leading to better heart health, and higher amounts of iron for muscles and blood supply.

A wide variety of uncultivated plant foods were eaten in the traditional diet, such as roots, starchy tubers, seeds, fruits and nuts. The plant foods were generally high in fibre, and as the carbohydrates they contained were unprocessed, they had a low glycaemic index which meant they were slowly digested and absorbed, providing greater energy throughout the day. These plant foods are highly nutritious, and many have higher antioxidant levels than introduced farmed crops. Australia's native peach or quandong fruit, for example, has twice as much vitamin C as an orange, and wattleseed is extremely high in fibre and protein.

Other important nutritional properties of the traditional diet of Aboriginal Victorians included foods that contained a relatively high proportion of long-chain, polyunsaturated fatty acids, low sodium and high potassium, magnesium and calcium, which protected against obesity, type 2 diabetes and cardiovascular diseases.

This diet was low in kilojoules and energy density and, along with the active lifestyle of Aboriginal Victorians and the intensive exercise required to find and collect food, had a positive impact on weight control, reducing the risk of obesity and diet-related diseases.

Traditional methods of food preparation generally resulted in minimal loss of nutrients. Many plant foods such as fruits, bulbs, gums, flowers and nectars were consumed fresh or raw as they were collected. Some foods underwent some processing, such as cooking meat and grinding and roasting seeds, which made them more palatable and digestible. The methods of boiling and steaming in a ground oven, roasting on coals and baking in ash were healthy as there was no need for any added fat or oil. Their diet contained no processed food and was therefore low in salt and sugar.

After European settlement in 1788, many First Nations Australians were displaced from their traditional lands and, as a result, were prevented from collecting and eating their traditional foods. For First Nations Australians who lived on the cattle stations, or in mission stations or government settlements, the only way to obtain food was through the communal dining rooms. As a result, they became dependent on British food rations such as flour, sugar, tea, jam and tinned or salted meat, and so were unable to use traditional knowledge and skills in food choice, food preparation and cooking techniques. These changes in the diet of First Nations Australians had a devastating impact on their health and led to the development of high rates of chronic disease, including diabetes, stroke, and heart and kidney disease.

Activity 5.3

Closing the Gap on health

Read the news article, then answer the questions below.

1. Evaluate the validity of this news article. Consider the reliability of the sources of information used in the article, the context and the presentation of evidence.
2. Describe some of the challenges with regard to meeting the Closing the Gap targets when providing nutritional advice that is suitable for First Nations Australians.
3. Identify the risks to First Nations Australians if the Closing the Gap targets are not met.
4. Explain why the Dietary Guidelines for Australians are not formulated to address suitable dietary advice for First Nations Australians. Describe one example of this concern in relation to dairy foods.
5. Kangaroo, goanna and seafood are listed in the 'lean meats and poultry, fish and eggs' section of the Aboriginal and Torres Strait Islander Guide to Healthy Eating. Explain why the other foods recommended in this section – apart from these native protein foods – may not be suitable for First Nations Australians.
6. Describe two strategies to improve dietary support and education for all First Nations Australians.

WE NEED TO CLOSE THE GAP ON HEALTH. BUT EVEN OFFICIAL DIETARY ADVICE DISADVANTAGES INDIGENOUS PEOPLE

Recently announced Closing the Gap targets aim to improve the health and well-being of Indigenous people.

But if that's to happen, we need to provide health advice suitable for First Nations Australians.

That includes providing culturally safe dietary advice, and acknowledging the difficulties some Indigenous people face in reliably accessing some foods recommended by official dietary guidelines.

If we don't, this will put Indigenous Australians at even higher risk of illness from a poor diet, worsening existing disadvantage. It will also make closing the significant gap of life expectancy and disease between Indigenous and non-Indigenous Australians even harder to achieve.

What's wrong with current dietary advice?

The Australian Dietary Guidelines form the foundation of nutrition advice and education in Australia.

These guidelines are based on research from around the world, analysed by a panel of experts. That evidence is then distilled into advice on everything from how many serves of vegetables to eat a day to whether it's best to drink full-fat or reduced-fat milk.

But these guidelines have not been formulated to take into account Indigenous Australians' traditional foods or dietary differences. Instead, they reflect the predominant Western culture, and implicitly assume Western dietary advice suits everyone.

One example of how the Australian guidelines fails to address Indigenous people is when recommending dairy products. Before invasion, Indigenous diets in Australia were in stark contrast to Western diets today. Most notable was the absence of dairy-based foods.

However, the guidelines suggest dairy is an important part of diets. What happens when this is not a traditional part of your diet? A significant percentage of Indigenous people are lactose-intolerant – a fact we've known ever since a landmark study in the 1980s. This is not addressed in the guidelines.

The guidelines also fail to consider Indigenous people are more likely to be suffering from a chronic disease such as diabetes, stroke, heart and kidney disease – and therefore need a tailored dietary approach.

For example, traditional Indigenous proteins such as kangaroo, emu and seafood are noticeably lower in fat than introduced proteins such as beef and lamb. This makes traditional foods particularly suitable for Indigenous people with a range of chronic diseases, including diabetes and cardiovascular disease.

The guidelines also assume everyone has access to the types of foods it recommends, particularly fresh food and vegetables. But we know food access and food security are an issue, particularly for remote Indigenous communities.

We'll hear more about this issue later this year, when the parliamentary inquiry into food pricing and food security in remote Indigenous communities reports its findings.

Indigenous foods are mentioned, but not enough

The guidelines do mention tailored foods for Indigenous peoples, such as the 'Aboriginal and Torres Strait Islander Guide to Healthy Eating', a one-page poster that includes kangaroo, seafood and goanna.

But this does not go far enough to address the inequity in these very generalised guidelines. For instance, these foods are only in the protein group.

When looking at the grains and cereals mentioned in the guidelines, foods offered are mostly processed and contain high levels of gluten. Gluten-dense grains such as wheat, barley and rye were not cultivated in Australia before invasion.

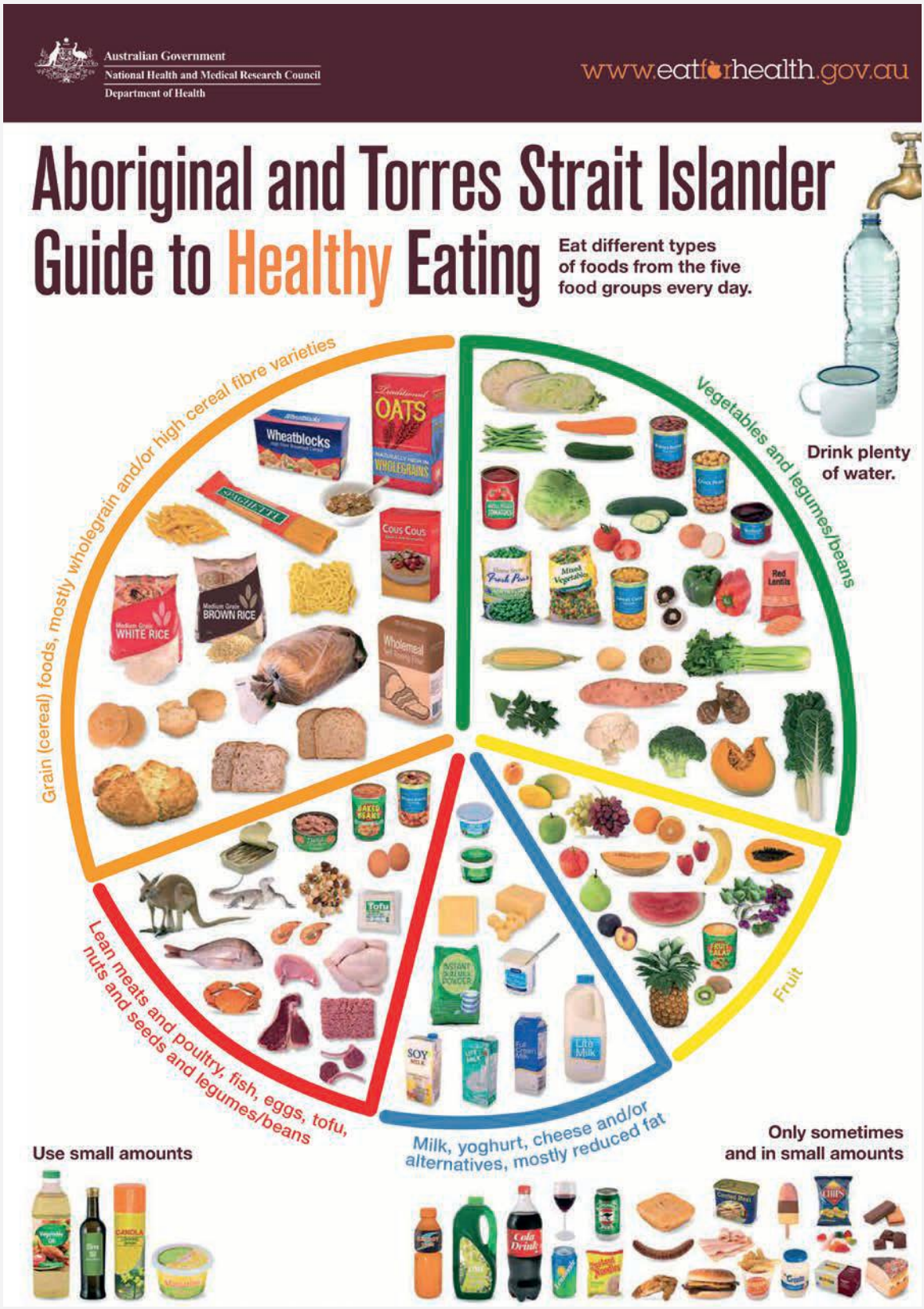
Instead, traditional Indigenous diets relied on seasonal fruits and vegetables for dietary fibre.

However, Aboriginal Australians were also one of the first cultures to bake bread. Breads were made without preservatives, from a variety of high-fibre foods such as grass seeds and nuts, as opposed to grain-based crops such as wheat and oats. These traditional foods are not included in the dietary guidelines.

What could we do better?

Rather than a 'one size fits all' approach, we should support First Nations people to create regionally based dietary guidelines for Indigenous people.

That's because there is no one consistent Indigenous food source across all Australia. So dietary guidelines need to be tailored to local foods, local conditions and practices, to reflect



Source: National Health and Medical Research Council

the diversity of Indigenous people around Australia and their diets.

For example, Davidson plums are found mainly in wet, rainforest terrains whereas saltbush is found in drier climates.

In the meantime, the lack of cultural applicability in existing dietary guidelines helps put the Indigenous population at higher risk of ill health and early death. That makes Closing the Gap even harder to achieve, whether you're talking about health, food equity or both.

The Conversation, 6 August 2020

Authors: Odette Best, Professor, Nursing, University of Southern Queensland; Aletha Ward, Lecturer in Nursing and Midwifery, University of Southern Queensland

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Understanding the Text

1 Describe some of the practices that First Nations peoples used to obtain their food.

2 Explain why the Wurundjeri people found the Birrarung Valley and its tributaries (now Melbourne and its surrounding areas) an ideal place to live.

3 Discuss the importance of rivers and waterways to Aboriginal Victorians.

4 Draw a knowledge map to demonstrate some of the key foods eaten by First Nations Australians.

5 Describe the value of the kangaroo in Indigenous Australian societies.

6 Copy and complete the table below, listing two animal foods in each category that provided a valuable protein source in the traditional diet of First Nations Australians.

FISH	MAMMALS	BIRDS	ANTS/GRUBS	REPTILES

7 List some of the plant foods that were considered staple foods in the traditional diet of First Nations peoples.

8 Explain the valuable nutritional properties of the Kakadu plum and wattleseed.

9 How did First Nations Australians traditionally obtain sweet flavourings in their diet? Identify two ingredients used by them to flavour foods, and outline how they were used.

10 Draw a mind map to highlight the health benefits of food production and consumption among Aboriginal Victorians.

Answers
Understanding the Text

Tools and technology used to obtain and prepare food

A great range of tools, weapons and utensils were used by First Nations people to gather plants for food, fibres and medicine, as well as to hunt animals for food and clothing. While all First Nations peoples used a similar range of tools and equipment, the geographic location of various groups was reflected in the materials they used. For example, coastal groups applied fish bones to the tips of their weapons, while desert tribes used stone tips.



FIGURE 5.2

SPEARS AND SPEAR THROWERS

The men used spears for hunting and fishing, as well as for fighting other groups. The spears were usually made from a light wood that would fly easily through the air. The spears varied in size depending on their use – long spears for hunting large animals at long distances; and short, stumpy spears for hunting smaller animals, such as seals, at close range. Some spears were made from a single piece of wood while others had a stone head attached to the shaft, bound with yucca grass or the sinews of kangaroos. People who lived near waterways used multipronged spears for fishing.



Alamy Stock Photo/Paul Mayall Australia

Spears were used for hunting and fishing.

The design of spear-throwing devices called woomeras enabled men to greatly increase the distance they could throw their spears. The woomera acted both like a lever and an extension of a man's arm, projecting the spears with greater force than the thrower's arm movement alone.

BOOMERANGS

The boomerang is a tool that is synonymous with Australia's First Nations peoples. It was widely used throughout the country for hunting and killing small animals or disabling a larger animal. Large, heavy boomerangs were used in desert areas to hunt kangaroo, while men from coastal New South Wales made smaller, lighter boomerangs to use when hunting ducks and other birdlife.



Alamy Stock Photo/Ian Dagnall

Boomerangs were widely used throughout the country used for hunting.

TOOLS USED FOR PREPARING FOOD

The women spent many hours grinding, pounding, straining, grating, boiling and cooking plant foods.

The first step carried out was 'yandying', a tossing process used to separate the seeds and other impurities (such as small stones) from the stalks of plants. The seeds were placed in a coolamon (a shallow bowl) and were shaken and tossed, allowing the wind to blow away unwanted material or rubbish.



Auscape/Reg Morrison

Coolamons were used for collecting and carrying seeds.

Seeds and grains were often ground using a small, flat stone, after first sprinkling a little water on a flat stone slab.



Newspix/Jason Busch

Stones were used for grinding.

To remove poisons and bitter flavours from some vegetables after they were ground into a paste, they were put into a dilly bag (a bag woven from grasses), and washed by hanging the bag in a stream of running water.

Bundles of grasses were often used to cover a depression in the sand and this was used to strain excess water from vegetables and plants. Graters were made from rough pieces of bark or tough grass leaves and used to shred vegetables. Water was boiled in bark troughs or large seashells in the preparation of many foods, such as boiled birds' eggs.



Alamy Stock Photo/Philip McAllister

A collection of Aboriginal tools, including a coolamon, a stone axe, dilly bags, a grinding stone, fire sticks, a woomera and a shield

STONE TECHNOLOGY

First Nations peoples developed technology to grind edges on cutting tools and to grind seeds. They used stone tools for a number of purposes, such as preparing and chopping food and preparing animal skins for clothing. To manufacture these tools and weapons, rocks such as obsidian and quartz were attached to wood using resin, a sticky substance from trees. Evidence shows that these rocks produced a sharp edge that gave a cleaner, smoother cutting surface than that of steel.

Fish traps

According to the Australian Government Department of the Environment: 'Long before Europeans came to Australia, Aboriginal communities were applying advanced knowledge of engineering, physics, water ecology and animal migration to catch large numbers of fish in traps.' In his book *Dark Emu* (2014), Bruce Pascoe includes examples of well-developed farming systems used by First Nations Australians to produce and collect food. He describes the Brewarrina Aboriginal fish traps in north-west New South Wales that have been used and maintained for thousands of



Getty Images/sasimoto

Resin from a gum tree

years – according to some estimates, they are more than 40 000 years old. Pascoe also states that these fish traps, which were made from stones, supported significant communities of up to 5000 First Nations Australians who lived in the Brewarrina area.

Stone fish traps were used in the rivers, where the waters rise and fall. Stones were placed in a circle, and when the water rose, the fish were washed into the circle. When the water fell or receded, the fish were trapped inside the circle and were easy to collect by hand.



Auscape/Reg Morrison

Fish traps made from stones were among the well-developed systems used by First Nations peoples to provide food for large communities.

In Victoria, First Nations communities near the Lake Condah district of western Victoria established extensive eel-farming systems (called the Budj Bim eel traps) based on the development of channels which drove the eels into 'holding ponds'. These eel traps are estimated to be more than 6000 years old. In a 2014 report for the ABC Radio National program *Bush Telegraph*, Gunditjmara man Jimmy Onus recalls stories his grandfather told, in which 'eels were smoked in the hollows of trees, stored for lean times or traded with other Indigenous clans in the district'.

Human and natural resources used by First Nations Australians

First Nations peoples were highly resourceful and used both their own skills and the resources provided by nature to obtain food.



Alamy Stock Photo/Hilke Maunder

First Nations women were responsible for collecting food such as fruit and berries for their group.

HUMAN RESOURCES

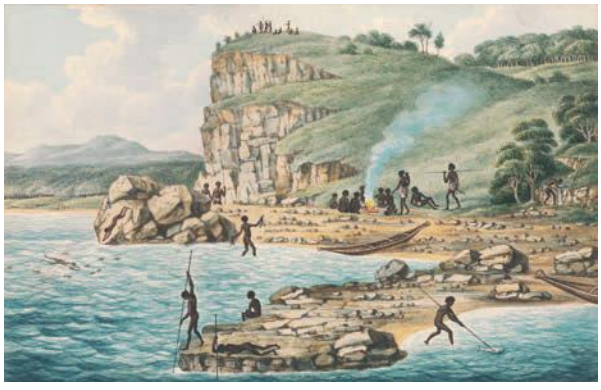
In traditional First Nations Australian societies, women played a central role within the family. Each day, the women spent many hours gathering food for their group. With their children, they hunted small animals, fished and collected plants, seeds, fruit, berries, vegetables, honey, eggs, and grubs. Women were also responsible for all of the domestic activities, such as cooking. They were viewed as life-givers and the caretakers of life, and were responsible for child rearing and the socialisation of children.



Alamy Stock Photo/Rafael Ben Ari

A First Nations Australian woman caring for children

First Nations Australian men spent most of their time hunting and fishing. They hunted large animals such as kangaroos and emus, and other mammals, reptiles and fish, usually alone or in pairs. They also had an important role as teachers of the young boys in the group – imparting knowledge about traditions and skills, and about how a man should act when he grew up. Their other main roles were as fire keepers and warriors, protecting the group.



Joseph Lycett, National Library of Australia, nla.obj-138500727

First Nations Australian men spearing fish

NATURAL RESOURCES

First Nations Australians used wood from certain trees and shrubs to make a wide range of tools and utensils. Spear throwers (woomeras) and shields were made from the dense wood of blackwood wattles. Digging sticks were made from a hard wood and were used by women and children to collect roots and yams and to dig for ants.

Fire drills were used to make fire. They were also made from wood and consisted of a straight stick that was rubbed rapidly between the hands against a tinder of grass or dried leaves. This friction created heat, which ignited the grass into a flame.



Alamy Stock Photo/Thierry Grun

Using a fire drill

First Nations Australians who lived along the waterways or near the coast built canoes for fishing. These canoes were relatively fragile as they were frequently made from bark – usually the bark of gum trees, which were often referred to as canoe trees. Canoes were used to transport fisher people through the lagoons and reed beds where they would fish, catch eels or hunt for the eggs from waterbirds.



Getty Images/ibusca

Canoes were made from the bark of gum trees.

Nets, bags and baskets were woven from plant materials and used for carrying, collecting and preparing food. Bulrushes, leaves, the stems of plants and the bark of trees were used to make string, baskets, bags and mats.

Nets were used for fishing traps, and for catching kangaroos and emus. Bags and baskets were used for collecting food, and some bags were so closely woven that they could carry honey and liquids.

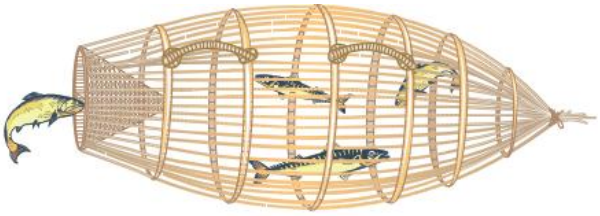


FIGURE 5.3 Fish such as barramundi were often caught in woven traps.



Auscape/S Wilby and C Ciantar

Making baskets for gathering fruits and seeds

Specialist knowledge and practices of First Nations Australians

Most First Nations communities were semi-nomadic, moving in a regular cycle over a defined territory. They followed seasonal food sources and returned to the same places at the same time each year. This helped to maintain the fragile environment because they did not overexploit the natural resources by too much hunting, fishing or harvesting in one particular area. This meant that the food supply could replenish itself and there would be food when the communities returned for the next season.

First Nations peoples divided the land using geographic boundaries such as rivers, lakes and mountains. Elders passed down the knowledge about these boundaries to the younger people in their community.

INDIGENOUS COOKING METHODS

First Nations peoples hunted or gathered enough food required for the day; very little was stored for future use. Many plant foods were eaten raw, and fruits, bulbs, nectar and gums were often eaten straight after picking.

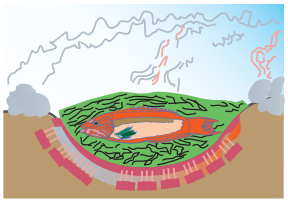
Food was prepared in many ways. Fire was used to cook meats and fish, and seeds and nuts were ground

and roasted on the coals. Shellfish, vegetables and meats were also steamed and boiled. Some vegetables were cooked to make them more palatable.

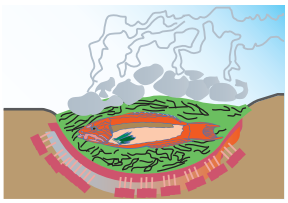
Animal foods were generally roasted, either over an open fire or steamed in pits. Kangaroo was laid on a fire and seared for a short period so that the inside flesh remained almost raw. Another method was to use a bush oven, in which the animal or fish was placed in a large hole surrounded by hot rocks and sealed from the air (see Figure 5.4 below). Sometimes the food was wrapped in melaleuca bark or damp leaves.



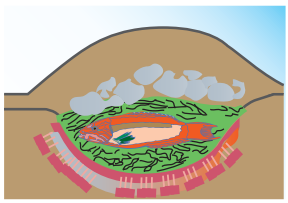
1 Fire is lit in a pit covered with rocks.



2 Rocks are removed from the pit and the fish or other food is wrapped in melaleuca bark or damp leaves and placed in the pit.



3 The hot rocks are placed back on top of the fish.



4 The fire pit is covered with soil to keep the heat and steam in.

FIGURE 5.4 Cooking using a bush oven

Seeds from trees, grasses and waterlilies were often made into a damper that was baked in hot sand and ashes.

FOOD DISTRIBUTION

Foods were portioned and distributed according to traditional law and strict cultural practices determined by the elders of the group. Sharing food had a social purpose and was important to strengthen relationships within the group or with neighbouring groups. Distribution was also associated with ceremonies or 'righting a wrong'. In some areas the older men received the choice cuts of meat, and the remainder of an animal was distributed according to age and status.

MANAGEMENT OF THE LAND AND THE ENVIRONMENT

First Nations peoples had great respect for their land because it supplied their food and supported their existence. People moved around their tribal area and regulated the size of their population according to the land and its resources. When an area had insufficient food resources to support the group, the people traded spears, baskets and possum skins for food. They possessed a detailed knowledge of the environment, and, with careful planning, they could ensure the environment survived and was not depleted, but could be regenerated and replenished, thus making sure their diet was adequate and varied.

First Nations Australians had an efficient way of managing the land; they tilled the soil when they dug up yams, roots or tubers, and were always careful to leave some roots to generate a new crop for the next season to provide an ongoing food supply.

Fire

A very important land management technique was carried out with the use of fire. Fires were always well-controlled and were used to encourage the regrowth of plants. They were also used as a technique to burn off the tough covering of seeds and to make them ready for germination when the rains arrived. First Nations Australians referred to this technique as '**fire-stick farming**'.

In his book *To Feed a Nation: A History of Australian Food Science and Technology* (2005), Keith Farrer says: 'They carried fire with them as fire sticks … they altered their food supply by firing forest and scrub deliberately and according to plan to promote the growth of lush green grass, thus increasing the supply of edible seeds and encouraging the grass-eating game on which they depended.' They also used fire to clear tracks for walking, to keep poisonous snakes away and to expose game by removing undergrowth and making the animals visible and easier to hunt. Fire-stick farming increased the amount and diversity of available food resources.

Finding water

First Nations Australians used their deep knowledge of the environment to find water, an essential resource in an arid country. This knowledge allowed them to harvest water from the roots of trees, such as the blue mallee tree that stored water, and to drain



Getty Images/Kyodo News

People participating in a workshop on fire-stick farming in Bungendore, New South Wales

the dew drops that collected on plants. They could also obtain water from a hollow tree by pushing small pipes or straws into a hole and sipping out the water. Keith Farrer also describes the dam building projects in arid areas used by First Nations Australians, stating: 'There is evidence that in some places dams were built to hold water after rain, and the diversion of flow in order to water fruit-bearing trees has already been noted.'

When desperate, First Nations people could even squeeze the water from water-holding frogs. This frog species can store large amounts of water in its body and is found below the surface in clay pan wetlands.



Alamy Stock Photo/Chris Mattison

A water-holding frog

Understanding the Text

11 Describe the different types of spears used by First Nations peoples and the types of animals they hunted. How did the woomera help men hunt animals?

12 Describe the processes used for removing the twigs and husks from seeds. How were poisons and bitter flavours removed from some vegetables?

13 Draw a knowledge map to highlight the way First Nations peoples used eel traps near Lake Condah in Victoria.

14 Describe the roles and responsibilities of women in a First Nations society.

15 What is a 'fire drill' and how is it used? Explain some of the uses of nets and bags by First Nations communities.

16 How did First Nations communities traditionally maintain the fragile nature of the food supply?

17 List three foods First Nations peoples cooked and the method that was used.

18 Explain how food was shared and why this was an important part of community life.

19 Explain why the use of fire and fire-stick farming was important to First Nations peoples in their management of the land.

20 Describe some of the ways First Nations Australians found water to drink.

Answers
Understanding the Text

Challenges faced by non-Indigenous settlers in establishing a sustainable food supply

In 1770, an Englishman, Lieutenant James Cook, charted Australia's east coast in his ship the HMS *Endeavour* and claimed it for the British Empire on 22 August the same year. He named it 'New South Wales'. Eighteen years later, in January 1788, Captain Arthur Phillip (later Governor Phillip) and the First Fleet arrived at Botany Bay, New South Wales, in 11 ships carrying 1350 people to establish the first British colony in Australia.

These events marked the beginning of the end of the traditional way of life for First Nations peoples.

The newly arrived passengers and crew of the First Fleet saw no evidence of settlement or cultivation of the land. They saw no fences or barriers, which were the traditional way Europeans marked land ownership, so the new arrivals mistakenly concluded that no one owned the land.

Food brought on the First Fleet consisted of flour, rice, salted meat, salt, alcohol, vinegar, seeds and vine cuttings. Livestock such as sheep, cows, goats, pigs and chickens



Alamy Stock Photo/The Artchives

Captain James Cook



State Library of NSW (ML 1222)

Captain Arthur Phillip raising the flag on the new colony in 1788

were brought as a source of fresh meat. The people who arrived on the First Fleet were mainly convicts, marines and the wives of marines, most of whom had little farming experience. The greatest challenge for the new colonists was the availability of a consistent food supply.

Unlike First Nations peoples, the Europeans were unaware of the abundance of nutritious food that surrounded them. They relied on deliveries from England, but sea voyages from Europe were arduous and it took many months for fresh supplies to arrive.

LACK OF AGRICULTURAL EXPERIENCE OF THE SETTLERS

In the first weeks following the landing, Governor Phillip gave instructions to begin cultivation of the land, so agricultural development similar to that practised in Britain and Europe could begin. The first task of the new settlers was to build basic shelters, and once this was done, they could get on with the mammoth job of clearing the land by 'grubbing out' (digging out of the ground) the big trees and burning them, much as they had done in the old country

However, many of the early settlers lacked the skills required for the establishment of a new colony. The first wave of new inhabitants, who were mainly convicts and soldiers, had no farming, animal husbandry or trade experience. In addition, the long voyage had taken its toll on their health, and many new arrivals were unfit for work. In a short time, the hard labour and poor food supply in the settlement led to a further deterioration in the health of many settlers.

Given the enormity of the task, officials in Britain soon realised that there was a desperate need for experienced farmers and labourers in the new colony. In 1793, the first free settlers arrived, and among them were English farmers. These settlers were granted land to begin farming and, under the conditions of their free passage, they were granted additional assistance. The government provided two years' provisions as well as agricultural tools and implements. These new settlers were also allocated convicts who would work for them as labourers.

A DIFFERENT LAND AND DIFFERENT CLIMATIC CONDITIONS

The first European settlers faced many challenges and struggled to survive in the early years of the new colony. They had come from a developed country with buildings, roads and shops and were not used to the unfamiliar conditions that confronted them. They had little knowledge of Australia's seasonal patterns and their first attempts at farming failed. The climate in the new land was very different from the one they had left. England had lush pastures where animals could graze. It had well-watered, fertile soil suitable for growing all types of food. A different land confronted the new settlers – one that was hot, dry and unsuitable for the farming methods, tools and equipment these new arrivals were familiar with.

LIMITED ARABLE LAND NEAR COASTAL AREAS

The attempts at agriculture by the settlers were fraught with problems, particularly as the soil around Sydney Cove, where the first settlement was established, was very poor and often flooded. The first farm for the colony was established in a coastal area called Farm Cove, close to where the First Fleet landed, but Governor Phillip soon realised that it would not support sufficient agriculture to feed the new colony. He established explorations to locate more suitable land and found the arable plains fed by the Parramatta River, which were later called Rose Hill. Efforts were soon concentrated on this area, and in 1789 a former convict, James Ruse, produced the first successful wheat harvest. As a reward, he was granted more land as well as pigs and chickens, as there was an urgent need to produce food for the new colony. As settlers spread out from Sydney Cove, they found better land for farming and began to successfully grow crops and vegetables.

SUITABILITY OF CROPS AND EQUIPMENT BROUGHT ON THE FIRST FLEET

Sheep, cows and other animals were sent from Britain on the First Fleet to be bred and raised in the new colony. However, it soon became obvious that the breed of sheep brought from England could not survive because these sheep were not suited to the harsh, dry conditions and the different types of pasture available for grazing. Disastrously, some of the animals, such as rabbits, proved so well suited to the Australian conditions that they thrived and today are considered to be an environmental pest.

Many different kinds of crop seeds were also included in the cargo of the First Fleet with the intention that they be grown in Australian soil as a major source of



Dixson Library, State Library of New South Wales

An illustration showing the early British settlement at Parramatta

food. However, a major problem that faced the new settlers was that the seed they had brought from England often did not grow as it had deteriorated on the long sea voyage or had been attacked by insects such as weevils. Much of the remaining seed also failed to germinate as the land around Sydney Cove was too sandy for farming and would not retain moisture.

The type of seed the first non-Indigenous settlers used was also a problem because they were English varieties of wheat that ripened in late July. Late-ripening varieties were disappointing in the Australian climate and the grain became pinched by the hot winds of the Australian summers. In later years, scientists bred wheat varieties that were more suited to the local climatic conditions of heat and lower rainfall.

It soon became obvious that the farmers lacked suitable equipment for clearing the thickly wooded land. The hard Australian timber soon blunted the English axes that were bought on the settlers' ships. Land clearing often involved sawing the trees off just above the surface of the ground and leaving behind the stumps, which had to be removed by convict labourers before the land could be cultivated.

LACK OF A SUSTAINABLE WATER SUPPLY

On arrival at Botany Bay, Phillip decided that the area was unsuitable for settlement as it lacked fresh water, so the colony was moved north to Sydney Cove. The availability of a sustainable fresh water supply and the management of droughts were major challenges for the first non-Indigenous settlers. Settlers began to build dams to collect water when it rained, and they sank bores to tap into underground water supplies to provide water in periods of drought.

UNWILLINGNESS TO ADAPT TO THE LOCAL ENVIRONMENT

Though the Australian landscape had many food resources – such as fresh fish available in the rivers and oceans and a plentiful supply of kangaroo – the first non-Indigenous settlers chose to grow the same types of foods and raise the same types of animals they were familiar with at home in Britain. Often out of desperation, or because some of the first non-Indigenous settlers were a little more adventurous, they tried the local food such as wombat and kangaroo. However, they usually did not enjoy it as it was so different from the foods they were familiar with.

POOR COMMUNICATION WITH FIRST NATIONS PEOPLES

When the First Fleet arrived, First Nations peoples, the traditional owners for over 60 000 years, encountered the British in an uneasy meeting. It was not long before conflict began, as the colonists did not understand the First Nations peoples' relationship with the land, and the First Nations people did not understand farming or the concept of land ownership.

The First Nations people in the Parramatta area, Burramattagal people (a clan of the Dharug), had an excellent knowledge of their environment, particularly the seasons and the flora and fauna. Their knowledge

also included significant spiritual sites that were not understood or treated with respect by the British.

Governor Phillip encouraged a hospitable relationship with the First Nations inhabitants, and trade of water, axes and artefacts took place. However, with entirely different languages, customs and beliefs, relationships were complicated and led to the disastrous changes and often violent dispossession that was to follow for First Nations peoples as colonisation expanded.

Weblink
Dictionary of Sydney: Governor Phillip and the Eora

Understanding the Text

21 List some of the foods brought to Australia on the First Fleet.

22 What were the first differences the settlers noticed on their arrival in the new colony?

23 Explain why the provision of a food supply proved to be a great challenge for the first non-Indigenous settlers in Australia.

24 Why did many of the first settlers have very few farming skills and experience?

25 Outline the main differences in land and climatic conditions that impacted on the settlers' first attempts at agriculture.

26 How did Governor Phillip begin to encourage and develop agriculture in the new colony of Australia?

27 What issues did the first non-Indigenous settlers face with the animals they brought with them on the First Fleet?

28 Why were the seeds of wheat bought from Britain unsuitable for Australian conditions?

29 What strategies did the first settlers use to provide a water supply?

30 Which factors may have led to the inhospitable relationship between the non-Indigenous settlers and Australia's First Nations peoples?

Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

Copy and complete the sentence starters below.

Worksheet

I learnt that native foods …	
I noticed that some of the indigenous plants that are used in contemporary cuisine are …	
I now know that First Nations peoples used natural resources such as … because …	
Some interesting facts I learnt about tools used for hunting and gathering food are …	
I learnt that when cooking and distributing food, First Nations peoples …	
Something I learnt about how First Nations peoples care for the environment is …	
I used to think … about non-Indigenous settlers, but now I think …	

Kangaroo chilli con carne with bush chips

Kangaroo is an animal that has long been used as a source of food for Australia's First Nations peoples. Kangaroo meat is a highly nutritious food as it is high in protein, iron and zinc, and low in saturated fat. This recipe uses a range of spices to enhance the flavour of the kangaroo mince to produce a delicious main course dish. The bush chips provide a contrasting crunchy texture and flavour.

KANGAROO CHILLI CON CARNE

2 teaspoons oil

½ onion, finely diced

1 clove garlic, crushed

½ red capsicum, diced

2 teaspoons Mexican chilli powder

200 grams kangaroo mince

200 grams canned chopped tomatoes

1 tablespoon tomato paste

¼ cup water

200 grams red kidney beans, drained and rinsed

BUSH CHIPS

macadamia oil or spray

2 small pita breads, cut open

ground bush flavourings such as aniseed myrtle, akudjura (ground bush tomato), lemon myrtle, native pepper

METHOD

Kangaroo chilli con carne

1 Heat oil in a large saucepan over medium heat. Add the diced onion and crushed garlic and sauté until tender but not browned.
2 Add the capsicum and continue cooking for a further 2 minutes.
3 Add the Mexican chilli powder and cook for 1 minute to develop the flavour.
4 Crumble in the kangaroo mince, stirring with a wooden spoon to break up mince. Cook only until the mince has lost its raw red colour.
5 Add the canned tomatoes, tomato paste and water. Bring to the boil. Reduce heat to low and allow to simmer, partially covered, for 20 minutes or until sauce has reduced slightly.
6 Add the kidney beans and cook for a further 10 minutes or until beans are heated through and sauce has thickened.
7 Serve with bush chips.

Bush chips

1 Preheat the oven to 180 °C.
2 Spray one side of the pita breads lightly with macadamia oil or brush oil on with a pastry brush.
3 Sprinkle lightly with the selected ground bush flavouring. You could use one of the selected flavours per piece of pita bread.
4 Place on an oven tray and bake for approximately 5–10 minutes or until crisp and lightly browned.

EVALUATION

1 Describe the sensory properties of both the kangaroo chilli con carne and the bush chips and explain why they are served together in the same meal.
2 Why is it important to stir the kangaroo mince in step 4 of the recipe?
3 Describe some of the physical and chemical changes that occur in the meat during the simmering process.
4 Suggest an alternative accompaniment to serve with the kangaroo chilli con carne if you did not wish to make the bush chips.
5 Discuss the health benefits of minced kangaroo meat compared to minced beef.



Mark Fergus Photography

Chocolate and wattleseed self-saucing pudding

Wattleseed is an Australian native spice that gives a chocolate, coffee and hazelnut flavour and aroma to recipes. It is very versatile and can be used to flavour a wide variety of dishes; for example, biscuits, ice-cream and desserts such as this simple chocolate pudding.

CHOCOLATE AND WATTLESEED PUDDING

2 tablespoons boiling water
1 tablespoon wattleseeds
½ cup self-raising flour
1 tablespoon cocoa
40 grams butter
¼ cup brown sugar
1 egg, lightly beaten
¼ cup milk

SAUCE

⅓ cup brown sugar
1 tablespoon cocoa
¾ cup boiling water

METHOD

1 Pour boiling water over the wattleseeds and soak for 10 minutes. Strain through a fine strainer. Retain the wattleseed grounds.
2 Preheat the oven to 180 °C. Grease 2 individual oven-proof ramekins.
3 Sift the flour and cocoa into a medium bowl.
4 In a separate bowl, cream the butter and brown sugar until light and fluffy.
5 Add the egg gradually, a tablespoon at a time, into the creamed mixture, and beat until well-combined.
6 Stir in the sifted flour and cocoa mixture alternately with the milk. Gently stir through the retained wattleseed grounds.
7 Divide the pudding mixture evenly between the oven-proof ramekins.
8 To make the sauce, mix the brown sugar and cocoa. Sprinkle over the top of the puddings. Pour the boiling water gently over the top of the puddings.
9 Bake in the preheated oven for approximately 25 minutes until the puddings have risen and feel firm to touch.

EVALUATION

1 Describe the sensory properties of the chocolate and wattleseed self-saucing pudding using descriptive language.
2 Explain why the wattleseeds are soaked for 10 minutes in step 1 of the recipe.
3 Predict what would happen if you were to add the egg all at once in step 5 of the recipe rather than adding it gradually.
4 Why does the recipe recommend pouring the boiling water 'gently' over the top of the pudding?
5 Explain why nutritionists and dietitians recommend that desserts such as this should only be eaten occasionally.



Mark Fergus Photography

Macadamia shortbread

Macadamia nuts are one of the most popular indigenous nuts used in cooking today. Toasting them and adding them to a classic shortbread biscuit dough makes a delicious, truly Australian sweet treat. A variation of this biscuit can be made by adding a small amount of the native spice, lemon myrtle, to the flour instead of the macadamia nuts, giving them a citrusy flavour.

50 grams raw, unsalted macadamia nuts
1 cup plain flour
¼ cup rice flour
125 grams butter
½ cup caster sugar
1 teaspoon vanilla essence

METHOD

1. Preheat the oven to 200 °C.
2. Chop the macadamia nuts roughly and place on a baking tray lined with baking paper.
3. Bake in the preheated oven for 3–4 minutes, or until just lightly browned. Remove from the oven.
4. Reduce the oven heat to 160 °C.
5. Sift the flours together.
6. Cream the butter and sugar together with a wooden spoon or an electric hand-held beater until light and fluffy. Add the vanilla essence.
7. Add the toasted, chopped macadamia nuts and stir through half the flours until well combined. Add the remaining flour to form a stiff dough.
8. Turn the dough onto a lightly floured bench and knead gently until smooth.
9. Roll out to a thickness of 1 centimetre. Trim the edges and cut into fingers, approximately 2.5 centimetres by 8 centimetres in size.
10. Bake in the preheated oven for approximately 15–18 minutes, or until just beginning to brown.
11. Cool on the oven tray.

Lemon myrtle variation

Omit the macadamia nuts. Add 1 teaspoon of ground lemon myrtle to the flours before sifting.

EVALUATION

1 Describe the sensory properties of the macadamia shortbread biscuit – appearance, aroma, flavour and texture.
2 Explain why macadamia nuts were a valuable food source in the diet of some First Nations peoples.
3 The macadamia nuts are only lightly browned before being added to the shortbread mixture. Why?
4 What is the functional role of rice flour in this recipe?
5 Discuss why families would make biscuits at home instead of buying commercially made biscuits.



Mark Fergus Photography

KEY EVENTS IN THE DEVELOPMENT OF FOOD PRODUCTION IN AUSTRALIA

1791

Wheat is first cultivated.

1803

Sheep are successfully introduced.

1820

Roads are built, opening up grazing land in the Blue Mountains.

1830

Greek settlers introduce grape growing.

1838

Flour mills and breweries are established.

1842

Grapes are first grown in the Barossa Valley.

1850s

During the gold rush, the Chinese establish market gardens and grow Asian vegetables.

1860s

Sugar cane is planted near Brisbane.

1870s

Wheat and barley become important broadacre crops.

1880s

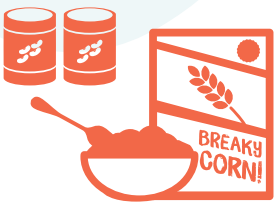
Food processing factories such as Rosella start production.

1900s

The dried food industry begins in South Australia.

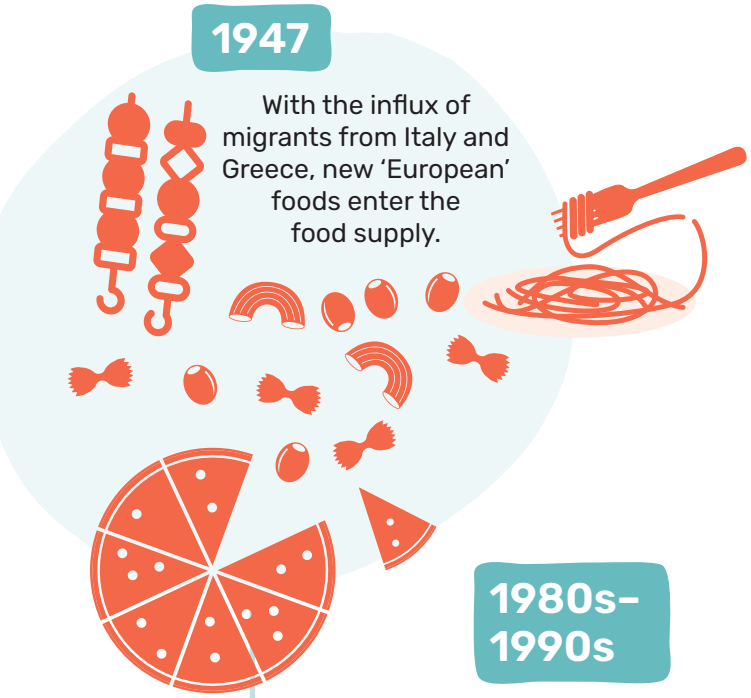
1920s

Food products are first marketed as convenience foods; food processors such as Heinz and Kraft enter the market.



6

DEVELOPMENT OF FOOD PRODUCTION IN AUSTRALIA



1947

With the influx of migrants from Italy and Greece, new 'European' foods enter the food supply.

1980s–1990s

Large food companies, such as National Foods, enter the market.



1945

The Australian food industry becomes 'Americanised' with the introduction of frozen foods and hamburgers.

2000s

Many more meals begin to be eaten away from home; *MasterChef* is aired for the first time; alternative milks start to grow in popularity.

1950s–1970s

Supermarkets carry a greater range of processed foods, such as canned and frozen foods.



KEY TERMS

agriculture the practice of cultivating land, growing crops and feeding, breeding and raising livestock

cattle feedlot a managed system to produce beef of consistent quality within a specific time frame

food processing the transformation of raw food or ingredients into new food products by physical or chemical means

horticulture the cultivation and management of a garden or orchard

mixed farming grazing sheep and cattle or raising of pigs, as well as broadacre farming of cereal grains

monopsony a marketing board that consists of one body or organisation that controls the market by selling to many buyers

Resources
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Development of agricultural production in Australia

With the growth and development of agriculture, horticulture and food processing, Australia was able to provide a reliable source of food for the population.

Agriculture refers to the practice of cultivating land, growing crops and feeding, breeding and raising livestock, whereas **horticulture** is the cultivation and management of a garden or orchard.

TABLE 6.1 Comparing agriculture and horticulture

AGRICULTURE	HORTICULTURE
Agriculture is a combination of the Latin words *agri* meaning field and *cultura* meaning cultivation; for example, wheat, oats and barley, sheep and cattle.	**Horticulture** is a combination of the Latin words *hortus* meaning garden and *cultura* meaning cultivation; for example, fruit and vegetable growing.

DEVELOPMENT OF THE WHEAT INDUSTRY

Wheat is a staple food and one of the most important commodities produced by the Australian agricultural industry. The first wheat crop was planted in 1790 on 40 acres of land at Parramatta in New South Wales, called the 'Experiment Farm'.



State Library of Victoria

Stooks of wheat ready for threshing and winnowing

Agriculture in the early years of settlement was challenging because the only tools available to till the soil and plant the grain were hand ploughs and basic machines drawn by animals.



Collection: Museum of Applied Arts and Sciences. Gift of Downer EDI Rail Pty Ltd,2009. Photographer unknown

Early machinery used to plough the land

Harvesting was done by hand using a reaper or a scythe, and cut sheaths of straw were laid in stooks or bundles. The bundles were then collected and taken for threshing and winnowing to remove the individual grains from the heads of wheat and to blow away the excess chaff.

The development of technology aided the expansion of the wheat industry into large-scale operations. The process of harvesting wheat and other grains became much easier with the invention of the 'stripper' in 1843, as it combed the straw of the wheat and collected the grain heads.

In 1876, the invention of the stump-jump plough made it easier to prepare new lands for grain growing in areas such as the Mallee country of South Australia and western Victoria. These areas had been cleared of trees for farming, but the strong tree roots and stumps that remained were difficult to remove. The stump-jump plough had the ability to spring back after coming into contact with tree roots in the soil and to continue ploughing.

In 1884, H.V. McKay invented the combine harvester, a machine that improved production as it could harvest, thresh and winnow the grain all in one process. A team of horses, usually heavy working horses such as Clydesdales, pulled the harvester.



Photograph attributed to George Bell for Kerry & Co. Tyrrell Collection, Museum ofApplied Arts and Sciences.

The Sunshine combine harvester revolutionised the grain industry.

In the 1890s, superphosphate and nitrogen were introduced into agricultural production to improve naturally poor soils that were further depleted by overcropping and grazing.

In the late 1800s, William Farrer began research into new wheat varieties and developed wheat that was more suited to Australian growing conditions. In 1900, he developed strains of wheat that had a shorter growing period and matured earlier. The new strains of wheat ripened before the hot weather of the Australian summer and could resist winter frosts. These varieties were also resistant to the fungal disease called 'rust' that lowered the quality of the yield.

In the 1920s, herbicides, insecticides, pesticides and non-organic fertilisers were developed to protect crops and increase yield.

In the 1920s and 1930s, farmers in Australia rebelled against the pricing of large grain-handling companies and the Australian Wheat Board was established. This organisation was a market form known as a **monopsony**, a marketing board that consists of one body or organisation that controls the market by selling to many buyers. The Australian Wheat Board, together with the Canadian Wheat Board, controlled much of the world's grain trade in the 20th century.



State Library of Victoria

One of the first tractors in Australia

By the 1940s, farmers began using tractors to pull harvesters, seeders and ploughs, which were more efficient than animals. This began a new age of motorised machinery.

In later years, growth of the Australian wheat industry was supported by changes in many farm management activities. Farmers embarked on **mixed farming**; that is, grazing sheep and cattle or raising pigs, as well as broadacre farming of cereal grains.

Collaborative Activity

Since the 1970s, other crops such as lupins, lentils, canola and field peas have been grown in rotation with wheat crops, in rotation with pasture for cattle and sheep.

DEVELOPMENT OF THE AUSTRALIAN DAIRY INDUSTRY

The Australian dairy industry began with the arrival of seven dairy cows and two bulls on the First Fleet in 1788. These cattle had poor fodder and grazing conditions and within months had escaped into nearby bushland. The nine animals survived and six years later when they were recaptured their number had increased to 61. They became the basis of the first herd of Australian dairy cattle.

Australia's cheese- and butter-making industry began at this time and was based on the traditional techniques the farmers brought with them from Europe. This allowed them to preserve these products so that there would be a supply available during autumn and winter when the dairy cows produced less milk.

The dairy industry grew quickly through breeding and the importation of new stock, and by 1800 the size of the breeding stock had increased significantly. In 1805, Dr John Harris built Sydney's first commercial dairy, and the first cheesemaking factory, the Van Diemen's Land Company, was established in Tasmania in the 1820s.

In 1832, the first Victorian dairy herd was established by John Fawkner with just two cows and two calves. Within 20 years, the ideal dairying conditions around Port Phillip Bay saw the number of dairy cattle in Victoria increase to more than 300 000.

In the early years, a lack of refrigeration meant that the dairy industries only supplied the domestic market, and these dairies were located close to consumers. However, as refrigeration became more widespread, the industry became more commercialised. Cooperatives were established to transport, process and market the milk produced by farm dairies. Gradually, many of these cooperatives become corporatised and large independent companies, such as Bega Cheese, National Farmers and Dairy Farmers, were established.

DEVELOPMENT OF THE AUSTRALIAN MEAT INDUSTRY

Over the first 100 years of European settlement, sheep and cattle numbers increased rapidly as the demand for meat grew to feed the growing population. Crossbreeds were imported from various countries around the world in an effort to find breeds that were best suited to the Australian environment. Droughts and dingoes were a constant threat, but by the 19th century stock numbers had increased to more than 100 million sheep and approximately 8 million cattle. Numbers continued to increase as farmers improved their pastures, fenced their farms and improved pest control.

In 1879, Australia sent a shipment of frozen beef to Britain and since then the meat export industry has continued to grow, making Australia a leading exporter of commercial livestock. Australia has an established reputation for its meat products, and strict quarantine regulations mean that the country is free from many sheep and cattle diseases experienced in Europe. Australia's natural environment provides vast grazing land and plenty of sunshine to raise healthy stock.

Cattle

Early development of the Australian beef-cattle industry was based on the shorthorn breed, as it was able to adapt to the hot, dry and rugged conditions of north-west Queensland, the Northern Territory and the Kimberley region of Western Australia. Cattle in these areas of Australia are run on large cattle stations and graze on native pastures.



Getty Images/Australian Scenics

Shorthorn cattle have adapted to the hot, dry conditions of northern Australia.

The Angus breed is grazed mainly in the south-eastern regions of the country, where there is lush pasture as a result of higher rainfall. Here, the cattle are grazed more intensively on smaller farms and are fed on pasture and fodder crops.

In the 1960s, the United States market was opened up to Australian grinding beef or mince steak, which caused a great expansion of the industry. This market grew further as hamburger and mince-steak recipes became popular in many homes and restaurants. Today, beef is the second most popular fresh meat consumed after chicken.

While pasture-fed methods of cattle production are most commonly used, feedlots have increased since the mid-1980s. A **cattle feedlot** is a managed system to produce beef of consistent quality within a specific time frame. This involves feeding cattle a high-protein diet for 60–300 days according to the specific market requirements; for example, with a higher percentage of fat.



iStock.com/Brian Brown

Feedlot cattle being fed

Sheep

Sheep are produced across a wide range of climates from the arid and semi-arid parts of Australia to the high-rainfall areas of New South Wales, Victoria, South Australia and Tasmania. Lamb production was initially for local consumption, but with the development of refrigeration in the 1880s, export to the United Kingdom expanded.

In the early 1900s, when the sheep industry was expanding, mutton – that is, fully grown sheep – were cheap and plentiful. In the 1920s, better pastures enabled farmers to fatten lambs, and they too became more widely available and affordable. The lamb roast became an icon of Australian cuisine at this time and took its place on Sunday lunch tables for many years.



Shutterstock.com/AlecTrusler2015

Sheep are raised for meat and wool.

Pigs

Pigs, like many other animals, came to Australia with the First Fleet. In the early years of settlement, many farmers in grain-growing areas who had a ready supply of grain for feed, raised a few pigs on their farm.

In the early 1960s, new farming systems and technologies were introduced, and Australia's first large-scale intensive piggery was built. Today, 89 per cent of production comes from herds of 100 or more breeding sows and Australia produces 5 million pigs annually. Approximately 34 per cent of Australian pork production is processed into bacon, hams and smallgoods. The rest is sold as fresh pork meat.



Shutterstock.com/Odairson Antonello

Intensive pig production

Chicken

Australia's chicken-meat industry is relatively new compared to other major livestock industries. Up until the 1950s, most of the chicken production in Australia was carried out in people's backyards or on larger family farms. During the 1960s, the consumption of chicken meat increased dramatically as a result of the introduction of continuous processing systems. These new systems meant that large quantities of poultry could be processed faster and more efficiently, leading to a reduction in the price consumers paid for chicken.

In 1968, Kentucky Fried Chicken opened its first store in Australia and by the 1970s it had opened 75 stores across the country. During this period, the



Shutterstock.com/David Tadevosian

Large-scale chicken production led to an increase in the consumption of chicken meat.

consumption of chicken meat increased by 38 per cent as a result of genetic improvements in chicken breeding and further improvements in processing techniques. During the 1980s, production and consumption of chicken meat continued to grow as it was considered to be a relatively inexpensive type of meat.

Understanding the Text

1 Explain the difference between agriculture and horticulture.
2 Draw a timeline to demonstrate the key developments in Australian wheat production.
3 Why was the development of the stump-jump plough such an important technological development for preparing new land for cultivation?
4 Why was the development of refrigeration so important for the dairy industry in Australia?
5 Describe two factors that contributed to an increase in the number of sheep and cattle in the early years of the meat and livestock industry.
6 Explain why different breeds of cattle are used in northern and south-eastern Australia.
7 What is meant by the term 'cattle feedlots'? What is the benefit of feedlot cattle to consumers?
8 Outline two factors that led to an increase in the supply of Australian lamb meat.
9 How has the production of pig meat changed over the past century?
10 Explain how technology helped the market for chicken meat to increase so dramatically during the 1960s.

Answers Understanding the Text

Development of horticulture in Australia

The growth of horticulture in Australia, particularly the establishment of orchards and vegetable production, was closely linked to the development of irrigation. Irrigation systems such as the Snowy Mountains Scheme were established to divert water into the Murray and Murrumbidgee rivers to make farming, and particularly fruit growing, viable in inland areas. The development of canning in Australia also had a major impact on the fruit industry and the export of fruit.

CITRUS FRUIT

Australian citrus production began in 1788 when the First Fleet arrived carrying the seeds of limes, lemons and oranges, collected from Brazil en route to Australia. These seeds were planted, and the trees now form the basis of today's national citrus industry.

The early settlers found Australia's climate ideal to produce a large range of quality citrus fruit. In 1887, the Chaffey brothers migrated to Mildura from California. They imported Washington Navel and Valencia orange trees from their homeland and developed a citrus industry in the Murray Valley, as well as establishing an irrigation settlement. Today, this citrus-producing region extends from the South Australian–Victorian border to Sunraysia and the area around Wangaratta.

Citrus fruit growers in these regions grow two types of oranges: navel oranges, which are available in the winter from June to October; and Valencia oranges, which are available in the summer months from November to February.



Alamy Stock Photo/Panther Media GmbH

Valencia oranges are widely grown in the Murray Valley.

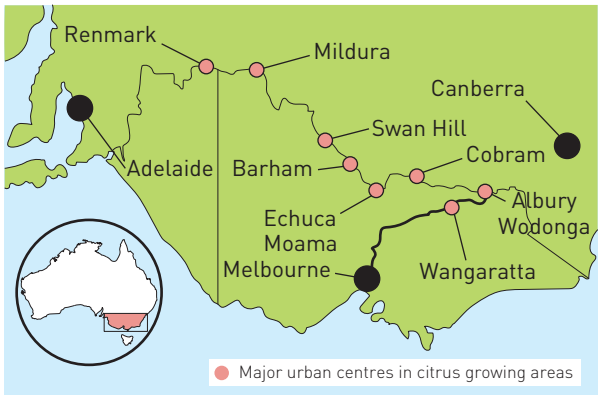


FIGURE 6.1 Citrus-growing areas in Australia

Practical Activity 6.1

Analysing orange juice and drink varieties

Aim: To compare the properties of a variety of processed orange juices and orange drinks.

Worksheet

Method

1. Select four varieties of orange juice or orange juice drinks. Choose varieties that are signficantly different in price.
2. Observe the labelling and packaging of each drink and record the packaging type, the country of origin, list of ingredients and any health star rating in a table similar to Table 1 on the next page.
3. Read the label carefully and record the nutritional information in a table similar to Table 2 on the next page.
4. Calculate the cost of 100 millilitres of each drink and record this in a table similar to Table 3 on the next page.
5. Conduct a taste test of each drink. Observe the appearance, aroma, flavour and texture of the orange drinks. Record your observations in a table similar to Table 4 on the next page. Wash your mouth out with fresh water between tasting each drink. Provide a ranking for each category according to your preference, using a scale such as:

   5 = Excellent, 4 = Very good, 3 = Good, 2 = Satisfactory, 1 = Poor.

Analysis

1. List the drinks that use only Australian-made ingredients.
2. List the drinks that use orange concentrate. Why is it used?
3. Which drinks contain only freshly squeezed orange juice? Did the freshness of the juice have an impact on the flavour of the drink?
4. Why are some of the drinks fortified with additional nutrients?
5. What is the role of preservatives in fruit drinks?
6. Identify the drink that contained the highest amount of vitamin C. Why does the vitamin C content vary between the drinks?
7. Study the labels. Is there a relationship between the sugar content and the number of kilojoules the drink contained per serve?
8. Explain the difference in the health star rating given to each product. Why do some products contain a health star rating while others do not?
9. Which drink was the best value for money? Justify your answer.

Conclusion

After considering all your analysis of the properties of orange juice and drink varieties, what advice would you give consumers about their purchase of orange juice and drinks?



Orange juices and orange drinks

Mark Fergus Photography

Results

Table 1

DRINK NAME	PACKAGING TYPE	COUNTRY OF ORIGIN	LIST OF INGREDIENTS	HEALTH STAR RATING
1				
2				
3				
4				

Table 2

NUTRITIONAL INFORMATION PER 100 ML				
Drink name	Total carbohydrates	Sugars	Vitamin C	Energy in kilojoules
1				
2				
3				
4				

Table 3

COST PER 100 ML OF EACH DRINK		
Drink name	Cost of the drink	Cost of 100 mL of the drink
1		
2		
3		
4		

Table 4

TASTE-TESTING THE DRINKS					
Drink name	Appearance (colour)	Aroma	Flavour	Mouthfeel	Overall score
1					
2					
3					
4					

VEGETABLES

Vegetable production in the early years of settlement was difficult because soils around Sydney Harbour were poor and were not suitable for growing vegetables on a large scale.

In the 1850s, market gardens were developed by the Chinese to provide food for the diggings during the gold rush. From the 1860s until the 1890s, Chinese market gardeners supplied a variety of fresh vegetables and sometimes fruit to miners in the gold diggings across Australia.

Between 1900 and 1920, the majority of vegetables grown in Western Australia were grown by Chinese market gardeners. More than a third of the Chinese population of Western Australia was involved in the market-garden industry – an industry that was very labour intensive and relied on farming techniques practised in China.

Chinese market gardens were later established in the suburbs of Australian capital cities; in Melbourne, market gardens were established along the Merri Creek and in suburbs such as Caulfield and Brighton. Market gardens also featured in many country towns throughout the nation. The gardens operated on a cooperative basis, often with as many as 10 workers from the same family group. Chinese shopkeepers and greengrocers gave financial help to the gardeners and then sold the produce on the gardener's behalf. The gardeners worked long hours using handmade tools and grew a range of vegetables such as tomatoes, cauliflower, herbs, leafy green vegetables and lettuces. In 1901, 43 per cent of all market gardeners in Victoria were Chinese.

Many of the Italian and Greek migrants who arrived in Australia following World War II chose to work in market gardening as they had done in the rural regions of their home countries. However, many of them found it challenging as they needed to learn which crops suited the local conditions and it could take several years before a market garden succeeded. During this time, post-World War II, market gardeners grew beans, peas, cabbages, cauliflowers, lettuce and early potatoes.

Case study

Alfred Fong Tong market gardener in Warracknabeal, Victoria

The majority of the Chinese immigrants who became market gardeners like Alfred Fong Tong came to Australia seeking their fortune on the goldfields during the 1850s and 60s. Many turned to vegetable growing and made a reasonable and regular living selling vegetables to miners. After the gold rush declined, many drifted north to the Mallee and later to the Wimmera region in Victoria. Many of these Chinese people established market gardens with a great degree of success, and some even became farmers in various parts of Victoria. Because of immigration restrictions in force at the time, most of the Chinese market gardeners were not able to bring their families with them to Australia but sent what money they could home to their relatives.

Over a number of years, several market gardens were established in Warracknabeal in the Wimmera in western Victoria, mainly along the Yarriambiack Creek. This creek provided a regular water supply



Alfred Fong Tong, Chinese market gardener, Warracknabeal, 1890–1940

Jenny Taylor, Warracknabeal & District Historical Society



Jenny Taylor, Warracknabeal & District Historical Society

A Chinese market garden in Warracknabeal

for the gardens. Most of the vegetables grown by the market gardeners were boxed and taken to the Warracknabeal Railway Station where they were sent to Melbourne for sale. Some vegetables were sold locally to shops or directly to the local people.

Alfred Fong Tong and his family were market gardeners who grew a wide variety of vegetables in Warracknabeal for more than fifty years, from 1890 to 1940, the longest surviving market gardeners in the region.

Source: Jenny Taylor, Warracknabeal and District Historical Society Box 355, Warracknabeal, Victoria, 3393

Development of food processing and manufacturing in Australia

Following the establishment of successful horticultural industries in Australia, it became important to develop a means of preserving the fresh fruit and vegetables for times when it was out of season or to export the produce to overseas markets. This led to the development of the Australian food processing industry. **Food processing** uses physical or chemical means to transform raw food or ingredients into new food products.

CANNING

In 1815, canned produce was introduced into Australia from Britain and this canned food was used by the early explorers on their expeditions throughout the country.

The first Australian meat-canning works was opened in Sydney in 1846; it produced canned beef and mutton that was exported to Britain.

In 1861, a jam-making factory was opened in Hobart and locally grown berries were made into jam and then the jam was canned. The Tasmanian fruit industry dominated the commercial jam industry well into the 20th century.

In 1892, the Mildura Fruit Preserving Company opened and began canning apricots, peaches, nectarines and other fruit and vegetables sourced from growers around Mildura.

The demand for canned food increased dramatically during World War I as the military sought food that could be sent overseas for the troops. Throughout the war, troops survived on canned foods such as 'Bully Beef' – a canned corned beef that could be transported safely and did not deteriorate in the trenches.

In 1921, Ardmona established a cannery near Shepparton in the Goulburn Valley. The cannery sourced its fruit from the irrigated orchards established by the soldier settlers after World War I. In the 1930s, R.C. Edgell established a modern cannery to can asparagus and other vegetables he originally grew on his property in New South Wales.

In the 1940s, the canning industry became more mechanised, and this meant that fruit such as cherries could be machine pitted, apples cored, peaches sliced and fruit juices could be canned.



John Oxley Library, State Library of Queensland [256040]

Golden Circle pineapple canning in the early 1950s

By the mid-1940s, the pineapple industry was well-established in Queensland. In 1947, Golden Circle began operations after a group of about 900 growers bought shares in a cooperative that financed the building of a new cannery. Golden Circle's first products were canned pineapple, paw paw, fruit salad and citrus cordials and other fruit juices. It also began to produce canned beetroot from the 1960s.



Mark Fergus Photography

Some of the first foods canned by Golden Circle were sliced beetroot and sliced pineapple.

Activity 6.2

The history of the Shepparton Preserving Company

1. Search online for information about the history of the Shepparton Preserving Company.
2. Prepare a timeline of the development of food processing by the company from its establishment in 1917 to the late 1990s.

Your timeline should include key dates in the development of the company and the types of food processing undertaken by the company.

Weblink
SPC



The SPC factory in 1917

Image used with permission of SPC

Practical Activity 6.3

Comparing a variety of processed apple products

Aim: To investigate and compare apples processed using different methods.

Materials

- Canned apples
- Air-dried apples
- Apple puree in a pouch
- Freeze-dried apples

Worksheet

Method

1. Research information about each product and record your findings in a table similar to Table 1 on the next page.
   - List two or three key features of the processing method.
   - Identify the method of packaging.
   - Explain how the food processing method extends the shelf life of the product.
   - Provide at least one example of how the consumer could use the product.
2. Complete a taste test of each apple product and record your findings in a table similar to Table 2 on the next page.

Results

Table 1

PRODUCT	CANNED APPLES	AIR-DRIED APPLES	APPLE PUREE IN A POUCH	FREEZE-DRIED APPLES
				
Food processing method				
Packaging method				
Shelf life of the product				
How consumers could use the product				

Mark Fergus Photography

Table 2

SENSORY PROPERTIES	CANNED APPLES	AIR-DRIED APPLES	APPLE PUREE IN A POUCH	FREEZE-DRIED APPLES
Appearance				
Aroma				
Flavour				
Texture				
Ratings				
1 = dislikes very much 5 = neutral 9 = likes very much				

Analysis

1. Explain how each method of food processing extends the shelf life of apples.
2. Identify a consumer group that food packaged in a pouch would appeal to. Explain why this method of packaging would appeal to this group of consumers.
3. Compare the similarities and differences in the sensory properties of the apple products in the taste test.
4. Explain why being able to process apples using a range of methods is an advantage to apple growers.
5. Outline how the availability of apples processed using different methods is of value to consumers.

Conclusion

Based on your research and taste test, which apple product did you prefer? Justify your answer.

DEVELOPMENT OF THE MILK-PROCESSING INDUSTRY

The first steps in the development of an Australian milk-processing industry began in 1870 with the establishment of a system of milk delivery from farms to a central processing point for the manufacture of butter and cheese. At this time, butter making involved allowing time for the milk to stand so that the cream could rise to the top of the milk vat. This would then be skimmed off and the cream hand-churned and heavily salted to form butter.

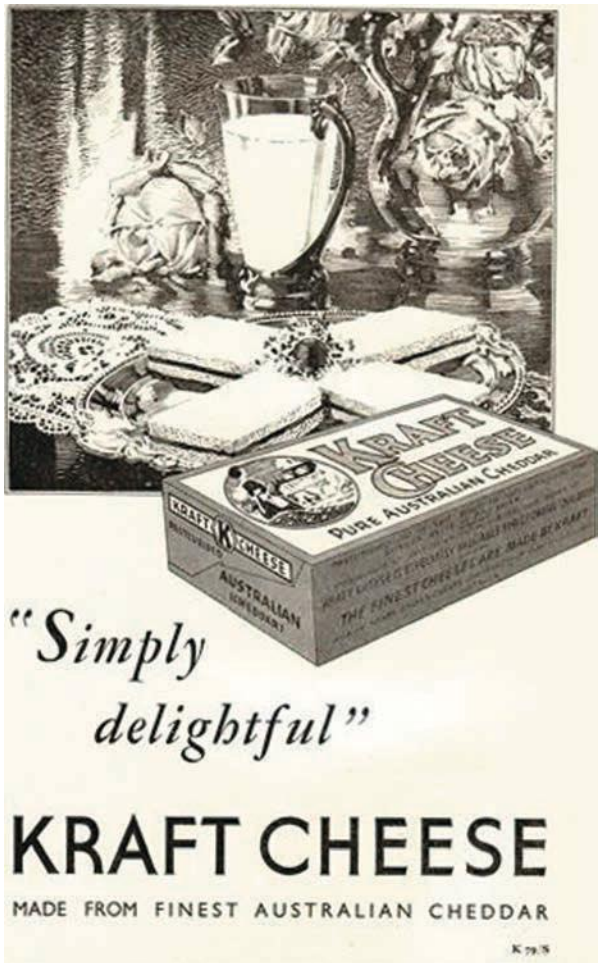


Image from the collection of Victorian Interpretive Projects Inc

An advertisement for early packaged cheese

At much the same time, commercial cheesemaking began in Bodall, a small country town on the south coast of New South Wales. This area was desirable as it had rich river flats and an ideal climate to produce excellent pasture for dairy cows. The production of cheddar cheese for local consumption and export continued in this area until the 1950s.

In 1925, a Melbourne food processor obtained the rights from the American company Kraft to manufacture other processed cheeses in Australia.

Devondale Murray Goulburn

Devondale Murray Goulburn was established in 1950 by a group of dairy farmers who combined their efforts to seek better prices for their milk. The company originally operated as a cooperative controlled by dairy farmer suppliers. Today the company is owned by Saputo, a publicly-listed Canadian dairy company. It is Australia's largest dairy foods company, processing more than one-third of Australia's milk supply.

In 1951, Devondale Murray Goulburn opened its first cooperative factory in Cobram in Victoria. The following year, it exported its first shipment of butter to the United Kingdom. By 1958, the production of cheese, butter and casein had reached 2500 tonnes and more than a million gallons of milk were produced for local and Melbourne markets.



Devondale Murray Goulburn

The first Devondale Murray Goulburn factory in Cobram, Victoria

In 1956, electric cooling vats were installed on dairy farms in the Cobram area for the first time. This was a significant development in milk production as it meant that milk could be handled in bulk and the farmers could deliver their milk to the factory once a day rather than having to deliver it after the morning milking and again after the dairy cows had been milked at night.



Devondale Murray Goulburn

Early milk processing at the Devondale Murray Goulburn factory

The company gained fame in 1969 when astronauts on the first space flight to the moon ate casein sticks produced in the Devondale Murray Goulburn factory at Cohuna. The 1970s saw a significant increase in the production of all dairy products, and butter was exported to Russia for the first time.

Considerable innovation took place in the dairy industry during the 1980s, and in 1985 the company began producing individually wrapped cheese slices in their Cobram plant. New blends of butter were also developed during the late 1980s and the company released Dairy Soft, a new blend of butter and oil, onto the market. By 1987, further developments in technology enabled the company to produce a new range of low-salt butter products to meet the demands of health-conscious consumers.



Smart Media

Dairy Soft

The impact of railway construction on the development of food production

The construction of railway lines and train services had a big impact on the development of food production across Australia. Farmers could send their grain to flour mills in rail trucks and animals could also be transported to abattoirs. Manufactured food products such as canned fruit could now be transported by rail to towns across the country.

In the late 1800's, railway lines were extended and built to service many outlying towns in country Victoria, particularly in the Mallee as these areas were opening up to farming. The ability to move agricultural products to market became important. Steam trains serviced these lines and later passenger services were added.

The first steam train arrived at Minyip, a country town in north-west Victoria, in the centre of a grain growing area in 1886. Stock yards were erected in 1887, the goods platform extended in 1888, and a weighbridge and cool-storage for storing dairy produce was added a little later. The facilities built at many of these stations ensured grain, animals and dairy products could be stored until they were loaded ready for rail transport.



Photograph attributed to George Bell for Kerry & Co. Tyrrell Collection, Museum of Applied Arts and Sciences.

Loading wheat bags at the Warracknabeal railway yards



Alamy Stock Photo/Excitations

The 'Remlaw Silos' in the Wimmera Region, Victoria

Grain was first transported to the railway stations in bags, which were then loaded into open rail wagons. By 1930, moving individual bags became very inefficient and in 1934 the Grain Elevators Board of Victoria built concrete silos. These bulk silos were built in many country locations and the railway connected them to shipping ports.

Some stations also had sheds for the storage and supply of bulk superphosphate, which in earlier days had arrived by train in bags.

Understanding the Text

11 Why did the Snowy Mountains Scheme have such a significant impact on the development of horticulture in Australia?

12 Outline the role of the Chaffey brothers in the development of the citrus industry in Victoria. Name the two types of oranges grown in Australia and the seasons in which they are grown in the Murray Valley region.

13 Draw a knowledge map to describe the role of the Chinese market gardeners in the development of the vegetable industry in Australia.

14 Define the term 'food processing'. How did food processing improve the availability of food for Australian consumers?

15 Draw a timeline to highlight the key stages in the development of food processing in Australia from 1815 to the 1940s.

16 Explain how the development of the Golden Circle cannery and canning of tropical fruits had an impact on menus throughout Australia.

17 Describe how butter was made in the 1800s.

18 Why was the area around Bodall in New South Wales so well suited to dairy farming?

19 Prepare a timeline for the historic development of the Devondale Murray Goulburn cooperative company.

20 Draw a knowledge map to highlight the importance of the development of the rail system to the production and supply of food across Australia.

Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

Prepare a snapshot summary of the development of one agricultural or horticultural industry in Australia. The snapshot summary should be written in your own words. You should aim to use vocabulary specific to the industry and the summary should be 60–100 words in length.

Roasted pumpkin salad with cannellini bean hummus and sesame haloumi fingers

Hummus is a Middle Eastern dip traditionally made with chickpeas. However, this recipe uses cannellini beans rather than chickpeas as the hero ingredient. Cannellini beans have a mild flavour and smooth texture, unlike the grainy texture associated with chickpeas. Roasting the pumpkin and red onion caramelises the natural sugars in these vegetables and imparts a sweet flavour to this salad. Haloumi is a firm, slightly salty cheese made from goat, sheep or cow's milk, which holds its shape when fried.

PUMPKIN AND ONION SALAD

500 grams butternut pumpkin
2 red onions
olive oil spray
3 radishes
50 grams spinach leaves
¼ cup mint leaves, roughly torn
¼ cup parsley, chopped

CANNELLINI BEAN HUMMUS

425 grams canned cannellini beans
1 tablespoon olive oil
1 tablespoon tahini
1 tablespoon lemon juice
1 small clove garlic, crushed
½ teaspoon salt
pinch of white pepper
2 tablespoons hot water

DRESSING

1 tablespoon olive oil
½ tablespoon red wine vinegar
1 teaspoon maple syrup
½ teaspoon Dijon mustard
salt and pepper

SESAME HALOUMI FINGERS

200 grams haloumi
1 egg, beaten
2 teaspoons toasted sesame seeds
1 tablespoon dukkah
2 tablespoons sunflower oil
1 tablespoon Greek yoghurt
1 teaspoon pomegranate molasses
few mint leaves, picked, for garnish

METHOD

Pumpkin and onion salad and dressing

1 Preheat the oven to 200 °C. Line a baking tray with baking paper.
2 Peel the pumpkin and cut into 3-centimetre pieces. Peel the red onions and cut into sixths.
3 Place on the lined baking tray and spray lightly with olive oil spray. Bake in the preheated oven for approximately 35 minutes until tender.
4 Slice the radishes into wafer thin slices using a mandolin or a very sharp vegetable knife. Prepare the mint and parsley and set aside.
5 Prepare the dressing by combining the olive oil, red wine vinegar, maple syrup, Dijon mustard and salt and pepper in a small screw-topped jar and shake well.
6 Place the spinach leaves, roasted pumpkin, red onion, radish slices and chopped parsley in a mixing bowl. Pour over the dressing and gently mix with your hands taking care not to break up the roasted vegetables.

Cannellini bean hummus

1 Drain and rinse the cannellini beans thoroughly. Place in a food processor with the olive oil, lemon juice, crushed garlic, salt and white pepper and process for 30 seconds. Add 2 tablespoons of hot water and process until a smooth paste is formed adding a little more hot water if necessary.
3 Spread the cannellini bean hummus on a serving plate and pile the salad over the top.
4 Garnish with the picked mint leaves.

Sesame haloumi fingers

1 To make the sesame haloumi fingers, pat the haloumi dry with paper towel and cut into fingers 1.5 centimetres in width.
2 Combine the toasted sesame seeds and dukkah on a piece of paper towel. Dip the haloumi fingers in the beaten egg and very lightly coat in the sesame seed and dukkah mixture; they don't need to be completely coated.
3 Heat the oil in a large frying pan and cook over a moderate heat until the haloumi fingers are golden brown on all sides. Drain on clean paper towel.
4 Top each haloumi finger with a small dollop of yoghurt, a tiny splash of pomegranate molasses and a picked mint leaf. Serve as an accompaniment to the pumpkin salad with cannellini bean hummus.

SERVES 2

EVALUATION

1 Describe the sensory properties of the roasted pumpkin with cannellini bean hummus and sesame haloumi fingers – appearance, aroma, flavour and texture – using descriptive language.
2 Why are the pumpkin and red onion roasted instead of steamed or microwaved?
3 If you didn't have access to a food processor, list some kitchen tools and/or equipment that could be used to break up the canned beans and make the hummus.
4 The dressing is an example of a temporary emulsion; explain why.
5 Identify the process that causes the haloumi cheese to brown when fried and explain how the cheese changes colour when fried.



Mark Fergus Photography

Seedy soda bread

Soda bread is the national loaf of Ireland. It is a no-yeast bread, which relies on baking soda and buttermilk to leaven the dough. This quick bread can be made with white or a combination of white and wholemeal flour and can have seeds and wholegrains added to boost the fibre content. The soda bread has a dense, soft texture and a crusty crust and can be eaten fresh or toasted.

200 grams white flour
2 teaspoons baking powder
¾ teaspoon bicarbonate of soda
¾ teaspoon salt
1 tablespoon brown sugar
⅓ cup rolled oats
1 tablespoon sunflower seeds
3 teaspoons fennel seeds
150 millilitres buttermilk

METHOD

1 Preheat oven to 200 °C and line a tray with baking paper.
2 Sift the flour, baking powder, bicarbonate of soda, salt and brown sugar into a large bowl.
3 Add the rolled oats, sunflower seeds, fennel seeds and stir to combine.
4 Make a well in the centre of the dry ingredients and pour in all the buttermilk.
5 Use a spatula to bring the dough together by starting to mix from the centre of the well and gradually pulling in the dry ingredients to form a soft dough. Add a tablespoon of extra buttermilk if the dough is too dry.
6 Turn the dough onto a lightly floured bench and lightly knead and form into a bard shaped (oval) loaf.
7 Place the loaf onto the lined baking tray, slash lengthwise with a sharp knife and bake for 20 minutes.
8 The loaf is ready when it is golden brown, and the bottom of the loaf sounds hollow when it is tapped.
9 Cool on a rack before slicing.

MAKES 1 SMALL LOAF

EVALUATION

1 Describe the sensory properties of the seedy soda bread – appearance, aroma, flavour and texture – using descriptive language.
2 Why are the dry ingredients sifted before the buttermilk is added?
3 Explain why the dough is only kneaded very lightly before baking.
4 List the tests you could use to determine when the cooking process for the seedy soda bread is complete.
5 Recommend some other ingredients or products that could be served with the seedy soda bread to create a light meal.



Mark Fergus Photography

Singapore noodles

Singapore noodles are a popular dish on the menu of many Asian restaurants. Although they did not strictly originate in Singapore, this dish is based on the style of cooking noodles used by many Singaporean street vendors. Rice or mung bean vermicelli noodles are a very fine type of noodle. They are tossed in a light curry sauce to form the basis of this recipe. Alternatively, ramen or hokkein noodles could be used. Char sui pork and prawns are also commonly used in this dish or you could use tofu instead to make a plant-based version. There are no strict rules about the type of vegetables to include in this recipe so it is an ideal dish to prepare using whatever vegetables are left over in the refrigerator.

CHAR SIU PORK

150 grams pork fillet
2 teaspoons brown sugar
2 teaspoons honey
2 teaspoons hoisin sauce
2 teaspoons soy sauce
¼ teaspoon five spice powder
1 teaspoon sunflower oil
1 teaspoon red food colouring

SINGAPORE NOODLES

125 grams rice or mung bean vermicelli
3 tablespoons light soy sauce
3 tablespoons Shaoxing wine
1 teaspoon curry powder
¼ teaspoon turmeric
1 teaspoon caster sugar
100 grams green beans, sliced diagonally
½ red capsicum, thinly sliced
⅛ wombok cabbage, finely shredded
4 shiitake mushrooms, sliced
2 eggs, beaten
pinch of salt
2 tablespoons peanut oil
6 medium, raw prawns
2 large cloves garlic, crushed
1 tablespoon finely grated ginger
½ long green chilli, deseeded, finely diced
3 spring onions, finely sliced
4 water chestnuts, sliced
2 tablespoons fried onion or garlic, to garnish
coriander sprigs, to garnish

METHOD

Char siu pork

1 Combine the brown sugar, honey, hoisin sauce, soy sauce, five spice powder, sunflower oil and red food colouring in a medium bowl and mix well to combine.
2 Add the pork fillet and coat well in the marinade. Set aside to marinate for 20 minutes.
3 Preheat the oven to 180 °C.
4 Remove the pork fillet from the marinade and place in a small oven-proof dish. Brush well with 1 tablespoon of the marinade. Bake in the preheated oven for 10 minutes. Remove from the oven and baste with the remaining marinade. Roast for a further 10 minutes.
5 Remove from the oven, allow to cool then slice thinly across the grain of the fillet.

Singapore noodles

1 To prepare the rice or mung bean vermicelli noodles, bring a large saucepan of water to the boil.
2 Add the vermicelli noodles and simmer for 5 minutes. Stir several times to prevent the vermicelli sticking together. Place in a sieve and drain well. Allow to stand in the sieve for 30 minutes, tossing occasionally so that the vermicelli does not stick together.
3 To make the sauce, place the soy sauce, Shaoxing wine, curry powder, turmeric and caster sugar in a small bowl and mix well to combine. Set aside.
4 Blanch the green beans in a small saucepan of boiling water for 1 minute. Drain, refresh in cold water and drain again. Set aside.

5 Combine the red capsicum, shredded wombok cabbage, shiitake mushrooms and beans in a bowl.
6 Beat the eggs with a pinch of salt in a small jug and set aside.
7 Heat 2 teaspoons of the peanut oil in a wok or heavy-based frying pan over medium heat.
8 Add the prawns and stir-fry for approximately 3 minutes until cooked through. Remove from the pan and place in a small bowl. Add the sliced char siu pork to the prawns and set aside.
9 Return the wok to medium heat and add the remaining peanut oil. Add the garlic, ginger and green chilli, cook for 1 minute until aromatic.
10 Add the red capsicum, shredded wombok cabbage, shiitake mushrooms and beans and toss for 2 minutes. Add the spring onion and water chestnuts.
11 Push the vegetables to the side and add the egg to the wok. Cook for 1 minute or until the egg begins to set. Gently scramble the egg through the vegetables. Add char siu pork and prawns, then toss to combine.
12 Add the drained vermicelli and the sauce ingredients to the wok and toss together for 1–2 minutes or until well combined and the sauce coats all of the ingredients and the noodles are heated through.
13 Divide the mixture between two serving bowls and garnish with the fried onion or garlic and coriander.

EVALUATION

1 Describe the sensory properties of the Singapore noodles – appearance, aroma, flavour and texture – using descriptive language.
2 Explain why a fillet is the most suitable cut of pork for this recipe.
3 There are many variations of recipes for Singapore noodles. List four other protein ingredients that could be used instead of the pork fillet.
4 Identify the process and describe the changes that occur when the pork fillet and egg are cooked.
5 When making a stir-fried recipe such as Singapore noodles, all the ingredients and sauces are prepared before the cooking begins. Explain why the preparation of the ingredients before beginning the cooking process is critical to the success of the dish.



Mark Fergus Photography

Mini orange syrup cakes

Citrus fruits such as oranges, lemons and limes have been an important part of Australian horticulture since these fruits arrived on the First Fleet in 1788. They have since become a key crop grown in the Murray Valley in Victoria. Oranges are used in this recipe to provide flavour and moisture to the cake. Boiling and baking are the cooking techniques used in this recipe.

CAKES

60 grams butter

⅓ cup caster sugar

1 egg, lightly beaten

¾ cup self-raising flour, sifted

¼ cup milk

½ teaspoon vanilla essence

ORANGE SYRUP

1 orange, zest and juice

¼ cup caster sugar

METHOD

Making the cakes

1. Preheat oven to 180 °C.
2. Grease a muffin tin well with melted butter or oil spray and line the base with a small circle of baking paper. Alternatively, you can line the muffin tin with patty paper cases (large muffin size) as this is a very tender cake.
3. Cream the butter and sugar with a wooden spoon until pale and fluffy.
4. Add the egg gradually and beat well.
5. Add half the sifted self-raising flour, and then half the milk. Mix well.
6. Repeat with the remaining flour and milk. Add vanilla and mix well.
7. Spoon the mixture into the lined muffin tin or patty cake papers.
8. Bake for 10–15 minutes or until a skewer comes out clean after being inserted into the centre of a cake. The cakes will still be quite pale.

Making the orange syrup

1. Remove the zest of the orange and julienne very finely, then juice the orange.
2. Combine all the ingredients in a small saucepan.
3. Stir constantly over a low heat until the sugar is dissolved.
4. Bring to the boil and simmer gently for 2 minutes, without stirring, until the syrup has reduced a little.

Assembling the cakes

1. Place the cakes on a wire rack to cool. Place the rack over a plate. Prick the cakes 4 or 5 times with a fine skewer.
2. Spoon the hot syrup over the cooked cakes and top with strips of orange zest. Spoon any syrup that drips onto the plate over the cakes.
3. Stand for 15 minutes before serving. Serve with cream or ice cream.

MAKES 4–5 CAKES

EVALUATION

1 Describe the sensory properties of the mini orange syrup cakes – appearance, aroma, flavour and texture – using descriptive language.
2 How could you tell if the cakes are cooked, other than by testing with a skewer?
3 Explain the difference between boiling and simmering when making the syrup.
4 Why is it important to allow the cakes to stand after the syrup has been poured over them?
5 Identify the processes that are used in the recipe which enable the sensory properties of oranges to be highlighted.



Mark Fergus Photography

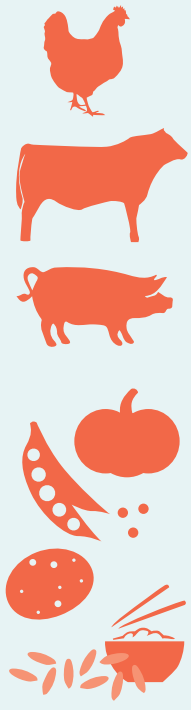
PATTERNS OF MIGRATION TO AUSTRALIA

1788

CONVICT TRANSPORTATION AND FREE SETTLERS



FOODS INTRODUCED



1850s

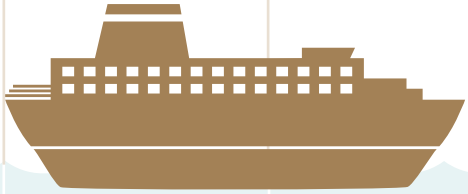
CHINESE IMMIGRANTS WORKING ON THE GOLDFIELDS

- Asian vegetables
- Cured and dried fish
- Chicken chow mein
- Chop suey



1940s

EUROPEAN IMMIGRATION POST-WORLD WAR II



- Pasta
- Eggplant
- Zucchini
- Feta cheese
- Olives
- Olive oil
- Lemons



1950s

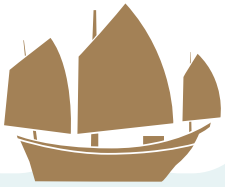
IMMIGRATION FOLLOWING THE 1956 MELBOURNE OLYMPIC GAMES





1970s

VIETNAMESE 'BOAT PEOPLE'



- Fish sauce
- Shrimp paste
- Nuoc cham, a Vietnamese dipping sauce
- Rice vermicelli
- Cellophane noodles
- Traditional Vietnamese herbs and spices, including lemongrass, Vietnamese mint, Saigon cinnamon, bird's-eye chilli and kaffir lime leaves
- Fruit, such as mangosteen, jackfruit, durian and star apples

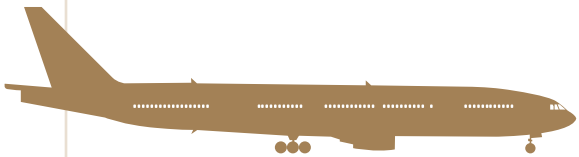


7

THE IMPACT OF MIGRATION ON AUSTRALIAN CUISINE

1980s >>

REFUGEE RESETTLEMENT





Countries that refugees have been resettled from, include:

- Afghanistan
- Balkan States
- Democratic Republic of the Congo
- East Timor
- Eritrea
- Ethiopia
- Iran
- Iraq
- Lebanon
- Myanmar
- Pakistan
- Somalia
- Sri Lanka
- Sudan
- Syria



KEY TERMS

chalau a simple dish of fluffy white rice that is a staple food in Afghanistan

filo pastry a pastry made by layering many sheets of paper-thin dough with butter; it is commonly used in Greek cuisine

koulourakia a Greek twisted butter biscuit traditionally served at Easter

loukomades delicate, golden balls of deep-fried dough, drizzled with honey and cinnamon served as a dessert in Greece

nuoc cham a Vietnamese dipping sauce

spanakopita cheese and spinach triangles made with filo pastry; they are a popular Greek dish usually served as an appetiser or first course

tzatziki a yoghurt, cucumber and garlic dip often used as an accompaniment to spicy Greek meat dishes

Vietnamese herbs and spices lemongrass, Vietnamese mint, Saigon cinnamon, bird's-eye chilli and kaffir lime leaves

Vietnamese 'boat people' people who fled Vietnam by boat, seeking asylum in other countries

Resources
Study Design
links
Infographics
Flashcards

Patterns of migration to Australia

Collaborative Activity

Australia is a nation built on migration. The first inhabitants, Australia's First Nations peoples, arrived on the continent more than 50 000 years ago from nearby islands in South-East Asia and New Guinea. For tens of thousands of years, First Nations peoples ate the food that the land provided – its native plants and animals. Since that time, the cuisine we know in Australia today has been built on successive waves of migration.

CONVICT TRANSPORTATION AND FREE SETTLERS

With the arrival of the First Fleet in Botany Bay in 1788, the first convicts landed on Australian shores. By 1868, more than 160 000 convicts, mainly from Britain and Ireland, had arrived in the country. Initially, their diet consisted of bread, salted meat and rum. During the late 1700s and early 1800s, thousands of free settlers arrived in Australia to start a new life. English, Scottish and Irish agricultural and domestic workers brought their traditional cooking methods and recipes with them, such as meat pies, Irish stew, Cornish pasties and shepherd's pie. However, many people chose to eat fresh kangaroo, wallaby meat and native fowl or bush turkey, as they preferred this type of fresh meat to the salted meat or tough mutton.

In these early years, much of the Australian cuisine was relatively bland, and potatoes were one of the main vegetables eaten. Sheep, which had successfully adapted to the Australian climate and landscape, became a staple food and today lamb is considered to be an iconic Australian food.



Photograph by unattributed studio. Tyrrell Collection, Museum of Applied Arts andSciences.

An Australian free-settler home

LABOURERS TO THE NEW COLONY

The discovery of gold in 1851, in New South Wales and soon after in Victoria, sparked a new influx of migrant workers into Australia. Hopeful diggers arrived from the United Kingdom, Europe, the United States of America and China. By 1860, approximately 24 000 Chinese immigrants were working the goldfields around Ararat, Bendigo, Ballarat and Castlemaine. However, as the Chinese were disliked and seen as a threat to other miners, they often established camps on the outskirts of the main mining towns. Here, they developed small gardens where they grew fresh vegetables and they also established eating houses. The eating houses sold Cantonese-style dishes cooked with fresh vegetables, pork, fish, poultry and vegetables. Despite the popularity of their food, the Chinese found it necessary to adapt their dishes, adding more meat to their dishes than was traditional in order to suit the tastes of the Australian, British and European miners. Local miners soon adapted the Chinese-style of cooking to produce a 'colonial curry' – a dish that would use herbs and spices to mask the flavour and texture of the native game they had caught.

As the gold rush dwindled, many Chinese stayed on in Australia and established new enterprises. Fishing around Sydney and Melbourne was once prolific, and the Chinese cured and dried the fish, which they then sold to other members of the Chinese community throughout the country. Other Chinese migrants, who had come from rural areas in China, established successful market gardens. These gardens were very labour intensive and the workers used handmade tools to tend their plants. They used a system of crop rotation to grow green leafy vegetables, cauliflower, herbs and tomatoes. The Chinese soon dominated the production and sale of fresh vegetables and fruit in New South Wales and Victoria.



State Library of Victoria/S T Gill

The Chinese established some of the first restaurants in the goldfields.



National Library of Australia (nla.obj-140626205)

Chinese market gardeners sold their fresh produce to the gold diggers.

Following the end of the gold rush, some enterprising Chinese began to open restaurants or 'cookshops' in Melbourne and Sydney. The majority of the Chinese had come from the south of China, the home of Cantonese cooking. This style of cooking is based on the freshest ingredients such as fresh vegetables, pork, fish, poultry and herbs and spices. Rice is also a key ingredient in Cantonese cooking and is an accompaniment to most dishes. In Melbourne, the Chinese community established their restaurants in Little Bourke Street and these restaurants quickly became a magnet for city workers and students.

Following World War II, the Chinese began to open cafés in other inner suburban areas, including Brunswick, Fitzroy and St Kilda. By the 1960s, Chinese cafés could be found in most Melbourne suburbs, providing new taste sensations for all Melburnians. It wasn't long before Australian parents began to cook their own version of chow mein or chop suey!

EUROPEAN IMMIGRATION POST-WORLD WAR II

Collaborative Activity

After World War II, the Australian Government embarked on a radical new immigration policy in an effort to increase Australia's relatively small population. 'Populate or perish' became the new government slogan, and between 1945 and 1952 more than 171 000 migrants arrived on Australia's shores. Many immigrants from the United Kingdom and Ireland arrived as part of the Assisted Passage Migration Scheme and were soon nicknamed 'ten pound poms'.

A vast number of immigrants also arrived from Greece, the Netherlands, West Germany and Turkey.



Fairfax Syndication/Gordon Short

Migrants arriving from Italy after World War II

Many of these immigrants went to work on Australia's largest engineering project, the Snowy Mountains Hydro-electric Scheme. This scheme was located in southern New South Wales – it began in 1949 and was completed in 1974. The Snowy Mountains Scheme is made up of 16 major dams, seven power stations and 225 kilometres of tunnels, pipelines and aqueducts.

Over 100 000 people worked on the project, 70 per cent of whom were assisted migrants who came to Australia from Europe following World War II. Migrants from over 30 countries, including Germany, Greece, Ireland, the United Kingdom, Italy, Norway, Poland and Yugoslavia, who had engineering or construction skills, were selected to work on this major project. When they arrived in Australia these migrants brought with them their own foods and food culture, which soon began to alter the way the Australian meals were prepared and presented. Mums and dads who had traditionally cooked a meal of 'meat and three veg' slowly began to use a greater variety of ingredients, including spaghetti, salami, olive oil, garlic, crusty Italian bread, Polish sausage, sauerkraut, pickled cucumbers, anchovies, olives, feta cheese and smoked meats.



Shutterstock.com/Liudmila Beliavskaia

Stuffed cabbage rolls were introduced to the Australian menu by Polish immigrants.



Rennie Ellis/Pictures Collection, State Library of Victoria

Lygon Food Store

In the 1950s and 1960s, in the wake of postwar immigration, a number of Italian cafés and food stores opened in Melbourne. Many Italian families lived in and around Carlton. Carlton became the focal point for Italian cuisine and was soon considered to be Australia's 'Little Italy'. Lygon Street became the hub of the Italian restaurant and café scene. The Lygon Food Store opened in 1951 and began importing ingredients key to Italian cuisine such as parmesan cheese and prosciutto. In 1954, the first espresso coffee machine to arrive in Melbourne was installed at Pellegrini's, in Bourke Street. Today, Pellegrini's is considered to be a Melbourne institution. Melburnians took to drinking strong Italian coffee with enthusiasm, and other Italian-style cafés opened, such as Grinders Coffee House on Lygon Street in 1962. The first pizzeria, Toto's Pizzeria, opened in 1961. Today, there are thousands of pizza restaurants throughout Australia.

THE 1956 OLYMPIC GAMES IN MELBOURNE

The 1956 Melbourne Olympic Games was another occasion when people from all over the world arrived in Australia. Athletes from 67 nations, as well as many international visitors, came to Melbourne for the two weeks of competition. In the lead-up to the games,



Alamy Stock Photo/domonabike

Pellegrini's in Bourke Street, Melbourne

the Melbourne Olympic Committee advertised for international chefs to come to Melbourne to cook for the visiting athletes. Hermann Schneider, a young Swiss chef, arrived in Melbourne to cook for the French and Belgian teams. After the games, Schneider stayed in Melbourne and opened a restaurant in South Yarra, called Two Faces. This restaurant was considered to serve some of Melbourne's finest European-style food and proved to be a turning point, as the people of Australia, and Melbourne in particular, embraced international cuisine.

VIETNAMESE 'BOAT PEOPLE'

The end of the Vietnam War in 1975 led to a wave of people, particularly those from South Vietnam, fleeing their home country. The South Vietnamese feared retribution from the North Vietnam communist leaders who now controlled the country. At the end of the war, it is estimated that more than 1 million people were sent to re-education camps and more than 65 000 Vietnamese were executed.

Many people who were desperate to leave Vietnam fled by boat, seeking asylum in other countries, mostly in neighbouring Asian countries. These people, who became known as **Vietnamese 'boat people'** spent years in refugee camps waiting to be resettled in another country such as the United States of America, Canada, Australia and New Zealand. Australia accepted approximately 137 000 Vietnamese refugees. A second wave of refugees from Cambodia, Vietnam and southern China arrived in Australia in the 1980s and 1990s, many as a result of the Vietnamese invasion of Cambodia in 1978.



Newspix/News Ltd

Vietnamese 'boat people'

Today, vibrant Vietnamese communities are centred in the Melbourne suburbs of Richmond, Footscray, Springvale, Sunshine and St Albans. In Sydney, Bankstown, Cabramatta, Canley Vale and Fairfield have significant populations of Vietnamese Australians. A large number of Vietnamese Australians also live in the Brisbane suburbs of Darra and Inala.

When the Vietnamese immigrants arrived in Sydney and Melbourne in the late 1970s and early 1980s, they found that many of the foods that they had traditionally eaten were not available here. Enterprising Vietnamese men and women quickly began to establish small import businesses, bringing in many of the ingredients essential to cooking the traditional foods of their home country.

Mini-supermarkets and fresh food markets soon sprang up in the Melbourne and Sydney suburbs that were home to many of the new Vietnamese migrants. Ingredients such as fish sauce, shrimp paste, Vietnamese dipping sauce, **nuoc cham**, rice vermicelli and cellophane noodles soon became more widely available. Traditional **Vietnamese herbs and spices**, including lemongrass, Vietnamese mint, Saigon cinnamon, bird's-eye chilli and kaffir lime leaves began to be grown locally. Fruits such as mangosteen, jackfruit, durian and star apples were also grown or imported, and members of the Vietnamese community established specialist grocery stores selling their fresh produce.

Australians quickly developed a taste for these new ingredients and the *Australian Women's Weekly* published a recipe book called *Easy Vietnamese Style Cookery* as part of its bestselling cookbook series. This enabled many more people to develop the confidence to start using the new ingredients in their own cooking.



Alamy Stock Photo/Stephen Dwyer

A Vietnamese greengrocer

Victoria Street in the Melbourne suburb of Richmond is often called 'Little Saigon'. The street is lined with many Vietnamese restaurants, greengrocers, grocery stores and butcher shops. The Footscray market in Melbourne's north boasts the largest selection of Asian produce in inner Melbourne, selling an enormous array of fruit, vegetables, meat, fish and grocery items that are integral to Vietnamese cuisine. Similarly, Springvale in Melbourne's south has a vast number of stores and markets selling Vietnamese produce to the local community, and shoppers come to the area specifically to find the Vietnamese ingredients they love. Today, the traditional ingredients of Vietnam, such as fish sauce, lemongrass and Vietnamese mint, have become commonplace and many Australians, regardless of their heritage, use them in their everyday cooking.

Vietnamese restaurants are a common sight throughout Australia and are seen as being great family restaurants because of their distinctive cuisine, with its fresh, light flavours and fragrant aromas. Dishes such as pho, broken rice, chicken salad with hot mint and fish with green mangoes are some of the dishes found in many of these restaurants.

The popularity of Vietnamese food amongst the wider community has paved the way for Vietnamese food to become a popular takeaway choice, with franchises such as Roll'd focusing their menu on traditional Vietnamese street food such as rice paper rolls, pho or noodle soup, noodle salads, Vietnamese pancakes and a dish called com tam (or broken rice).



Courtesy Roll'd, rolld.com.au

Roll'd is a chain that serves Vietnamese street food.

Activity 7.1

Luke Nguyen

Luke Nguyen, a Vietnamese-Australian chef, is the host of a popular television series – *Luke Nguyen's Vietnam*. This program has been aired on SBS Television and documents Luke's culinary journey through the country of his ancestors. Luke was born in a refugee camp in Thailand after his parents fled Vietnam following the war. His parents settled in Sydney where he grew up and later opened his award-winning restaurant, The Red Lantern.

While documenting his love of Vietnamese food, he has also produced many shows, such as *Street Food Asia* and *Railway Vietnam*, taking Australian food lovers to discover foods in places such as France, the United Kingdom and the Greater Mekong.

Luke is a great communicator, and his shows are among the most popular on SBS Food.



Getty Images/John Donegan

Luke Nguyen

View one of the episodes of *Luke Nguyen's Vietnam* and answer the following questions.

1. Summarise the information Luke gives about two of the recipes he is about to prepare.
2. What ingredients are used to prepare each of the recipes Luke cooks?
3. Does Luke use any ingredients that are common to each of the recipes?
4. List four ingredients that you are unfamiliar with. Search for the ingredients online and briefly describe each of these ingredients and its uses.
5. What cooking methods does Luke use to prepare each of the recipes?
6. What serving suggestions does Luke give for each of the recipes he prepares?
7. List two examples of Vietnamese recipes or ingredients that are now commonly used in Australian modern cooking.

Understanding the Text

Answers
Understanding the Text

1 Outline four features of the type of food eaten by the early settlers in Australia.
2 Draw a knowledge map to demonstrate the key points about the role of the Chinese in the availability and supply of food during the gold rush.
3 Explain how the Chinese community continued to influence the type of food consumed in Australia after the decline of the gold rush.
4 What impact did the migrants who arrived in Australia after World War II have on Australian cuisine?
5 Draw a simple timeline to demonstrate the spread of Italian cafés and food stores in the 1950s and 1960s.
6 Why was Hermann Schneider considered to be an influential figure in bringing international cuisine to Australia?
7 Outline the key factors that led to thousands of people fleeing Vietnam to seek refuge in Australia.
8 Prepare a table like the one below to demonstrate:
   - the strategies that members of the Vietnamese community used to access their traditional ingredients
   - the types of ingredients that were soon available for consumers to purchase.

Gaining access to Vietnamese ingredients	Types of Vietnamese ingredients

9 What role did recipe books such as those published by the *Australian Women's Weekly* play in introducing Australian cooks to the flavours of Vietnam?
10 Give three examples that show how the cuisine of Vietnam has become widely accepted by Australian consumers.

REFUGEE RESETTLEMENT IN AUSTRALIA

Since the early days of European settlement, Australia has welcomed refugees. War and the fear of persecution are the two key forces that drive people out of their home countries. Since the 1980s, thousands of people from Afghanistan, the Balkan States, the Democratic Republic of the Congo, East Timor, Eritrea, Ethiopia, Iran, Iraq, Myanmar, Pakistan, Somalia, Sri Lanka, Syria and Ukraine have sought refuge in Australia. These people have enriched the Australian community and brought their traditional food cultures and distinctive cuisines with them.

More than 7000 refugees from war-torn Afghanistan settled in Australia in the 1980s and 1990s. Today, there are close to 20 000 Afghanis living here. Afghan cuisine is influenced by the cuisines of neighbouring countries, particularly Iran, India and Mongolia. Herbs and spices such as saffron, chilli, garam masala, cardamom, cinnamon, cumin, nutmeg, coriander and mint are key ingredients in their dishes. Rice is an important ingredient served at every meal and **chalau**, a simple dish of fluffy white rice, is a staple recipe. Many Afghanis have opened up restaurants across the country, giving Australians the opportunity to sample and enjoy this delicious cuisine.



iStock.com/LindasPhotography

Chalau is usually served with vegetables or stews in Afghan cuisine.

More recently, refugees from north-west African countries, including Eritrea, Somalia and Ethiopia have settled in Australia. As earlier migrants and refugees discovered, many of the traditional ingredients used in their homelands were initially hard to find in Australia. Somali food is a spicy mix of rich flavours and uses many of the spices from neighbouring Arab countries. Rice, garlic, coriander, chilli, cumin and cloves are key ingredients in Somali cuisine.

Television cooking shows such as *Food Safari* and videos on YouTube enable viewers to develop an understanding of some of the key ingredients used in cuisines from the home countries of our newest settlers.

One of the most popular Ethiopian recipes is a thick stew called wat, served with traditional injera flat bread. Traditionally, wat is made with teff flour, an ingredient that until recently was not available in Australian supermarkets. With the growing diversity of the Australian population, ingredients such as teff are easier to find because supermarkets have become more willing to stock them.



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Ethiopian wat and injera

Influence of Greek immigration on Australian cuisine

The Greek community in Australia is thought to be one of the largest Greek communities in the world. According to the 2016 Census, there are 316 350 people of Greek descent in Australia, and about 43 per cent of these people have settled in Melbourne.

The first Greek migrants began arriving in Australia not long after the First Fleet, and a steady stream of Greeks seeking a new home has continued, particularly after World War II. Since that time, a vast array of ingredients traditionally associated with Greek cuisine has become widely available and these ingredients have influenced the food habits of the nation.

REGIONAL INFLUENCES ON GREEK CUISINE

Greece is situated in south-eastern Europe, on the southern tip of the Balkan Peninsula. It shares a land border with Albania, North Macedonia, Bulgaria and Turkey. The population of Greece is spread across the mainland and the 227 inhabited



FIGURE 7.1 Map of Greece and surrounding countries

islands that are scattered throughout the Aegean and Ionian Sea. Greece has the largest coastline in the Mediterranean.

Greece is a one of the most mountainous countries in Europe, with mountains covering about 80 per cent of the countryside. Generally, Greece has a Mediterranean climate, with mild, wet winters and hot dry summers. However, central Greece and some parts of the more mountainous regions of the Peloponnese – a peninsula off mainland Greece – can experience a more alpine climate.

These geographic and climatic conditions mean that there are some significant variations in the cuisine of northern and central Greece, the Peloponnese and the coastal areas and Greek islands.

The north of Greece is very mountainous and sheep and goats graze in the mountain pastures. Greek farmers use their milk to produce their famous feta cheese and also a hard, salty cheese called kefalotyri, which they use to make saganaki. This area also produces some of the country's best fruit and vegetables, including potatoes, eggplant, onions and beans. In northern areas of Greece and North Macedonia, the locals are renowned for their pastries and syrup-soaked cakes.

The Peloponnese, unlike many parts of Greece, has rich, fertile soil. Olive groves are spread throughout the region and this area is especially well known for producing kalamata olives. A wide range of vegetables and fruits, including tomatoes, eggplant, artichokes, potatoes, figs and lemons, is grown throughout this region.

The cuisine of the Greek islands and other coastal areas is light and fresh in flavour. The dishes of this area are based on locally caught seafood, especially sardines and octopus, and a wide range of vegetables that are stuffed and roasted.

Practical Activity 7.2

Taste-testing feta cheese

Aim: To compare the sensory properties of different types of feta cheese.



Method

1. Taste-test a range of feta cheese types, including:
   - Greek feta
   - Australian feta
   - Danish feta.
2. Focus on the properties of appearance, aroma, flavour and texture of each type of feta cheese. Record your results in a table like the one that follows.
3. Rank the varieties of feta cheese and draw a facial hedonic descriptor (see page 30).

Analysis

Describe the similarities and differences in the sensory properties of the three types of feta cheese. What could be the reasons for these?

Conclusion

Which types of feta cheese did you prefer? Justify your answer.

Results

	GREEK FETA	AUSTRALIAN FETA	DANISH FETA
Appearance			
Aroma			
Flavour			
Texture			
Ratings			
Nine-point scale 1 = dislikes very much 5 = neutral 9 = likes very much			
Facial hedonic descriptor			

TYPICAL GREEK INGREDIENTS

Feta cheese originated in Greece in about 8000 BCE. Traditionally, Greek feta was made from sheep's milk, but today goat's milk is also used to produce feta cheese. It is a crumbly cheese that has a slightly grainy texture and a tangy, salty flavour. Feta is made in large blocks, sliced into portions that are then resalted. Feta is used for making spanakopita or added to salads.



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Greek salad with feta

Greek yoghurt is renowned for its thick, creamy texture and slightly sour flavour. Traditionally, Greek yoghurt was made from sheep's or goat's milk. It is used as the basis for making **tzatziki** – a yoghurt, cucumber and garlic dip. Tzatziki is often used as an accompaniment to spicy Greek meat dishes as its slightly sour flavour helps to balance the rich flavours of the meat dish. Greek yoghurt mixed with honey is also eaten as a breakfast food, accompanied by sweet poached fruit.



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Tzatziki is made with thick Greek yoghurt.

Filo pastry is made by layering many sheets of paper-thin dough with butter. Although filo pastry is thought to have originated in Turkey, it is often associated with Greek cuisine and is used in the preparation of many traditional Greek dishes, including baklava, spanakopita and borek. Greek cooks stretch the dough using their knuckles rather than their fingertips to prevent the dough from tearing. Filo pastry has a crisp, dry texture and gives products a delicious flaky crust.



Shutterstock.com/Esengul Alici

Baklava is a traditional Greek dessert made with filo pastry.

Olives have been grown throughout Greece for thousands of years. There are many varieties of Greek olives, and they are named after their main growing region. They are an almond-shaped fruit and, depending on their variety, can be large or small, and can range in colour from black or dark purple to light green. Kalamata olives are a large, plump, deep purple olive with a smooth, meaty texture. Halkidiki olives are large green olives with a tangy flavour. Elitses olives are tiny green olives that have a sweet, fruity flavour. Olives are a characteristic ingredient



iStock.com/AnnaPustynnikova

Olives are a common ingredient in Greek cuisine.

used in Greek cuisine. Regardless of whether olives are used to make an olive paste, served as a part of a *mezze* platter or used to make olive bread, they add to the distinctive flavour of Greek food. Olive oil is also used to preserve a wide range of foods, including cheese, roasted peppers and dried tomatoes.

Olive oil is an essential ingredient in Greek cuisine. It can vary in flavour depending on the type of olives from which it is extracted and the ripeness of the olives when they are picked. Olive oil that is made from early-picked fruit has a strong, peppery flavour, while that from a late-picked crop has a soft, smooth, fragrant aroma and flavour. Extra virgin olive oil is made by simply pressing the olives and is considered to be the premium type of oil. Olive oil can be used to sauté vegetables, or to brush over lamb before it is roasted or grilled, or Greeks simply tear off a piece of their crusty bread and dip it into the oil.



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Greek cooks prefer to use olive oil in their cooking.

Lemons were introduced to Greece during the 1st century CE. Today, lemons are used in an endless array of Greek dishes, but are most widely known as a key ingredient in avgolemono, a lemon and egg soup, and in ladolemono, a dressing based on lemon juice used to flavour grilled fish. Preserved lemons are often used in Greek cuisine to add a zesty flavour to meat dishes, salads or as a stuffing for vegetables. Lemon gives dishes an intense, acidic, citrus flavour.



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Preserved lemons give an intense citrus flavour to dishes.

Fruit and vegetables are the basis of most Greek meals. One of the most popular methods of cooking vegetables in Greece is to stuff them. Tomatoes, zucchini, capsicum and eggplant are filled with rice and diced vegetables and baked in a tomato-based sauce. In the northern part of the country where meat is more widely used, the vegetables may be stuffed with minced lamb along with rice and other flavourings. Stuffing and baking the vegetables gives them a beautifully soft, melt-in-the-mouth texture and a rich flavour and aroma.



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Stuffed vegetables are a popular Greek meal.

Fish and meat are also key features of Greek cuisine. Around the coastal areas, fish and seafood dishes are commonly served. Fish may be simply grilled and served with a fresh salad or baked on a bed of vegetables. Squid, octopus and sardines are often cooked quickly over a barbecue. Lamb is the meat most commonly used in Greek cuisine. It is often spit-roasted or made into a stew, with a wide variety of vegetables and herbs. One of the most well-recognised Greek lamb dishes is moussaka – a dish made from minced lamb that is layered with eggplant and topped with a rich cheese sauce.

Flavourings such as garlic, onion and herbs, including oregano, parsley, celery leaves and mint, are commonly used to flavour Greek foods. These flavouring ingredients add a richness and complexity of flavour to dishes. Orange flower oil is used in delicate sweet dishes and cakes. Masticha is used as a spice in sweet foods, such as chocolates, or for

flavouring yoghurt or cream. It can also add flavour to savoury dishes, especially those that are based on lemon or tomato flavours. Masticha is a resin produced from the mastic tree that grows on the Greek island of Chios and is a prized ingredient of Greek cuisine. One of the most common uses of masticha is in the production of a Greek liqueur. When preparing the sticky masticha resin, Greek cooks use a mortar and pestle and grind it, adding a little sugar or salt to prevent it from sticking.

Practical Activity 7.3

Taste-testing olives

Aim: To compare the sensory properties of different types of olives.

Method

1. Select a variety of different olives for this activity, such as:
   - Kalamata olives – deep purple olives
   - Halkidiki – green olives
   - Liguria – small green to purple olives
   - elitses – small green olives
   - black olives.
2. Work in small teams to complete this activity: each team member prepares one quantity of the recipe for warm garlic and chilli olives provided, using a different type of olive.
3. Taste-test each of the olive dishes your team has made. Focus on the properties of appearance, aroma, flavour and texture of each type of olive. Record your results in a table like the one below. Remember to write your ranking of the varieties of olives (1 = most liked, 4 = least liked).



Analysis

1. Describe the similarities and differences in the sensory properties of the types of olives. Refer to the information about olives in this chapter to inform your discussion.
2. Explain your reasons for the ranking you have given to each of the olives – focus your discussion on the sensory properties of each of the olive varieties.

Conclusion

Which of the types of olives did you prefer? Justify your answer.

WARM GARLIC AND CHILLI OLIVES

2 teaspoons olive oil
1 clove garlic, crushed
small red chilli, finely diced
⅓ cup olives
1 teaspoon fresh oregano, finely chopped

METHOD

1. Place the oil in a small frying pan and warm over a medium heat.
2. Add the garlic and chilli and cook for two minutes until the garlic is translucent and the chilli is soft and fragrant.
3. Add the olives and oregano and toss over the heat until just warm.

Results

	OLIVE TYPE	OLIVE TYPE	OLIVE TYPE	OLIVE TYPE
Appearance				
Aroma				
Flavour				
Texture				
Rank 1–4				

TYPICAL GREEK MEALS

Greece is renowned for producing a variety of dips such as taramasalata, made from fish roe, and tzatziki. Dips are served with fresh crusty bread as part of an appetiser platter. Saganaki (a fried cheese), dolmades (traditional stuffed vine leaves) and tyropitakia (cheese triangles made with filo pastry) or **spanakopita** might also be served as an appetiser or first course. Soups including avgolemono and a bean or lentil soup are also traditionally served in Greek households. Main course dishes might include moussaka, baked or fried fish, souvlaki, stuffed vegetables and fresh salads. Greek desserts are rich and sweet and often coated in syrup. Filo pastry is often used to make sweet treats such as baklava, galaktoboureko, loukomades and kourabiethes.



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Galaktoboureko is made with filo pastry.

METHODS OF PREPARING AND SERVING GREEK FOOD

Greek cooks use a wide range of cooking methods to prepare their delicious food. Meat dishes such as lamb might be slow roasted in the oven so that the meat melts in the mouth. However, Greeks also cook their meat, especially lamb and baby goat, over coals or on a spit.

Vegetables, including potatoes and stuffed vegetables, are often baked or roasted in olive oil. Foods such as meatballs, zucchini or eggplant may be shallow-fried in oil to enrich their flavour. Other dishes, such as moussaka, are covered with a thick béchamel sauce and then slowly baked.

Greek meals are an opportunity to talk and share food with family and friends. Lunch is often seen as the main meal of the day and may not be eaten until about 2 p.m. It might consist of a number of courses, including appetisers, soups and a main course. Like many of their European neighbours, Greeks traditionally have a late evening meal, often around 10 p.m. Dinners are a shared event and a variety of dishes are placed on the table for everyone to help themselves.

As dinner is often served late, many Greeks have a snack in the late afternoon when small portions of food called *mezze* are served. A *mezze* platter normally consists of dips, such as taramasalata and tzatziki, served with Greek bread, olive oil and olives. Fresh vegetables or dolmades and a variety of cheeses may also be included.

GREEK CUSTOMS AND CELEBRATION

The vast majority of the Greek population is Greek Orthodox; therefore, celebrations are based on the festivals of the Church. Fasting is a key part of many of the religious festivals and, during these times, meat and fish, and sometimes oil, are not permitted.

Easter

Easter is the most important festival in Greece and Easter Sunday is a day of great celebration. A lavish meal is prepared to celebrate the end of the fasting period of Lent and roasted lamb is often central to



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Tsoureki, traditional Greek Easter bread

this meal. A lamb or baby goat might be spit-roasted over hot coals and served alongside platters of roasted and stuffed vegetables, salads, seafood, rice dishes and an array of different cheeses. Families spend days preparing **koulourakia**, twisted butter biscuits, and tsoureki, the traditional Greek Easter bread, studded with dyed, hard-boiled eggs.

One of the features of Greek Easter celebrations is a game played by family members in which they challenge each other to crack their red-dyed, hard-boiled eggs. The winner is the one whose egg outlasts the others; it is believed that they will enjoy good luck for the forthcoming year.

Christmas

Christmas celebrations are a little more subdued than those of Easter. Fish is usually eaten on Christmas Eve, while on Christmas Day, celebrations revolve around a meat dish such as roast pork, or a chicken or turkey stuffed with rice and raisins. A soup, usually avgolemono, feta, olives, tzatziki, vegetable dishes and salads are all traditional foods served at a Christmas feast. Sweet treats such as **loukomades**, delicate, golden balls of deep-fried dough drizzled with honey and cinnamon, and kourabiethes, a butter biscuit, also adorn the Christmas table.



iStock.com/ALLEKO

Loukomades are a traditional Greek dessert.

Understanding the Text

Answers
Understanding the Text

Chapter Test
Chapter review

11 Draw a knowledge map to demonstrate the way more recent refugee communities have had an impact on the food of Australia since the 1980s.

12 Draw a rough map of Greece and annotate it to show how its geography and climate have influenced traditional Greek food.

13 What is feta and how is it commonly used in Greek cuisine?

14 How do Greek cooks prepare filo pastry so that it does not break? List three common uses of filo pastry in Greek cooking.

15 Describe the difference in the characteristics of early- and late-picked olive oil.

16 Create a table like the one below to summarise key information about the fruit and vegetables, fish and meat and flavourings popular in Greek cuisine.

Fruit and vegetables	Fish and meat	Flavourings

17 Prepare a summary table of the foods eaten at typical Greek meals. List the information under the following headings:

- Appetisers
- Main course dishes
- Desserts.

18 Outline some of the main characteristics of Greek meal times.

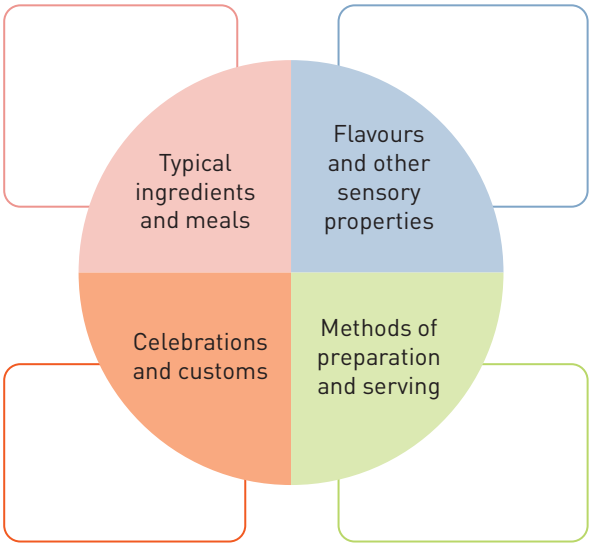
19 Describe the main foods eaten during a Greek Easter celebration.

20 List some of the main foods that a family would traditionally serve at Christmas in Greece.

THINKING SKILLS

Prepare a diagram like the one to the right to identify the following characteristics of Greek cuisine:

- typical ingredients and meals
- flavours and other sensory properties
- methods of preparation and serving
- celebrations and customs.



Chicken wonton soup

Wontons are Chinese bite-sized dumplings similar to Italian ravioli or tortellini. The dumplings are paper-thin pillows of dough filled with a mixture of minced meat, seafood and/or vegetables. The final shape of the wontons can vary depending on the method of folding the wrappers or skins. Wontons can be boiled, steamed or fried and are served as a snack with a dipping sauce or in a flavoured broth as soup.

SOUP

1 litre chicken stock

1 tablespoon Shaoxing wine (Chinese cooking wine)

1 teaspoon soy sauce

2 centimetres ginger, peeled and thinly sliced

½ head choy sum, leaves separated and washed

½ teaspoon sesame oil

CHICKEN WONTONS

200 grams chicken mince

½ teaspoon ginger, finely grated

½ carrot, grated

2 teaspoons vegetable oil

½ teaspoon sesame oil

¼ teaspoon white pepper

¼ teaspoon salt

16–20 wonton wrappers

TO SERVE

2 spring onions, white and green parts, thinly sliced

½ cup coriander leaves

½ long red chilli, cut into thin rounds

METHOD

Making the soup

1 Place the chicken stock, Shaoxing wine, soy sauce and sliced ginger in a medium saucepan.
2 Bring to the boil and simmer for 2 minutes. Remove from heat, cover with a lid and set aside.

Making the chicken wontons

1 Combine the chicken mince, grated ginger, grated carrot, vegetable oil, sesame oil, white pepper and salt in a medium mixing bowl and stir well to combine.
2 Cover the wrappers with a clean, damp tea towel to prevent them from drying out and so that they remain soft and pliable.
3 Place one teaspoon of the filling in the centre of a wonton wrapper. Place a dab of water in the centre of one of the long sides of the wonton wrapper.
4 Fold the wrapper in half to create a rectangle and use your thumb and forefinger to press the sides firmly together to seal.
5 Hold the bottom corners of the rectangle (the filling side, not the seam side) and dab one of the corners with a little water.
6 Fold the top of the seam side over towards the filling.
7 Bring the two corners together and squeeze to seal.
8 Place the wonton on a lightly floured bench and repeat the process.

Cooking the wontons and serving the soup

1 Fill a large saucepan with water and bring to the boil. Add the choy sum leaves and cook for 3 minutes or until just wilted.
2 Use tongs or a slotted spoon to lift the leaves out and place in two serving bowls.
3 In the same water, cook the wontons in batches for 4 minutes. Stir them gently for the first 30 seconds to ensure that they don't stick together. Lift out with a slotted spoon and divide between the serving bowls.
4 Add the sesame oil to the hot soup and pour into the serving bowls.
5 Top each bowl with spring onions, coriander leaves and red chilli.

SERVES 2

EVALUATION

1 Describe the sensory properties of the chicken wonton soup – appearance, aroma, flavour and texture – using descriptive language.
2 Explain why the wonton wrappers should be covered during the production process.
3 Describe how the properties of the wonton wrappers change during cooking. Name this process.
4 Describe how the properties of the wonton filling change during cooking. Name this process.
5 Make a list of other vegetables that could be added to the wonton soup to improve its nutritional value.



Mark Fergus Photography

Moroccan carrot and orange salad with harissa dressing

This salad is very vibrant in both colour and flavour. Harissa is traditionally associated with the cuisines of North Africa and Tunisia. It gives a wonderful spicy flavour to the dressing and provides the perfect balance to the sweet flavour of the carrots and orange. You can increase the heat or zing of the harissa by adding more chilli if you prefer it spicy!

Try experimenting with different citrus fruit in this recipe – swap the blood oranges for ruby grapefruit, red navel oranges, cara cara oranges or tangelos depending on the variety of citrus fruit in season. Caramelised walnuts or pecans give the salad extra crunch. This salad is a very versatile dish and is ideal to serve on its own as a light meal or as part of a shared table.

HARISSA

1 red capsicum, cut in half, seeds removed

olive oil spray

½ teaspoon coriander seeds

½ teaspoon cumin seeds

½ teaspoon caraway seeds

1 tablespoon olive oil

½ red onion, finely diced

3 cloves garlic, crushed

½ long red chilli, deseeded and finely diced

2 teaspoons tomato paste

1 tablespoon lemon juice

½ teaspoon salt

SALAD

4 medium carrots

2 teaspoons olive oil

1 orange,

1 blood orange or cara cara orange

1 cup rocket

CARAMELISED WALNUTS

2 tablespoons raw caster sugar

2 tablespoons water

40 grams (⅓ cup) walnuts

METHOD

Making the harissa

1. Preheat the oven to 200 °C.
2. Cover a small tray with baking paper. Place the red capsicum on the covered tray and spray with olive oil spray.
3. Roast the capsicum in the preheated oven for approximately 20–25 minutes or until the skin is charred and the capsicum is soft. Remove from the oven, cover with plastic wrap and allow to cool. When cool enough to handle, carefully remove the peel from the capsicum. Cut into large pieces.
4. Place coriander, cumin, and caraway seeds in a dry frying pan and toast over a medium heat for 2 minutes until aromatic. Grind the spices in a mortar and pestle to a fine powder.
5. Heat one tablespoon olive oil in a frying pan over medium heat, and sauté the onion, garlic and finely diced chilli for 10 to 12 minutes, until soft and caramel in colour.
6. Place the roasted capsicum, ground spices and sautéed onion, garlic and chilli mixture, tomato paste, lemon juice and salt in a small food processor and pulse to a smooth paste.
7. Store the harissa in a sterilised jar in the fridge if you are not using it immediately.

Caramelising the walnuts

1. Reduce the oven temperature to 160 °C. Line a small baking tray with baking paper.
2. Combine the raw caster sugar and water in a small saucepan and stir over a moderate heat until the sugar has dissolved.
3. Remove the sugar syrup from heat, add the nuts and allow to stand for 5 minutes.
4. Drain the nuts and place on the baking tray. Bake in the preheated oven for 15 minutes. Remove from the oven and leave to cool before using.

Preparing the salad

1 Cover a small tray with baking paper.
2 Slice 3 of the carrots into 2-centimetre-thick slices. Place the sliced carrots on the covered tray and spray with olive oil spray. Roast in the oven at 200 °C for approximately 20–25 minutes or until the carrots are browned.
3 Meanwhile, use a julienne peeler to slice the remaining carrot into fine julienne strips.
4 Peel and segment the oranges over a bowl, saving as much of the juice as possible. Set the juice aside for use in the dressing.
5 To make the dressing, place 2 tablespoons of harissa in a small bowl and mix to a smooth dressing with 2 tablespoons of reserved orange juice.

TO SERVE

1 Place the roasted carrot pieces and julienned carrot in a serving bowl. Add the rocket and harissa dressing and toss through the roasted and julienned carrots.
2 Add the segmented oranges and gently toss through the salad. Garnish with caramelised walnuts if using.

Note:

- If time is short, use ground coriander and cumin instead of whole seeds.
- The caramelised walnuts will keep in an airtight container for several months.

EVALUATION

1 Describe the sensory properties of Moroccan carrot and orange salad with harissa dressing – appearance, aroma, flavour and texture.
2 What is harissa? Explain how it reflects the cuisines of North Africa and Tunisia.
3 Explain why the spices are heated in a dry frying pan before being ground into a powder?
4 How could the carrots be julienned if a julienne peeler is not available?
5 Outline some hints to ensure the oranges are segmented successfully for this recipe.



Mark Fergus Photography

Semolina gnocchi with roasted tomato sauce

Gnocchi is a classic traditional Italian recipe. In this recipe semolina replaces the traditional potato as the main starch ingredient. The semolina produces a slightly firmer texture in the gnocchi and a golden-brown crust during baking. Roma tomatoes have a low moisture content. Roasting the tomatoes before making the sauce concentrates the flavour and produces a much richer colour. This dish can also be served as an alternative to mashed potato as an accompaniment to a meat dish.

ROASTED TOMATO SAUCE

3 ripe Roma tomatoes
1 tablespoon olive oil
pinch of dried basil or oregano
1 clove garlic, finely chopped
salt and pepper

SEMOLINA GNOCCHI

1⅓ cups milk
⅓ cup semolina
salt
⅓ cup parmesan cheese
1 egg yolk
10 grams butter

METHOD

Roasted tomato sauce

1 Preheat oven to 200 °C.
2 Cut the tomatoes in half lengthwise and place them on a baking dish in a single layer, cut side up.
3 Drizzle the tomatoes with olive oil. Sprinkle with dried herbs, garlic and salt and pepper.
4 Bake at 200 °C for 20 minutes. Remove from the oven and set aside.
5 When cool, slip the skins off the tomatoes. Purée with the garlic, and season with salt and pepper. Thin this mixture with a little hot water if necessary.

Semolina gnocchi

1 Pour the milk into a saucepan and bring almost to the boil. Lower the heat and add the semolina in a slow trickle, stirring constantly with a wooden spoon.
2 Cook for 8–10 minutes over low heat, stirring constantly until it is thick and creamy.
3 Remove from the heat and add a pinch of salt and half the parmesan cheese.
4 Beat in the egg yolk and half the butter.
5 Moisten a tray with a little water and spread out the cooked semolina about 1 centimetre thick, using a wet spatula. Refrigerate to cool.
6 Cut the cooled semolina into rounds with a 5-centimetre cutter, dipped in water to stop it from sticking.
7 Place the rounds of semolina in a greased ovenproof container approximately 15 × 20 centimetres in size, in a single layer, overlapping slightly. Fill in the gaps with the offcuts.
8 Increase the oven temperature to 220 °C.
9 Dot the rounds of semolina with the remaining butter and sprinkle with the remaining parmesan cheese.
10 Bake the gnocchi for 10–15 minutes or until it forms a crisp, golden crust.
11 Serve with the tomato sauce.

SERVES 2

EVALUATION

1 Describe the sensory properties of the semolina gnocchi with roasted tomato sauce – appearance, aroma, flavour and texture.
2 Why is it important to add the semolina in a small trickle when adding it to the hot milk and then to stir constantly?
3 How does the process of roasting change the sensory properties of the tomatoes?
4 Discuss your performance in terms of:
   - cooking the semolina
   - cutting the gnocchi
   - making the tomato sauce.
5 Explain why the semolina gnocchi with roasted tomato sauce would be a healthy meal for vegetarians. Justify your answer by referring to the Australian Guide to Healthy Eating.



Mark Fergus Photography

Sweet potato parathas

Parathas are Indian flat breads made with wholewheat flour and clarified butter or ghee. The paratha can be shaped into rounds, squares or triangles. They are often filled with a spicy vegetable filling and served with yoghurt.

DOUGH

½ cup wholemeal bread flour

½ cup white bread flour

¼ teaspoon salt

2 teaspoons ghee

cold water for mixing the dough

FILLING

100 grams sweet potato

1 potato

1 teaspoon oil

½ teaspoon cumin seeds

½ teaspoon black mustard seeds

¼ teaspoon salt

oil for frying

METHOD

Making the dough

1. To make the dough, sift both flours and salt into a large bowl.
2. Make a well in the centre of the dough, add the ghee and gradually mix in enough cold water to make a soft dough.
3. Turn the dough out onto a floured bench and knead for approximately 5 minutes or until smooth and elastic.
4. Cover with cling wrap and rest on bench for 30 minutes.

Making the filling

1. Peel the sweet potato and potato and cut into 2.5-centimetre pieces.
2. Place in a small saucepan and just cover the diced potatoes with cold water. Cover and bring to the boil. Simmer until the vegetables are tender then drain. Mash the sweet potato and potato together.
3. In a separate saucepan, combine the oil, cumin, mustard seeds and salt, and cook until the seeds begin to pop. Add to the mashed potato.

Making and cooking the parathas

1. To make the parathas, divide the dough into eight pieces, then roll each piece on a floured bench into a round paratha of 14 centimetres. Keep each paratha separate and cover with a clean tea towel to prevent the dough drying out.
2. Divide the filling into four portions and spread over the four parathas, leaving a 1-centimetre border on each. Brush the border with water and top each one with the remaining paratha. Press the edges together to seal.
3. In a large frying pan, heat 2 tablespoons of oil. When hot, cook one filled paratha at a time. Both sides should be golden brown. Drain on paper towel and keep warm in the oven until serving.

MAKES 4 LARGE PARATHAS

EVALUATION

1 Describe the sensory properties of the sweet potato parathas – appearance, aroma, flavour and texture.
2 What is ghee and why is it used in this recipe?
3 Explain why it is important to knead the paratha dough for 5 minutes. How will this affect the sensory properties of the parathas?
4 Why is the dough rested for 30 minutes before being rolled out?
5 Suggest two modifications you could make to the filling of the parathas if you were to make them again.



Mark Fergus Photography

FOOD TRENDS DRIVEN BY CHANGING SOCIAL BEHAVIOURS



8

FOOD IN CONTEMPORARY AUSTRALIA

KEY TERMS

contemporary food the present period of time; a term often used to describe current food practices in Australia

functional foods foods that provide a health benefit beyond basic nutrition

fusion foods foods that are a combination of different cultural cuisines in a single eating experience

Gen Z people born between 1995 and 2021

organic food system a food production system that produces food without the use of pesticides, herbicides or chemical fertilisers

subculture a group of people who have a view that is different to that held by the majority of the community

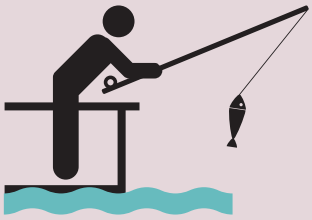
Resources
Study Design links
Infographics
Flashcards

FOOD SUBCULTURES IN CONTEMPORARY AUSTRALIA

ORGANIC FOOD MOVEMENT



SUSTAINABLE FOOD AND SLOW FOOD MOVEMENTS



YOUTH FOOD MOVEMENT



GROW FREE MOVEMENT



Food trends and changing social behaviour

Collaborative Activity

Food producers and restaurateurs constantly ponder the question 'What's hot and what's not?' Their businesses depend on keeping up with the latest ideas and consumer demands. For three or four years, macarons and cupcakes were the latest food fashion product demanded by consumers, but these are now 'so yesterday!' Food trends post the COVID-19 pandemic point to consumers' desire for better health, and many people have followed the trend of purchasing or making their own cultured foods such as kombucha and kimchi. Comfort foods such as teacakes and cinnamon scrolls like nana used to make have also had a resurgence in popularity. The humble potato and hamburger have taken on a gourmet status in restaurants and online cooking classes. Many consumers who are concerned about the health of the planet are being active food citizens and making environmentally sustainable food choices.

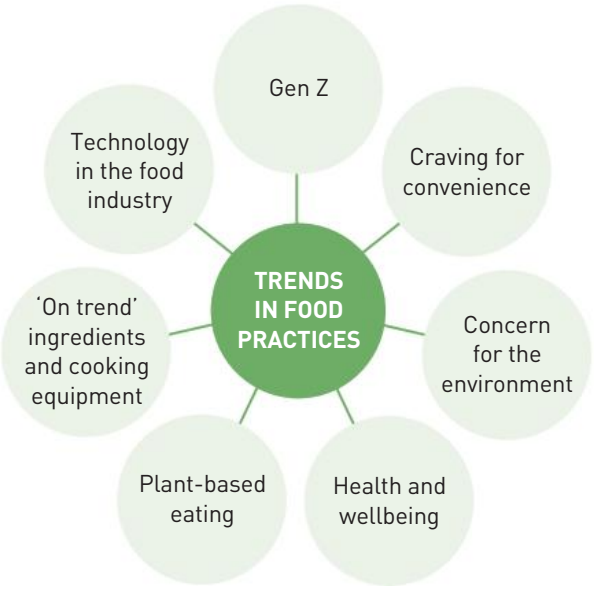


FIGURE 8.1 Trends in food practices

GEN Z

People who were born between 1995 and 2001 make up a generation known as **Gen Z**. It is the largest generation ever in Australia, comprising around 20 per cent of the population. People of this generation are the first to be fully connected through digital devices and engaged through social media.

Food is an important part of the social scene for this generation, and snacking takes centre stage. Rather than sitting down for lunch and dinner, the younger generation prefers to eat small meals or snacks throughout the day. They are fascinated by global food trends and choose dishes that challenge 'traditional' dishes in flavour, combination of ingredients and textual complexity.

People that make up Gen Z are becoming positive food citizens as they are motivated by the 'greater good'. They are concerned about climate change and moving towards sustainability of the food supply, mindful eating, waste reduction and eco packaging.

Gen Z's food preferences are a reflection of their lifestyle:

- They prefer natural, organic and sustainable foods.
- Snacking is the preferred way of eating.
- They prefer food that is 'grab and go' and suitable to eat on the couch or easily transportable.
- Chicken is their preferred type of protein.
- Hamburgers made with quality ingredients are high on their preferred list.
- They use their phones constantly, even at the table, to photograph and respond to their food experiences.



Shutterstock.com/FoodAndPhoto

Hamburgers are a popular Gen Z food.

CRAVING FOR CONVENIENCE

Convenience is a key driver in the creation of many new Australian food products. Meal components that are pre-prepared and simply need to be pan-fried or reheated are becoming increasingly popular as consumers struggle to balance their work life, family commitments and finding time for leisure activities. Time for shopping may be limited and consumers may need to take the quickest and easiest method of getting a meal on the table for the family. In the past, this situation may have led to the purchase of less healthy fast food, but now there are many convenient, healthy, high-quality meal options.

Preprepared meals and ingredients

Collaborative Activity

Supermarkets now stock an array of fresh, ready-to-heat products in the chill cabinet of their deli department. The number of frozen meals in the freezer section of the supermarket is also expanding to meet consumer demand. These ready-to-eat chilled and frozen meals need no food preparation and can be prepared in just a few minutes, requiring just one or two simple steps such as heating. According to the data analytics and market research company IRI (Information Resources, Inc.), the pre-made meal category is now worth $275 million in supermarkets, an increase of 11 per cent from 2016–2018.



Mark Fergus Photography

Pre-made, ready-to-heat products are convenient meal options.

The desire for convenience has also led to the availability of a wide range of preprepared vegetables and salad ingredients. These products have become increasingly popular with consumers as the cook does not have to spend time peeling and chopping the potatoes, carrots or pumpkin, and can simply add them to the roasting pan with a splash of oil. Many salad mixes even include the dressing or herbs, so all the cook has to do is toss them together and serve!



Getty Images/gerenme

Portioned and pre-cut vegetables make meal preparation simple.

Home-delivered meal kits

One convenient meal option that has seen an upsurge in popularity is the home-delivered meal kit. Companies such as HelloFresh, Marley Spoon and Dinnerly deliver a box or bag of food that contains all the components necessary to cook a family dinner. All the ingredients are supplied, together with an easy-to-follow recipe card and the promise that the cook can have a meal on the table in less than 30 minutes! These meals are popular as the cook has the satisfaction of having prepared a home-cooked meal from fresh, seasonal ingredients, but without the hassle of having to spend time shopping or preparing some of the key components of the meal.



Shutterstock.com/Daria Nipot

Home-delivered meal kits are increasing in popularity.

Online meal delivery services

Technology has transformed the way takeaway food is ordered and now a wide variety of meals are available at any time of the day or night. According to information presented by data analytics and market research company IRI, most Australians now buy takeaway food at least once a week, with the average household spending almost $1600 per year on this service.

Research shows that the reason Australians are opting for ready-to-eat takeaway meal delivery is that, despite the cost, it is very convenient, saving a significant amount of meal preparation time and there is no washing up. The most popular meal delivery options amongst Australian consumers are Asian cuisine and healthy options such as poke bowls and sushi.

CONCERN FOR THE ENVIRONMENT

Consumers are now becoming 'conscious consumers' and want transparency in order to know where their food comes from and if it has been farmed or produced ethically and sustainably. When they eat in a restaurant, many consumers want to be reassured that the products they are eating are responsibly sourced, preferably locally, and that the restaurant is taking steps to minimise their environmental footprint. That is, they are becoming responsible food citizens.

The threat of climate change and the impact of agricultural production on the environment are leading more consumers to seek products that have a minimal environmental impact or that are produced using more humane methods. Foods such as cage-free eggs, free-range poultry and pork are now the preferred-choice of many Australians. Consumers are more likely to check the product labels to make sure that the product does not contain palm oil, for example, as this product is closely linked to the destruction of many of the world's rainforests. Similarly, shoppers are now able to check whether the canned tuna they are about to purchase is sourced from an endangered species or caught using methods that might harm dolphin populations.



Shutterstock.com/hairreena

Free-range eggs are now the choice of many consumers.

Australians are looking to purchase local products as they connect more closely with their local communities. Locally sourced food has become more important than ever as transporting food increases the amount of carbon dioxide released into the atmosphere. Locally sourced food is an important trend as it also ensures seasonality and freshness.

Consumers are also increasingly wanting to shop in supermarkets that are committed to reducing food waste and plastic packaging. They are already bringing their own bags to the supermarket, but other 'zero waste' practices are emerging, such as compostable produce bags.



Shutterstock.com/AYA images

Many consumers are seeking out locally sourced produce.

HEALTH AND WELLBEING

Most Australians are now living longer, and many expect food to play an important role in their health and wellbeing. **Functional foods**, which are foods that provide a health benefit beyond basic nutrition – for example, by adding omega-3 to a food that does not normally contain this nutrient, or by decreasing the fat content of a traditional food such as milk – are growing in popularity. Issues such as the growing levels of obesity in the community have a huge impact on the health of the nation. The COVID-19 pandemic has highlighted consumers' desire for a healthy body and heightened immunity. This has led to a trend of consumers seeking products that contain 'good-for-you' ingredients. There is also a desire by consumers to 'eat clean' and choose food products that are less processed and closer to their natural state because there is a belief that these foods will provide 'instant, feel-good cures' for health issues.

The term 'nutrient dense' is becoming an important term for health-conscious consumers. This term will indicate foods that have a high nutritional value; that is, are high in protein, dietary fibre, vitamins and minerals, and low in kilojoules. These are foods that follow the recommendations of the Australian Dietary Guidelines.



Mark Fergus Photography

'Free from' products are becoming increasingly popular with consumers.



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Fermented beverages such as Kombucha improve gut health.

The 'free from' trend is also on the rise, with the exclusion of dairy, gluten and sugar as 'no go' ingredients. Many consumers are attempting to eat less cane sugar, so they are sweetening their foods with natural sweeteners such as maple syrup, agave syrup, stevia and coconut palm sugar. Even though these natural sweeteners contain sugar, they are perceived as healthier than 'added sugar'.

The rise in gluten-free products, for example, has come about in part because many consumers feel these products are healthier and include wholesome ingredients, even though the consumer may not be gluten intolerant. This has led to an explosion of gluten-free flours such as those from legumes, ancient grains, teff and nuts which are used as a substitute for wheat flour. As a consequence, the gluten-free section of the supermarket has increased considerably as consumer demand has grown.

Fermented foods such as kimchi, kombucha and kefir have also become very popular in Australia. These fermented foods are good for gut health as they add probiotic bacteria to intestinal flora, increasing the health of the gut microbiome and digestive system, and enhancing the immune system and improving mental health.

PLANT-BASED FOODS

One of the biggest growing food trends is plant-based eating. Vegans and vegetarians eating in restaurants are no longer served a limp green salad or a mushroom risotto but are now offered a wide range of interesting and flavoursome plant-based meals. New meat- and dairy-free products range from lasagne, yoghurt, shredded cheese and schnitzels. Plant-based meat products are being marketed to traditional meat eaters and not just to vegans and vegetarians, and are available next to the meat cabinet in the supermarkets.

Thomas King, CEO of Food Frontier, told *Choice magazine* 'Australian supermarkets now offer more than 250 plant-based meat alternative products.' He also stated that 'The number of new products in supermarkets like meat-free burgers, sausages and ready meals, also doubled in that time [2019–2020], with the category seeing 46 per cent sales growth in retail.'

The plant-based revolution has led to companies producing more products that are plant based and suitable for vegans.

Practical Activity 8.1

Comparing beef burgers and plant-based burgers

Many Australians are trying to reduce the amount of meat they consume by, for example, opting for meat-free Mondays or substituting meat in their diet with an appealing plant-based alternative.

Aim: To compare the sensory, chemical and nutritional properties of beef burgers and plant-based burgers.

Materials

- A packet of preprepared beef burgers
- Varieties of plant-based alternative burgers, such as the Beyond Meat Burger, Naturli' plant-based burgers, Quorn burgers or V2 burgers

Method

Work in groups of three to complete this activity.

1. Examine the ingredient list and nutrition panel from the packaging of each of the burgers and record the information in a table like the one below.
2. Cook the burgers according to the instructions on the packet.
3. Complete a sensory analysis and record your results.

Analysis

1. Identify the major protein source used in each of these burgers.
2. Did the plant-based burgers contain ingredients you did not recognise? Undertake a web-based search to identify the purpose of including four of these ingredients in the burger.
3. Were you surprised by the number and variety of additives used in the plant-based burgers? Why or why not?
4. Explain which burger you would recommend to someone wanting to reduce the amount of fat in their diet.
5. Explain which burger you would recommend for someone wanting a plant-based alternative to a meat burger. Justify your decision.
6. Using the data from the nutritional panels, which burger would you suggest to include as a part of a healthy eating plan? Explain the reasons for your choice.
7. Based on your sensory analysis, which burger did you find most enjoyable? Explain your answer.
8. Discuss any similarities or differences between the beef burger and the plant-based varieties.

Worksheet

Conclusion

Based on your sensory, chemical and nutritional analysis, which product would you recommend to someone wanting to consume a preprepared burger? Justify your response.

Results

	BEEF BURGER	PLANT-BASED BURGER 1	PLANT-BASED BURGER 2
Main ingredients used			
Energy per 100 grams			
Protein per 100 grams			
Total fat per 100 grams			
Saturated fat per 100 grams			
Carbohydrate per 100 grams			
Sugars per 100 grams			
Dietary fibre per 100 grams			
Sodium per 100 grams			

	BEEF BURGER	PLANT-BASED BURGER 1	PLANT-BASED BURGER 2
Appearance			
Aroma			
Flavour			
Texture			



iStock.com/Sundry Photography

A wide range of plant-based alternatives are now available in supermarkets.

Plant-based milk and cheese

Plant-based milk and cheese are also becoming increasingly popular with consumers. Oat, rice, soy, coconut and almond milk are some of the popular non-dairy milk alternatives now available. Plant-based cheddar, mozzarella and parmesan cheese are also appearing on supermarket shelves. The growing ethical, environmental and health concerns of consumers have dramatically increased the demand for these dairy-free products. People have long been attracted to the health benefits of plant-based milks, but a growing number of socially conscious consumers are now seeking food and drinks with stronger environmental credentials. Steve Beams, General Manager – Sales at Sanitarium, says: 'the reason people are increasingly turning to plant milks is two-fold. Firstly, people view plant-based milks as being better for them but they also view them as being better for the environment.'



Shutterstock.com/flydaniel

Plant-based milks are becoming popular with coffee drinkers.

Practical Activity 8.2

Comparing dairy tasty cheese and vegan tasty cheese

Aim: To compare sensory properties of dairy tasty cheese and vegan tasty cheese.

Materials

- Shredded dairy-based tasty cheese
- Shredded vegan tasty cheese
- Bread for toasting

Method

1. Complete a taste test of the uncooked dairy-based tasty cheese and the vegan tasty cheese. Record the results in a table like the one below.
2. Toast two pieces of bread. Top each slice of toast with one of the two different cheeses. Try to spread the cheese as evenly as possible.
3. Preheat a grill and cook the cheese on toast until golden brown. Note the time it takes each type of cheese to melt and brown.
4. Complete a taste test of the grilled cheese on toast. Record the results in a table like the one below.
5. Complete a preference test using a nine-point scale and drawing an appropriate facial hedonic descriptor (see page 30).

Worksheet

Results

QUALITATIVE RESULTS OF CHEDDAR CHEESE		
	Dairy-based tasty cheese 	Vegan tasty cheese 
Sensory descriptors – uncooked cheese		
Appearance		
Aroma		
Flavour		
Texture		
Sensory descriptors – grilled cheese on toast		
Appearance		
Aroma		
Flavour		
Melting properties of the cheese		
Time taken to brown		
Overall rating of the cheeses		
1 = dislikes very much 5 = neutral 9 = likes very much		
Facial hedonic descriptor		

Mark Fergus Photography

Analysis

1. Cheese is traditionally a dairy-based product. Outline why food manufacturers have developed a vegan cheese.
2. Describe the similarities and differences in the sensory properties of the two types of uncooked cheese.
3. Describe the similarities and differences you noticed in the sensory properties of the cooked cheese.
4. Examine the ingredient list on the label of each cheese. List the ingredients that are used to replace milk and milk solids in vegan cheese.
5. After observing the effect of heat on both cheeses during grilling, predict which ingredients impact on how cheese melts. Justify your answer.

Conclusion

Using the information you have gathered, which type of cheese would you recommend? Explain why.

'ON TREND' INGREDIENTS AND COOKING EQUIPMENT

Australian cooks are now much more adventurous and willing to try **contemporary foods** – new flavours, ingredients, cooking methods and equipment.

Australia's multicultural society has led to the fusion of food flavours from different overlapping cultures. **Fusion food** combines contrasting traditions, techniques and flavours from around the world in a single dish. Miso, a Japanese flavouring ingredient, is becoming a staple ingredient in many pantries and is used to add a delicious umami flavour to vegetables, fish and meats and some baked sweet goods. Spices that are becoming increasingly popular are ghost peppers from India, sambal from South-East Asia, gochujang from Korea, and harissa, sumac and dukkah from North Africa.

One restaurant fusing Australian and Asian ingredients and flavours is Supernormal, based in the city of Melbourne. The restaurant describes its cuisine as 'an inspired interpretation of our favourite Asian eating experiences [that is influenced] by the cuisine and restaurants of Tokyo, Shanghai, Seoul and Hong Kong'. The menu features dishes such as Sesame noodle salad with Szechuan pickled cucumbers and marinaded clams with Shoaxing and ginger.

New butters and spreads such as those made from almonds and cashews are appearing as alternatives to dairy butter, and are suited to those consumers who are vegan and vegetarian. New pieces of cooking equipment are constantly being developed by manufacturers to make the preparation of food easier and quicker for the cook or to undertake specialist 'on trend' cooking processes.

The air fryer has become a very popular piece of cooking equipment and the 'must have' piece of equipment for many busy families. This appliance operates by blowing air at a high temperature around the food, to make it crisp and tender without the use of oil or fat. This technique helps to cook food much faster than a conventional oven, and is used for cooking French fries, chicken or steak, baking a pizza and reheating food. The popularity of this appliance has also been driven by consumers who are health-conscious, but enjoy the taste and texture of fried food.



Shutterstock.com/Enjoy The Life

Air fryers are a quick and healthy way to cook food.

TECHNOLOGY IN THE FOOD INDUSTRY

New technologies have had a significant impact on food industries and food products. Augmented reality and the use of QR codes have allowed the consumer to check real-time information about a product by scanning the code on the product and accessing information such as where the ingredients are grown and how it is produced. The marketing of new products and menus can also be directed to a consumer's phone through the mobile application. In restaurants, diners can use an app to scan the QR code on the menu which helps them to visualise the dishes before ordering them.



Shutterstock.com/STEKLO

Scanning a QR code for product information.

A growing number of people order their food online from supermarkets, which then deliver it directly to their homes. Consumers who are time-poor or simply dislike pushing a trolley around the supermarket aisle with their children in tow, or who work long hours, are now using the online services offered by all the major supermarkets. Many customers with health concerns during the COVID-19 pandemic used online ordering and delivery for their supermarket supplies.

Social media also play a significant role in the way people share their enjoyment of food. Social media platforms such as Instagram and Facebook allow the home cook to post images of their latest creations so that cooking ideas can be shared. Family and friends share their cooking skills with one another and create a profile to showcase their culinary ability.



Shutterstock.com/bearmoney

Instagram allows friends to share food creations.

Activity 8.3

Social media food posts

Social media photo and video sharing sites such as Instagram, TikTok, Facebook, Pinterest and Snapchat are fun ways to discover a new trend or share your latest food creation. Many people access these sites multiple times each day, for recreation, as a habit, or to post a photo of the great dish they have just created or the meal they are about to eat at a café.

Complete the following activity about your use of social media in sharing your favourite food photos and videos with your friends.

1. Name one food trend you or your family have tried based on seeing it on a social media site.
2. Which social media site do you most commonly use for your food inspiration?
3. Which social media site do you most commonly use to share photos or post videos? Explain why you prefer this site to others.
4. How frequently do you upload photos or videos to a social media site to show the food you have prepared or the food you have eaten when you are out?
5. Provide examples of the photos or videos that you have in your photo gallery (or that of a friend) that reflect the following trends:
   - shared plates
   - fusion cooking
   - a café breakfast
   - the use of 'on trend' ingredients
   - the hottest # trend.
6. Provide a photo of a recipe that you have prepared yourself, where you followed a social media post, recipe or video. Annotate your photo to explain the ingredients, cooking methods or method of plating that demonstrate a contemporary flair.

Food subcultures in contemporary Australia

Australians have a wide range of fresh food to choose from when planning weekly meals. However, there are many **subcultures** or groups of people who have a view that is different from the views held by the majority of the population about the types of food they should purchase and consume. It is also important to remember that quite often food subcultures evolve slowly into food trends, as is the case with the sustainable food movement, for example.

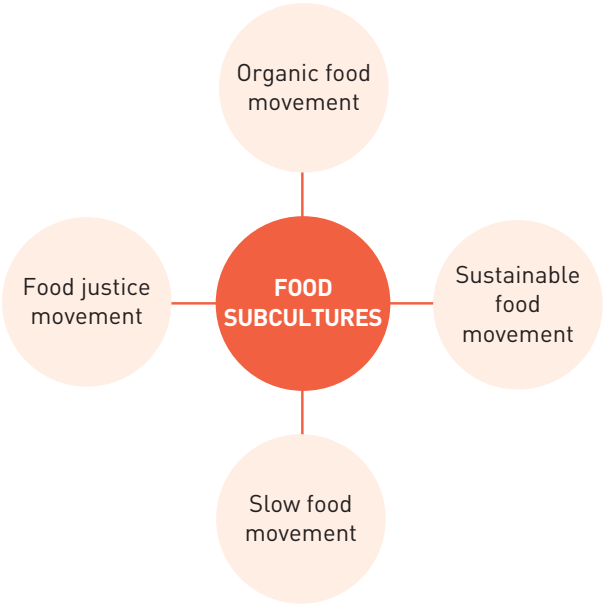


FIGURE 8.2 Food subcultures in contemporary Australia

THE ORGANIC FOOD MOVEMENT

An **organic food system** is a production system that produces food without the use of pesticides, herbicides or chemical fertilisers. Some people choose to buy organic or biodynamic produce because they feel it is healthier to avoid the pesticides and herbicides that are frequently used to produce the food we eat. While many supermarkets and fresh food markets now stock organic products, the range can be limited, and the produce is often more expensive to purchase. Some specialty organic and wholefood shops are now beginning to appear, but these are often only located in metropolitan areas or large regional towns.



Shutterstock.com/Shuang Li

There is a strong subculture whose members are committed to purchasing organic foods.

THE SUSTAINABLE FOOD MOVEMENT

The sustainable food movement encourages consumers to purchase food that has been produced using systems that do not damage the environment so that breeds of fish, rare breeds of animals and farming land will be available for future generations. Friends of the Earth Australia is a group that works for social justice and sustainability for food and farming. It challenges the agri-food businesses that dominate our food production system. This subculture is committed to lobbying for safe, healthy and nutritious food that is sold at a fair price for farmers. It aims to improve animal welfare and promote environmental protection by conserving natural resources such as water, soil and agricultural biodiversity. The members promote their cause through farmers' markets, the Fairtrade movement and food cooperatives.

Friends of the Earth

Friends of the Earth promotes environmental sustainability.

THE SLOW FOOD MOVEMENT

The slow food movement was formed in Italy in 1989 as a protest against fast food. In Australia, the mission of the movement focuses on encouraging people to understand where food comes from, how it was produced and by whom. It encourages people to eat locally and to purchase foods that have been produced by sustainable methods. The movement focuses on a concept of food that is 'good, clean and fair', and aims to bring international and Indigenous gastronomic traditions to the community.

The slow food movement demonstrates the principles of food sovereignty by challenging the control of the food system and food supply by large corporations, and returning the decision-making back to farmers and individuals who produce and consume food, in order to ensure that it is produced ethically and sustainably.

The Slow Food Australia group organises educational activities and programs for children, such as helping to construct school kitchen gardens and organising farm visits and practical workshops with food producers to educate children about the types and origin of foods.



Slow Food Australia

The slow food movement encourages people to choose sustainably produced food.

THE FOOD JUSTICE MOVEMENT

The food justice movement aims to address issues of food insecurity in the local community by ensuring that fresh, safe and nutritious food is readily available to all people regardless of their socioeconomic status.

The Youth Food Movement Australia (YFMA) is a volunteer-run, non-profit organisation that engages people aged 18–35 years and educates them about food sustainability issues. The mainly online movement has almost 4000 subscribers and more than 16 000 followers on Facebook. It organises events and campaigns that focus on the reduction of food waste, creating culturally inclusive food communities, how to use 'ugly food' and community eating.

Source: 'These movements are trying to change the way we eat', *SBS*, 4 September 2019

Another food justice movement is the Grow Free movement, with a philosophy of 'growing and giving'. The group aims to share free, healthy food with all members of the community. The movement centres around the existence of physical carts, placed in various locations that are shared online with members of the public. The carts display free produce that people can collect, and vegetable, herb and flower seedlings for them to take and plant in their garden.



Grow Free

The Grow Free movement seeks to share free, healthy food with the community.

The Right to Food Coalition works to ensure that all people have the right to access healthy and affordable food. It is a voluntary organisation that undertakes networking, advocacy, research and education to promote public policy and programs that support access to healthy food in Australia as a fundamental human right. There are many sub-groups in society, such as refugees and single parents, who are vulnerable to food insecurity as they may be on low incomes and struggle with rent, utilities, clothing and transport, with little left over for regular healthy food. This volunteer group holds events and activities to raise awareness of the issue, and advocates to ensure that food-insecure people have a voice in public and government forums, on food and health.



Right to Food Coalition

The Right to Food Coalition supports people who are food insecure.

Understanding the Text

1 Explain how the COVID-19 pandemic has had an impact on food trends.

2 Describe two features of Gen Zs and how these are influencing current food trends.

3 Draw up a knowledge map to demonstrate the way the demand for convenience has influenced people's eating and food purchasing habits.

4 Draw a diagram to demonstrate the strategies consumers who are concerned about the environment and the humane treatment of animals can use when shopping for food.

5 Discuss the reasons why Australians are looking to purchase 'local' food products.

6 Outline two new trends that are linked to health and wellbeing.

7 Explain why plant-based eating has become a popular food trend.

8 Outline the benefits for consumers of using an air fryer.

9 Explain how augmented reality and QR codes are used in the food industry.

10 Create a table like the one that follows to summarise key information about the organic food movement, the sustainable food movement, the slow food movement and the food justice movement.

Answers
Understanding the Text

Organic food movement	Sustainable food movement	Slow food movement	Food justice movement

Influence of Australian chefs on food trends

Australian cuisine has come a long way in recent years and while 'meat and three veg' might still be popular with many people, others are beginning to experiment with the new flavours and cooking methods they read about in recipe books or see demonstrated on television cooking programs.

Australia has been blessed with a significant number of creative chefs and cookbook authors who have guided us in the move away from the classic British foods of our past and into a future of exciting new flavours.

Many of our top restaurant chefs have become household celebrities who appear on our television screens on programs such as *MasterChef Australia*, or who write recipe books or feature articles in newspapers and magazines or become ambassadors for one of the big supermarket chains. These chefs have introduced the Australian public to new flavours, cooking techniques and the wonders of experimenting with new ingredients, and have had a significant influence on contemporary Australian cuisine.

SHANNON MARTINEZ

Shannon has been cooking in the kitchens of Melbourne restaurants for more than 20 years.

She is the owner of two vegan food outlets, a plant-based deli and a vegan bar and restaurant. At Smith & Deli, customers can purchase a wide variety of plant-based hot and cold dishes, vegan meats and cheese to take-away, or select from a range of bakery items such as bagels, pastries, croissants and doughnuts. Shannon's vegan bar and restaurant, Smith & Daughters, brings together the concept of a deli, as well as an affordable dining space. Her vegan offerings are available for breakfast, lunch and dinner and include snacks, hot carvery meals and salads, as well as her popular pastry items.

Shannon is the author of best-selling books *Smith and Daughters*; a vegan cookbook, *Smith & DELicious: Food from our Deli* and *Vegan With Bite*.

Although Shannon is a meat eater, she is considered to be a 'food shaper', as her goal has been to change the way the world considers plant-based dining and the way people eat, particularly meat eaters. As a positive food citizen, it is her goal to convince meat eaters to eat two meat meals less per week, as this will have a significant impact on the planet. She is passionate about sustainable cooking and believes even 'meat-free Mondays' will have a significant impact on sustainability. Shannon's menu items are meat-free versions of classic dishes that have a similar mouthfeel and taste to animal dishes. According

to an article written by Cassidy Knowlton in *Time Out* in June 2021: 'You won't find raw kale or unprocessed chia seeds on her menus. Instead, they are chock-full of cheese, prosciutto, sausage, mutton and eggs–every single one of them completely vegan and virtually indistinguishable from their animal-based counterparts.'



Smith and Daughters

Fitzroy vegan hub, Smith & Daughters

ADAM LIAW

Adam is a cook, television presenter and writer and past winner of *MasterChef Australia*. He is the author of five cookbooks including *The Zen Kitchen,* a cookbook of easy-to-prepare Japanese recipes and a guide to providing healthier and more enjoyable family mealtimes. The focus of his latest book *Tonight's Dinner* is to encourage people to 'fall in love' with cooking again. His goal is to create delicious and doable recipes that busy people can make easily. His books are more than just recipe books; they contain information about ingredients, cooking techniques and tips used in the Asian kitchen to create authentic Asian flavours.

His television series, *Destination Flavour*, has been viewed throughout Australia, New Zealand, Japan, Scandinavia, and Singapore. He is also a regular columnist for Fairfax newspapers, *Good Food, Sunday Life Magazine and The Guardian.*

Adam is also UNICEF Australia's National Ambassador for Nutrition.



Getty Images/Caroline McCredie

Adam Liaw has brought Asian cuisine to Australian kitchens.

JENNA NORTH

Jenna is head chef at Lucy Liu Kitchen and Bar in Melbourne's CBD. Lucy Liu's menu is broadly Asian and takes inspiration and flavours from Thailand, Korea, China, Taiwan, Vietnam, Japan and India. The dishes steer away from strict food traditions and marry and 'fuse' new flavours into a unique style of cuisine. Classic Asian, hot, sour, salty and sweet flavours fill every dish on the menu.

Jenna featured on an episode of *MasterChef Australia* in May 2021, where her team took on contestants in an Eastern versus European cookoff.



Lucy Liu

The Lucy Liu Kitchen and Bar menu has a wide range of Asian flavours.

Practical Activity 8.4

Chef's recipes

Worksheet

You and a partner must plan and prepare a two-course meal based on the recipes of a well-respected Australian chef such as one of those mentioned in this chapter or another you have researched.

1. With your partner, decide which chef you would like to use as the inspiration for your meal.
2. Use the resources of your school library or local library, or your food studies centre to search for an entrée, main course and dessert recipe.
3. With your partner, decide which two courses you would like to prepare. In selecting the recipes, consider the following issues.
   - Are the ingredients available? Will there be some that are difficult or too expensive to purchase? You may need to negotiate these with your teacher.
   - How long will each recipe take to prepare and cook? You must be able to complete the meal within your normal class production session.
   - Do you have the skills to produce each of the processes in the recipe? Are there some processes that you haven't used before? Will you need to practise these at home before class?
   - The two courses must be from the same chef and should complement each other.
4. Each person should prepare and serve one of the two courses.
5. Prepare an evaluation of the two-course meal. Your evaluation should focus on:
   - the sensory properties of the meal – describe the meal using descriptive language
   - the ease of following the recipe – were the instructions easy to follow or did you need to ask your teacher or parent to help clarify some steps in the recipe?
   - the style of the recipe – is it a contemporary approach to food preparation or is it a more traditional recipe?
   - the cooking methods used – were they challenging or were they within your present skill set?
   - whether you would make this recipe again or recommend it to others – remember to explain your answer, justifying your point of view.

Does Australia have its own distinctive cuisine?

Food is a very big part of contemporary Australian life and brings unique flavour combinations, intriguing stories and nostalgia to the table. While there are many dishes we may think of as typically Australian, the question we need to ask is – do we have a national cuisine?

When we get together with friends it is often over a barbecue. Lamb chops, steak or prawns on the barbie are perhaps some of our most typical Australian meals. Our warm summer weather and relaxed, laid-back lifestyle mean that entertaining outdoors suits our more casual attitude. So, is a barbecue a feature of a distinctive Australian cuisine? Or is it the fact that we have access to high-quality food all year round or our capacity to embrace the food of other cultures that are important factors in the development of an Australian cuisine?



iStock.com/LauriPatterson

Barbecues are popular in Australia during the warm summers.

AUSTRALIAN FOOD ICONS

Lists of Australian top iconic foods usually include the pavlova, Chiko Rolls, meat pies, the 1950s Streets Splice ice-cream, lamingtons, Vegemite, the sausage sanger, Weet-bix, Anzac biscuits and neenish tarts. So where did they come from, why do we love them, and can we describe them as distinctively Australian?

Pavlova

Pavlova is one of our all-time favourite desserts in Australia and it is still popular today with many home cooks. In the 1920s, an Australian chef, Herbert Sachse, is reputed to have developed the recipe and named it after the Russian ballerina Anna Pavlova during one of her tours to Australia. However, this version is often disputed by New Zealanders, who claim the recipe originated on their shores. While the truth of its origins may never be known, it is still a popular dessert when topped with fresh strawberries or passionfruit – or kiwi fruit if you are a New Zealander! Today, this recipe has many contemporary adaptions, such as the coffee meringue roulade on page 344, or versions featuring wattleseeds or toasted nuts stirred through the meringue or the filling.



Shutterstock.com/Robyn Mackenzie

The pavlova is a classic Australian dessert.

Anzac biscuits

The Anzac biscuit is another iconic Australian food. This traditional Australian biscuit was created during World War I by the mothers, wives and sisters of soldiers serving overseas and takes its name from the Australian and New Zealand Army Corps. The women created it as a food suitable to be sent overseas to boost soldiers' morale and sustain them in the trenches. It was originally called a 'soldier's biscuit' and was designed to supplement the diggers' rations. The traditional ingredients of oats, flour, coconut, butter, golden syrup and bicarbonate of soda used to make Anzac biscuits were suitable to withstand the journey to the battlegrounds, which may have taken many months.

In recent years, these biscuits have undergone a revival and are often available, sometimes as very large biscuits, in cafés and coffee shops. Manufacturers such as Arnott's make these biscuits all year round for sale in supermarkets. Before Anzac Day, the biscuits are often sold in special commemorative tins and some of the profits are donated to Legacy, a charity providing services to Australian families suffering financially and socially after the death of a spouse or parent during or after their war service.



Shutterstock.com/Murni

Anzac biscuits are still an Australian favourite.

Lamingtons

Legend has it that Lord Lamington, Governor of Queensland in the late 1800s, created the lamington after a mix-up in the kitchen. Supposedly, a maid working at Government House in Brisbane, accidently dropped the Governor's favourite sponge cake into some melted chocolate. Not wanting to get his fingers messy or to waste the sponge cake, the Governor suggested she dip the chocolate-covered sponge in coconut. And so the lamington was born; it has become an Australian food icon.

The lamington is often split in half and filled with a thin layer of strawberry jam or cream. Mass-produced lamingtons can be found in most Australian supermarkets and 21 July has been designated as National Lamington Day in Australia.



Shutterstock.com/nelea33

Lamingtons are a great way of using leftover sponge cake.

Meat pies

Although meat pies have British origins, they have always been an iconic Australian food. During the opening of the original Parliament House in Canberra in 1927, guests dined on hot meat pies. Aussie meat pies have always been associated with sporting events such as the AFL or rugby league as they are an easy hand-held snack to eat while watching the game.

The traditional pie usually included only the basic ingredients of meat, usually beef, gravy and pastry. Today, the pie reflects more contemporary ingredients and flavours, such as Thai chicken pies, Mexican pies, curry pies and pies with a beef and burgundy filling. Low-fat fillings and pastry have also been designed for the health-conscious. Our love of pies is so great that a party or get-together is not complete without party pies!



iStock.com/Robyn Mackenzie

The meat pie is one of Australia's most iconic foods.

CONTEMPORARY USE OF 'BUSH FOODS'

Collaborative Activity

Our native bush foods are some of Australia's most distinctive ingredients. There has been a resurgence of interest in the use of indigenous ingredients by many of Australia's top chefs, and today, warrigal greens, saltbush, wattleseed or pepperberry, mountain pepper, quandong, finger limes, lemon myrtle and lemon aspen can be found on the menu in some of our more contemporary restaurants. However, indigenous ingredients are not commonly used by most Australian cooks and it is unlikely they will be found on many pantry shelves.

Kangaroo has, however, become more popular and can now be found in most supermarkets and butchers, often because it is a lean, high-protein food that has a low-fat content. The most tender cuts of kangaroo such as kangaroo tail are often stir-fried with Asian flavours or simply grilled so that they are medium rare. Many restaurants in tourist areas include kangaroo on their menus, and in some areas wallaby, emu and crocodile are also served in a range of creative ways.



StockFood/Louise Lister

A contemporary Australian dish of seared kangaroo tail

Wattleseeds, the seeds of a type of Australian acacia tree, have become a popular flavouring for drinks, desserts and ice-cream. The nutty, coffee flavours of the seeds are also suited for dishes such as pancakes.



Wild Hibiscus Flower Company Pty Ltd

Wattleseeds can be used to give a coffee flavour to desserts.

Finger limes are becoming more widely available for use as an ingredient in contemporary recipes. They are a cylindrical rainforest fruit that contain tiny, lime-flavoured, individual juice crystals or pearls similar to caviar that are compressed inside the fruit and burst out when eaten.

This fruit has recently become popular for flavouring and garnishing citrus-flavoured tarts and savoury foods such as fish dishes, salmon and oysters. These lime-flavoured pearls explode in the mouth; they are also used in the preparation of cocktails to give a burst of citrus flavour.



iStock.com/PicturePartners

Finger limes give a citrusy lime flavour to foods.

A FUSION OF FLAVOURS

One of the distinctive features of Australian cuisine is that it often involves combining completely different ethnic foods; that is, foods that originate from different heritages, cultures and traditions. This is known as **fusion food** and involves combining a variety of different cuisines in a single eating experience.

Leo Schofield, in a 1994 edition of *The Age Good Food Guide*, first coined the term 'modern Australian' cuisine. The style he was referring to had previously been known as 'international cookery' but came to be known as 'modern or contemporary Australian' and referred to a collision of cuisines from around the world.

Asian flavours and ingredients, such as lemongrass, coriander and chilli are now blended into many European dishes. In the same way, locally grown foods, such as barramundi, can be used in the preparation of a Thai green curry. A tandoori-marinated lamb fillet may be served with curried spinach, a roasted pear and saffron polenta – a traditional Australian meat combined with a mix of Indian and European-style ingredients and cooking techniques.



Newspix/Bob Barker

Thai red curry with barramundi combines a local Australian fish with Asian flavours.

Developing a discussion web

A discussion web is a graphic aid that will help you debate an issue and look at both sides of an issue before drawing a conclusion. It helps you to organise your thinking, to have a voice in the discussion and to examine the points of view of others and show tolerance for them.

The discussion web uses reading, writing, speaking and listening skills, and requires you to work cooperatively in learning groups or teams, rather than attempting to undertake this task alone.

This discussion web provides a structure for critical thinking and helps to examine both sides of a question or issue carefully before making a judgment.

Activity 8.5

It's up for debate …

Follow the steps below to prepare a discussion web on the question: 'Does Australia have its own distinctive cuisine?'

1 Draw your own conclusion about the question.

2 Write your conclusion in the form of a response on a blog or letter to the editor.

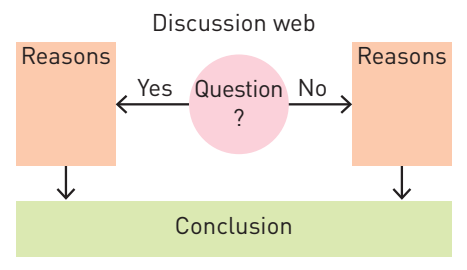
3 Alternatively, hold a class debate on the question to come to a conclusion about whether Australia has its own distinctive cuisine.

Steps

1 Working with a partner, discuss and draw on the information in this chapter on contemporary foods in Australia and other resources, as well as personal experiences, to consider the topic question. You need to take a 'yes' or 'no' position and provide evidence for your position. Remember that all opinions are acceptable as long as they are supported by evidence. You should record the information from the discussion in a graphic organiser similar to the one on the right. Each pair should write down at least three reasons for answering the question 'yes' and three reasons for answering 'no'.

YES	QUESTION FOR DEBATE : 'DOES AUSTRALIA HAVE ITS OWN DISTINCTIVE CUISINE?'	NO
Reasons		Reasons

2 Join together with another pair to form a group of four students and share your responses. The group then needs to reach a consensus on a 'yes' or 'no' point of view. The most common reasons for the 'yes' or 'no' position and the conclusion reached should be listed on a discussion web form like the one below.



3 Elect a spokesperson to share these points of view with the whole class.

4 Working individually, write a personal response to the topic to support your opinion.

Understanding the Text

11 Explain why Shannon Martinez is described as a 'food shaper'.

12 Explain how Adam Liaw and Jenna North have inspired and influenced Australian cooks.

13 Identify a celebrity chef you have seen on television and briefly describe one recipe they have prepared.

14 Draw a knowledge map to demonstrate some of the factors influencing Australian cuisine. List one additional factor not listed in the text that you think influences the type of food we eat.

15 Select one of Australia's 'food icons' and comment on why you think it is a firm favourite with many Australians.

16 Describe two contemporary adaptions for the food 'icon', the pavlova.

17 Name two 'bush foods' you know of and give one example of how they can be used in contemporary Australian cuisine.

18 Search the recipes in *Food Solutions*, both at the end of each chapter and online, and list examples of three recipes that demonstrate the contemporary use of fusion flavours.

19 Select two recipes from magazines or the Good Food website that are examples of 'fusion dishes'.

20 Explain why a discussion web is a useful tool in developing arguments for a debate.

Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

Develop a digital collage to reflect a current food trend or food subculture in Australia. Annotations should be used to highlight key features of your chosen topic.

Italian meatball sub

Almost every cuisine throughout the world has its own style of meatballs. This version takes its origins from Italy, where ricotta cheese was first produced. The addition of ricotta to the pork and beef mince in this recipe produces a very tender and light meatball. Baking rather than frying the meatballs helps them keep their shape before they are gently coated in a Napoli sauce. They can either be topped with parmesan or mozzarella and served in a fresh bread roll as a meatball sub, or served on top of a bowl of pasta as a main meal.

RICOTTA MEATBALLS

1 tablespoon oil
½ onion, finely diced
1 clove garlic, crushed
2 slices fresh bread
125 grams minced beef
125 grams minced pork
½ teaspoon dried oregano
125 grams ricotta
2 tablespoons grated parmesan
1 small egg
1 tablespoon parsley, chopped
¼ teaspoon salt
black pepper
olive oil spray

NAPOLI SAUCE

1 small onion, finely diced
1 clove garlic, crushed
1 tablespoon oil
250 grams tomato passata
½ teaspoon sweet paprika
¼ teaspoon salt
black pepper

TO SERVE

2 long bread rolls
30 grams mozzarella or parmesan
butter – if desired

METHOD

Making the ricotta meatballs

1 Line a baking tray with baking paper.
2 Heat the oil in a small saucepan over a low-moderate heat. Add the onion and sauté for approximately 5 minutes until tender but not browned. Add the crushed garlic and sauté for a further 2 minutes. Remove from the heat.
3 Remove the crusts from the bread, tear into small pieces and blitz in a food processor to make breadcrumbs.
4 Place the minced beef, minced pork, breadcrumbs, oregano, ricotta, parmesan cheese, egg, chopped parsley, salt and a few grindings of black pepper in a medium bowl. Add the sautéed onion and garlic and mix well for approximately 2 minutes until the mixture becomes sticky – clean hands are best for this.
5 Roll heaped tablespoons of meat mixture into balls approximately 3 centimetres in diameter. It will make approximately 6–8 meatballs. Place on the lined tray and refrigerate for 10 minutes.
6 Preheat the oven to 220 °C.

Making the Napoli sauce

1 Heat the oil in a small saucepan over a low-moderate heat.
2 Add the onion and sauté for approximately 5 minutes until tender but not browned.
3 Add the crushed garlic and sauté for a further 2 minutes.
4 Add the tomato passata, sweet paprika, salt and pepper.
5 Simmer for 10 minutes stirring occasionally until the sauce is thick.

Baking the ricotta meatballs

1 Remove the meatballs from the refrigerator and lightly spray with olive oil spray.
2 Bake in the preheated oven for 10 minutes.
3 Gently toss the meatballs in the Napoli sauce until well coated.

To serve

1 Split the bread rolls in half lengthwise and butter if desired. Top one half of the bread rolls with the meatballs in Napoli sauce. Sprinkle over the parmesan or mozzarella.

2 Return to the oven and bake for a further 3–4 minutes to melt the cheese. Top with the remaining half of the bread roll. Serve warm or at room temperature.

SERVES 2

EVALUATION

1 Describe the sensory properties of the Italian meatball sub – appearance, aroma, flavour and texture.

2 Explain how frying the onion and garlic before adding them to the meats may influence the flavour profile of the finished meatballs.

3 When making the meatballs, in step 4, the mixture becomes sticky. Identify the process and the functional component of the ingredients which are responsible for the physical change.

4 What are the benefits of baking the meatballs instead of frying them?

5 Suggest some vegetables or vegetable dishes that could be served with the meatball sub to meet the recommendations of the Australian Guide to Healthy Eating.



Mark Fergus Photography

Sushi bowl with soy-glazed tofu

Although sushi is synonymous with the cuisine of Japan, it is thought to have originated in China. Today, sushi is one of the most popular hand-held snack foods eaten throughout the world. It is a very healthy food containing a range of ingredients including rice, nori, vegetables and a protein ingredient, often tofu, fish or chicken. This recipe for a sushi bowl with soy-glazed tofu is a deconstructed version of the traditional sushi roll – it includes all the classic ingredients, but they are combined in a bowl to make a delicious, healthy, light meal or snack.

SUSHI BOWL

3 tablespoons rice wine vinegar
1½ tablespoons raw caster sugar
½ teaspoon salt
1 cup Koshihikari rice
1 cup water
1 teaspoon sesame seeds
2 eggs
2 teaspoons vegetable oil
1 spring onion, finely sliced
½ Lebanese cucumber, cut into very fine ribbons
½ sheet nori, crumbled
1 tablespoon pickled ginger, chopped
½ avocado, diced

SOY-GLAZED TOFU

1 tablespoon olive oil
200 grams firm tofu
1 tablespoon soy sauce
2 teaspoons maple syrup
½ teaspoon sesame oil
black pepper

TO SERVE

Kewpie mayonnaise
soy sauce
wasabi paste

METHOD

Sushi bowl

1 Combine the rice wine vinegar, raw caster sugar and salt in a bowl and stir thoroughly to dissolve the sugar. Set aside until the rice is cooked.
2 Place the rice in a large bowl and cover with cold water. Massage the rice by running it through your fingers – the water will turn milky in colour as the starch is washed off the rice.
3 Tip the rice into a sieve to drain away the starchy water. Repeat, rinsing the rice three more times. Drain well.
4 Place the washed rice in a small saucepan that has a tight-fitting lid. Cover with 1 cup of water. Bring to the boil then immediately reduce the heat so that it is barely simmering. Cover with the lid and simmer for 15 minutes. Remove from the heat and allow to stand for a further 15 minutes. *Do not* lift the lid.
5 Once the rice has rested, stir through the seasoned vinegar until the rice is well coated with the vinegar mixture. Set aside until ready to serve.
6 Toast the sesame seeds in a small saucepan or small frying pan over a medium heat for approximately 5 minutes or until lightly toasted. Remove from the saucepan or frying pan and set aside to cool.
7 Beat the eggs with 1 tablespoon water in a small bowl until well combined. Heat 2 teaspoons of vegetable oil in a small non-stick frying pan over a moderate heat. Pour the egg mixture into the frying pan. Gently shake the pan to ensure the omelette mixture covers the base of the pan. Carefully lift the edges of the omelette with a spatula so that the mixture can run to the edges and set. Loosen the omelette and turn it onto a chopping board. Allow to cool then roll up gently and slice into thin shreds.
8 Slice the spring onion diagonally into fine slices, slice the Lebanese cucumber into very fine ribbons, roughly crumble the nori, chop the pickled ginger and dice the avocado. Set the topping ingredients aside until ready to serve.

Soy-glazed tofu

1 Slice the tofu into finger-sized lengths approximately 1.5 centimetres wide.
2 Heat the olive oil in a large frying pan. Add the tofu, making sure not to overcrowd the pan. Cook the tofu for approximately 5–6 minutes until golden in colour. Using tongs, carefully turn the tofu over and cook the second side for a further 5–6 minutes until the tofu is golden and crisp.
3 Reduce the heat to low then add the soy sauce, maple syrup and sesame oil. Cook for a further 3–4 minutes, turning the tofu so that it is well coated with the glaze, is golden in colour and the glaze has reduced. Season with black pepper.

To serve

1 Divide the sushi rice between two serving bowls. Arrange the soy glazed tofu, spring onion, Lebanese cucumber, crumbled nori, pickled ginger and avocado. Sprinkle with the toasted sesame seeds.
2 Serve with the Kewpie mayonnaise, soy sauce and wasabi paste.

SERVES 2

EVALUATION

1 Describe the sensory properties of the sushi bowl with soy glazed tofu – appearance, aroma, flavour, texture – using descriptive language.
2 Why is the Koshihikari rice washed three times before cooking and how does this impact on the properties of the final dish?
3 Outline two reasons why seasoned vinegar is stirred through the cooked rice.
4 Identify the functional component of eggs and the process that occurs when the egg is cooked and made into an omelette in step 7.
5 Explain why the sushi bowl with soy glazed tofu could be promoted as a healthy meal compared to a meal of fried chicken and chips.



Mark Fergus Photography

Japanese-style spicy miso chicken with pickled cucumber and rice noodles

White miso, or shiro miso, is a key ingredient used in the marinade for this dish. White miso has the most mild flavour of the various types of miso paste. It is widely used in Japanese cooking as it imparts an umami or savoury flavour to many dishes and deepens the flavour of the food. The crunchy texture and sweet-sour flavour of the pickled cucumbers provide a delicious contrast to the spicy chicken. Serve the spicy miso chicken on rice noodles or with a bowl of steamed rice alongside for a light main-course meal.

SPICY MISO CHICKEN

1 tablespoon white miso paste

2 garlic cloves, crushed

1½ centimetres ginger, finely grated

½ teaspoon ground coriander

¼ teaspoon chilli powder

2 tablespoons soy sauce

2 tablespoons honey

2 teaspoons sunflower oil

2 chicken thigh fillets, skin on, bone in (chicken chops)

1 teaspoon sesame seeds, toasted

125 grams rice stick noodles

2 tablespoons coriander leaves, finely chopped

2 tablespoons mint, finely chopped

PICKLED CUCUMBER

1 Lebanese cucumber

2 teaspoons salt

2 tablespoons caster sugar

2 tablespoons rice wine vinegar

METHOD

1. To make the marinade, combine the white miso paste, crushed garlic, grated ginger, ground coriander, chilli powder, soy sauce, honey and sunflower oil in a medium bowl.
2. Add the chicken chops and coat well with the marinade. Cover with plastic wrap and set aside and allow to marinate for 20 minutes.
3. Preheat the oven to 220 °C. Line a baking tray with aluminium foil.
4. To make the pickled cucumber, slice the Lebanese cucumber lengthwise into long thin ribbons. Sprinkle with the salt and set aside for 15 minutes. Rinse and dry on paper towel. Place in a small bowl.
5. Place the caster sugar and rice wine vinegar in a small saucepan and stir over a low heat until the sugar is dissolved. Remove from the heat and allow to cool. Pour over the prepared cucumber.
6. Toast the sesame seeds in a small saucepan over a medium heat for approximately 5 minutes or until lightly toasted. Remove from the saucepan and set aside to cool.
7. Remove the chicken from the marinade, reserving the marinade for step 9. Place the chicken on the foil-lined tray. Bake in the preheated oven for 20 minutes.
8. Bring a large saucepan of water to the boil. Add the rice stick noodles and return the water to the boil. Reduce the heat and simmer for 6 minutes until tender. Drain well and rinse. Drain again. Divide the rice stick noodles between 2 serving bowls.
9. Place the reserved marinade in a small saucepan. Bring to the boil over a moderate heat and simmer for 4–5 minutes until the mixture reduces and thickens to a glaze.
10. Remove the chicken from the oven and brush the miso glaze over the chicken. Return the chicken to the oven and cook for a further 5 minutes until cooked through. The juice from chicken chops should run clear when tested with a skewer.
11. To serve, place the chicken chops on top of the rice stick noodles. Top with the finely chopped coriander and mint and sprinkle with the toasted sesame seeds. Serve with the pickled cucumber.

EVALUATION

1 Describe the sensory properties of the spicy miso chicken with pickled cucumber and rice noodles – appearance, aroma, flavour and texture.
2 Discuss how marinading the chicken improved its sensory properties.
3 Explain the functional roles of salt and rice vinegar in the production of the pickled cucumber.
4 Outline the two reasons why the marinade is boiled before it is used as a glaze on the chicken in step 10.
5 List the tests used to determine when the chicken was cooked and ready to serve.



Mark Fergus Photography

COMPONENTS OF AUSTRALIAN FOOD SYSTEMS

FOOD PRODUCTION

PRIMARY PRODUCTION

- Agriculture, horticulture, fisheries
- A wide range of plants and animals are produced for human consumption





FOOD PROCESSING AND MANUFACTURING

- Food processing: turns raw food products into ingredients for use in food manufacturing, such as olives into olive oil, flour into pasta
- Food manufacturing: value-added food products – precooked rice, chilled or frozen meals
- Packaging: processed food is packaged with required labels for distribution and retail sale



FOOD RETAILING AND MARKETING

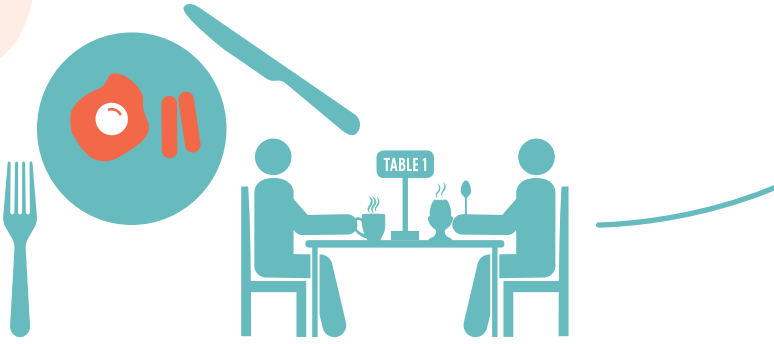
- Food retail: individual family members shop for food at supermarkets, fresh food markets, farmers' markets, convenience stores and small local stores
- Food marketing: social media, television, magazines, point-of-sale displays
- Food distribution: personal shopping, supermarket home delivery services, independent food delivery riders/drivers





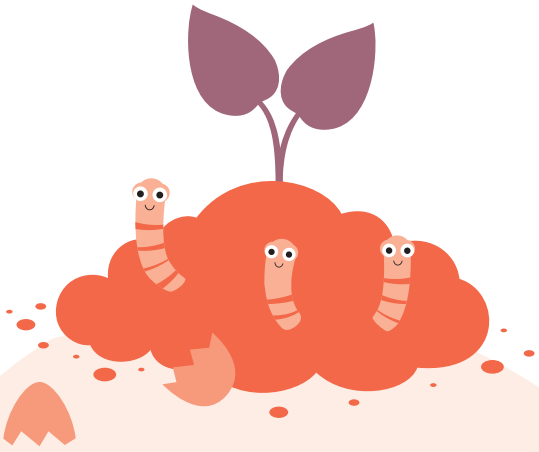
FOOD CONSUMPTION

- Domestic food: meal prepared from scratch by a family member, meal kits, takeaway meals
- Food catering: hospitals, schools, restaurants, cafés, takeaway food outlets



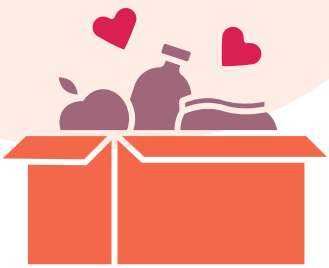
9

AUSTRALIAN FOOD SYSTEMS



DISPOSAL AND RECYCLING OF FOOD

- Composting: home composting systems, worm farms, local shire composting strategies
- Food rescue: primary producers, food manufacturing companies, supermarkets, cafés, bakeries donate excess food to food rescue services
- Renewable energy production: production of biogas from food waste



KEY TERMS

agricultural sectors in Australia include grains, oilseeds, sugar, dairy, livestock and fisheries production

climate change a change in the pattern of weather, and related changes in oceans, land surfaces and ice sheets, occurring over time scales of decades or longer

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

food security when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their food preferences and their dietary needs for an active and healthy life

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

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

private label products products that a supermarket sells under its own company name

Resources
Study Design
links
Infographics
Flashcards

Understanding food systems

A **food system** is the path that food travels from 'paddock to plate'. It is a complex series of activities involving food's journey from the farm, its movement to food processors, then on to the food retailers and finally on to the consumer's plate at home or in a restaurant.

In Australia, much of our food is produced through a conventional pathway that is often highly industrialised. The conventional food system aims to produce large volumes of food at a reasonable price to feed the Australian population. Our current food system usually begins when the primary producer or farmer grows crops or raises animals, often on a large scale. After harvest or slaughter, the food is transported to large food processors where it undergoes secondary processing to produce a wide range of food products. These food products are then packaged and again transported to retailers such as supermarkets or to food service outlets – for example, restaurants and cafés – where it is used to prepare meals. The final stages of the pathway occur when consumers eat the food either as home-cooked meals, prepared food delivered to the home or in food service outlets. Recycling or disposal of waste food is also a part of the food system.

A food system must also take into consideration the supply of agricultural inputs, economic and government oversight of the system, its sustainability, and the impact of the system on the health of individuals and the community.

Stages of a food system

Australia's current food system involves a number of complex stages, including production, food processing and manufacturing, transportation, disposal and recycling of food waste. Food citizenship is another important feature of all aspects of the food system as individuals make considered and informed decisions about their food choices.

PRIMARY PRODUCTION

Primary food production in Australia involves the agricultural, horticultural, pastoral and fisheries sectors. Each of these primary food producers grows a wide range of plants and animals, usually on a large scale, for human consumption.

In order to grow the plants and animals we consume as food, primary food producers use a wide variety of ***agricultural inputs***. Resources including the land/soil, water and sunlight necessary for growing crops or pasture; the supply of seeds/plants or animal stock; agricultural equipment and machinery; and fertilisers, pesticides and herbicides are all essential inputs. The farming community also provides a wide range of human resources or inputs to ensure the success of the food system including knowledge developed over many years and often many generations, the human labour provided by primary producers and their managerial skills.

In recent decades, the development of ***new technologies*** and ***innovations*** in primary food production has been essential in ensuring Australia's primary producers are able to continue to produce high-quality food for consumers. For example:

- Cereal farmers and orchardists use digital technology and embedded sensors to measure the moisture content of their soil. This lets them know exactly when crops need to be watered, the amount of fertiliser required and the optimum time to apply it to their crops. This technology also enables them to remotely measure the level of water in their dams.
- Livestock farmers use embedded technology in ear tags and collars to track the health of their cattle, sheep and goats so that they can, for example, determine the optimum fertility time of their stud animals. These new technologies are often connected via the Internet of Things, and are accessed remotely via a mobile phone, iPad or computer so that the farmer can assess this vital information in real time.
- Many farmers use artificial intelligence or AI to sort their primary produce; for example, for colour and size. Today, many large tomato growers use sensor-based optical sorting to separate out lower-grade tomatoes that do not meet the colour requirements of supermarkets.

Transportation is another essential feature of primary food production for the supply of agricultural inputs and to convey raw ingredients to food-processing or manufacturing plants.

As with every stage of the food system, ***food waste*** is created during primary production; for example, when fruit and vegetables are damaged during harvest or do not meet supermarket standards, or during processing of meat, poultry and fish.



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Primary producers such as vegetable growers produce a wide variety of fresh produce for consumers.

Food citizenship is another important feature of primary food production as individuals may make considered decisions about the sustainability of some farming practices, ethical food production, organic food production or the employment of seasonal workers.

FOOD PROCESSING AND MANUFACTURING

In Australia the food-processing and manufacturing sector of our food system is highly industrialised. ***Food processing*** turns raw food products into ingredients for use in food manufacturing; for example, olives into olive oil or wheat into flour. ***Food manufacturing,*** by contrast, involves producing value-added food products; for example, precooked rice, chilled or frozen meals, canned or dehydrated soup or preprepared baby food products.

Food packaging is essential to ensure processed food is safely contained and labelled for distribution and retail sale. Our food system requires all processed food products to be labelled according to the Food Standards Australia New Zealand (FSANZ) food labelling regulations, including a nutrition information label. Front-of-label information such as the Health Star Rating may also be included to help consumers make informed decisions when purchasing food products.

Innovative technology using 3D printing of food products is starting to emerge in the food-processing and manufacturing sector. For example, Meat and Livestock Australia is exploring the way 'meat ink' can be produced from meat offcuts and used to produce high-protein meals for the aged care sector. This technology will enable the industry to add value to secondary cuts of meat and to reduce food waste. Large food manufacturing companies use digital technology to connect vital equipment such as automated food-processing machinery, ovens and fryers through the Internet of Things. This allows key staff to obtain data remotely to, for example, ensure the correct cooking temperature is maintained, or to be sent an alarm via a smart phone if a breakdown in the equipment occurs. Packaging manufacturers can also embed sensors into the packaging of perishable products so that they can track whether the correct

temperature has been maintained throughout the supply chain to avoid any spoilage and food waste.

Road and rail ***transportation*** is essential to ensure raw ingredients are delivered to food processors and manufacturers and the final product transported to food retail outlets.

Food waste during processing and manufacturing can occur; for example, when vegetables and fruit are peeled for use in pre-prepared products. Assembly line machinery malfunction, incorrect food labelling, or a breakdown in the cold-chain cycle can also create food waste.

Food citizenship decisions will also be made by consumers in relation to the environmental impacts of food-processing and manufacturing methods, ethical food choices and sustainable food packaging.



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Value-added food products such as muffins or cupcakes are produced in highly automated factories.

FOOD RETAILING AND MARKETING

The ***retail*** component of a food system occurs when individual family members shop for food at supermarkets, fresh food markets, farmers' markets, butchers, fishmongers, specialty delicatessens, Asian grocers, convenience stores or small local stores. In Australia, the food retail industry is dominated by Coles and Woolworths, the two major supermarket chains that hold more than 60 per cent of the grocery market. Other supermarkets include IGA, Aldi, Foodworks and smaller independent supermarkets.

The Internet of Things has become an essential ***technology*** used by food retailers to connect all sectors of their food supply chain via the internet. GPS (Global Positioning Systems) are vital components of logistics and monitor the whole storage and shipping route of a product, allowing its location to be tracked at every stage of its journey. The introduction of Autonomous Mobile Robots (AMR) or self-driving forklifts, has also revolutionised warehouse management. These machines use artificial intelligence to navigate the warehouse and to locate, select and transport all of the ordered products to the despatch depot. Many food manufacturing companies incorporate new technologies such as QR or Quick Response codes and augmented reality into the packaging of their products as a key marketing strategy. Scanning a QR code can provide shoppers with, for example, additional nutritional information that may not be included on the product label, or any extra ingredients they may need to purchase while shopping. Many companies incorporate data on their QR codes so that customers have greater sovereignty over the products they purchase and can immediately determine the origin of the product and its route from paddock to plate. The QR code can also link consumers to an augmented reality feature that includes recipe ideas or serving suggestions and inform consumers of marketing strategies such as a competition.

Food manufacturers ***transport*** their produce using a wide range of local, interstate and international food transport systems such as cold chain logistics, which utilise road, rail and air transport.

The ***marketing*** of food is essential for food manufacturers to inform consumers about their new products and the health benefits they may have. Food manufacturing and marketing companies use a variety of text, images and sounds in their advertisements on social media, television, magazines and point-of-sale displays to appeal to consumers. A variety of ***transport*** and food distribution options are available to consumers including personal shopping, supermarket home delivery services and independent food delivery riders/drivers.

Food waste occurs when food is marketed and sold. Food products may be discarded if they are discontinued due to being unpopular with consumers, if their use-by or best-before date has expired or if food labelling regulations change. The food retailing component of a food system is where consumers make many decisions in relation to ***food citizenship***. Consumers might make food purchasing decisions based on their values of environmental sustainability, ethical food choices, sustainable food packaging, or only purchasing seasonally available food to minimise the 'food miles' some fresh food products travel.



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Consumers shop for food in a variety of venues including supermarkets and fresh food markets.

FOOD CONSUMPTION

Food consumption is another very complex aspect of our current food system. ***At home***, meals may be prepared from scratch using ingredients sourced individually, or they may be purchased and preprepared via a meal kit. Online meal delivery services are also becoming increasingly popular.

Food is also consumed in ***commercial settings,*** such as meals served to patients in hospitals; food purchased by students and staff from a school cafeteria; or a group of people eating together in a restaurant or café, or purchasing food from a takeaway food outlet.

The ***technology*** that is embedded in our smartphones and tablets has changed the way Australian households prepare, cook and consume food. Websites and supermarket apps provide consumers with a variety of user-friendly information, allowing them to look up a vast array of recipes and meal ideas before they place their order online. The wide use of smartphone apps has also driven the dramatic increase in food delivery services. Individuals can decide what type of meal they want to eat and have it delivered rather than having to eat the same meal as everyone else in their household. QR or Quick Response codes are another form of innovative technology that has revolutionised food service. Many cafés and restaurants have introduced a QR code that allows customers to simply scan the code with their smartphone and this takes them to an online digital menu where they can place their order and pay for their food using their phone.

Transportation is a key factor in ensuring food is able to move from the point of purchase to the consumer. Individuals might drive a car, ride a bike or walk to the supermarket or store to purchase the ingredients for their meal. Small trucks are used by supermarket and meal kit companies to deliver ingredients ordered online, and independent food delivery riders and drivers deliver food ordered through a food delivery app.

Food consumption creates significant ***waste***. Twenty per cent of all purchased food in Australia is wasted. The foods which create the most waste include fresh produce from the refrigerator and freezer that is not used, packaged and long-life food that is past its best-before date and leftovers from takeaway meals.

Consumers demonstrate their ***food citizenship*** when making decisions about the food they consume. They will consider factors such as whether the packaging of a takeaway meal is environmentally sustainable, or if a meal kit uses only ingredients that have been ethically sourced, such as free-range eggs or poultry.



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Meal kits are a popular way for many consumers to purchase ingredients to prepare meals.

DISPOSAL AND RECYCLING OF FOOD

Almost half of all ***household waste*** is organic food waste. In the home, food waste is generated when preparing meals, such as when peeling vegetables for dinner or peeling a banana to eat as a snack. Organic food waste, like fruit and vegetable peelings can be recycled into a nutrient-rich organic matter that can be spread onto a home vegetable or flower garden. Worm farms are another popular method of ***recycling*** food waste and producing an organic fertiliser for use on the home garden. Many local councils have introduced composting strategies. A number of Victorian local councils encourage ratepayers to place their food waste into their 'green' bin along with their garden clippings and lawn cuttings. Commercial contractors compost the food and green waste to produce soil improvers that are used as fertilisers for local parks and gardens or on organic farms.

Many commercial companies across Australia, including primary producers, food manufacturing companies, supermarkets, greengrocers, restaurants, cafés and bakeries ***donate excess food*** that would otherwise go to waste to food rescue services like Foodbank, FareShare, Oz Harvest and Second Bite. Supermarkets such as Coles, Woolworths and Aldi donate unsold, edible food and fresh produce to these organisations to support people in the community who have a limited income or who are affected by homelessness or unemployment and who face food insecurity.

Many food manufacturers and food distributers have committed to minimising their packaging waste. Woolworths, for example, is working towards making 100 per cent of their 'Own Brand' packaging either reusable, recyclable or compostable by 2023.

A vast array of new and ***innovative technology*** is being developed to minimise food waste and to ensure that fresh food can be recycled rather than being disposed of in landfill. The University of Sydney, Faculty of Engineering is undertaking research into the development of 'printable food ink sensors' that can be included in food packaging. These inks are designed to detect gases including ammonia, hydrogen sulphide, nitrogen dioxide and carbon dioxide produced by bacteria as food ages. The development of food packaging that can detect these gases would enable suppliers to determine the exact date the food will expire and divert it to food rescue services and away from the food waste stream. Smartphone apps are another important technology that is helping to recycle food and prevent food waste. OzHarvest has developed an app that local volunteers can use to rescue food from major suppliers and supermarkets in regional areas not serviced by the OzHarvest collection teams. The aim of the OzHarvest app is to support food relief in regional and remote areas as well as preventing food waste. 'Bring Me Home' is another food rescue app that ensures surplus restaurant food is recycled rather than being disposed of in the waste stream. This food rescue service allows consumers to purchase surplus unsold food from restaurants at discounted prices.

The ***transportation*** of food that can be rescued is another important feature of a food system. Food rescue organisations work with food producers and food retailers to transport produce to their food preparation facilities. Small trucks or vans collect the raw ingredients and then distribute prepared meals to those in need.

Environmental sustainability is an aspect of ***food citizenship*** that is important to many consumers. Searching for products that have minimal packaging or packaging that can be recycled to reduce the waste sent to landfill is a priority for many people.



Alamy Stock Photo/Operation 2021

Commercial companies donate excess food to food rescue services to support people in need.

STAGES IN THE DAIRY INDUSTRY FOOD SYSTEM

Primary production

Dairy cows graze on pasture; they come into automated milking sheds twice a day where they are milked. A series of stainless-steel pipes sends the milk to large refrigerated vats, where it is cooled and stored at -5 °C.

Key agricultural inputs

Key agricultural inputs include human knowledge and labour; water for dairy cows, pasture growth and sanitation; electrical energy to power milking sheds; automated milking equipment; and grains, hay or silage to feed cows during milking to keep them calm.

New technologies

'Smart collars' fitted on dairy cattle allow farmers to monitor the health of their herd and detect any illness in an animal days before the symptoms become obvious to the human eye.

Milk processing

The milk is sent to milk processors in refrigerated tankers where it is pasteurised to ensure all pathogenic bacteria are destroyed. Milk may also be homogenised. Milk is packaged and labelled according to FSANZ labelling requirements.

Consuming dairy products

A wide range of food products are made from milk for consumers to eat at home or in a variety of other settings. Consumers can purchase fresh milk, reduced-fat milk, protein-enriched milk, flavoured milk, dehydrated milk and condensed milk. A vast array of cheese, butter and yoghurt are also produced to meet consumer needs.

Marketing

A range of marketing strategies are used to promote milk, yoghurt, butter and cheese. Social media influencers use Instagram, Facebook and TikTok to promote their favourite products. Food manufacturers also promote the benefits of consuming dairy foods for good health, highlighting the nutrients they contain and their ability to assist in the prevention of osteoporosis.

Transportation

Milk and dairy products are highly perishable foods and must be transported safely at all stages of the food system. Raw milk is transported from the farm to milk processors in refrigerated tankers. Dairy products are transported to retail food outlets such as supermarkets, markets and local stores in refrigerated trucks and vans. Supermarket home delivery services use a fleet of refrigerated vans to deliver dairy products to their customers.

Waste

The dairy industry produces waste material throughout this food system. Whey, a waste product produced during cheese making, is used in the production of baby formula and added as a protein ingredient to baked products. It is also used in the production of feed for fish farms and piggeries. Some farmers use it as a fertiliser by spreading small quantities on their soil.

Food citizenship

Food citizenship decisions are made by consumers when purchasing dairy products. They may consider ethical food choices such as whether the milk, yoghurt or cheese is organically produced, or consider environmental factors such as whether the product is packaged using recyclable food packaging.

FIGURE 9.1 A dairy industry food system



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Dairy products

ALTERNATIVE TYPES OF FOOD SYSTEMS

Australia's current food system is complex and can involve both conventional or industrialised features as well as alternative systems such as organic and local food systems. Food is also imported into Australia from many countries across the world through the global food system.

Organic food systems

An organic food system is one that involves growing and producing food without the use of synthetic chemicals such as pesticides and artificial fertilisers. Genetic modification and food irradiation are also prohibited in an organic food system. These strategies ensure that the food production system sustains the health of soils and ecosystems as well as the health of the people who consume the food produced in this system.

Local food systems

Local food systems may involve organic food production and are associated with small-scale independent producers who are concerned about their environmental stewardship. A key feature of a local food system is that it aims to shorten the distance between where the food is grown and where it is sold to consumers. Local food markets and farmers' markets are a key feature of local food systems where consumers can have direct interaction with the fruit and vegetable farmer, cheese maker, butcher, baker or producer of jams and chutneys. A key advantage of a local food system for many consumers is that it gives them the opportunity to ensure their food sovereignty and food citizenship by purchasing nutritious food that has been ethically and sustainably produced.

Global food systems

Food is produced in every country across the globe. The components of a food system will be similar regardless of the individual country, in that they all involve farmers and other primary food producers, commercial food manufacturers, food consumption, transportation of food between sectors, food waste and food citizenship. Given the availability of high-speed air transport and the ability to move large volumes of raw or processed food products on bulk carrier ships, food can be easily, safely and reliably transported from one side of the world to the other. This enables consumers to have access to specific products that may not be made locally, that are out of season in the southern hemisphere or that can be purchased at a lower price than similar locally produced food products. For example, grapes or stone fruit that are in season during Australia's summer months are often flown in from America so that consumers can have access to these fruits during our winter months if they wish to purchase them.



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Local farmers' markets allow consumers to have direct interaction with the farmers who produce their food.

Activity 9.1

Coles Group sustainability strategies

Coles Group is an example of a large-scale Australian business working towards becoming more environmentally sustainable in all areas of their retail food supply system. The Coles Sustainability Report brings together its Together to Zero and Better Together initiatives. In addressing sustainability, the company is taking strides to ensure food security for both Australia as a nation, and Australian consumers.

1. Search for and read the article 'Coles Moonee Ponds sets a new benchmark for sustainability and innovation', which is featured on the Coles website.
2. Review the information on Coles Group's sustainability initiatives on its website in the Sustainability section.
3. Identify one new initiative Coles has implemented in each section of the food system. Highlight it in a table like the one below and explain how it will improve environmental or economic sustainability, or food sovereignty.



Coles Group Limited

ASPECT OF THE FOOD SYSTEM	COLES INITIATIVE	HOW THE STRATEGY IMPROVES SUSTAINABILITY OR FOOD SOVEREIGNTY
Primary food production – crops, animals for food, agricultural inputs		
Ingredients processing and manufacturing of food products		
Packaging		
Food distribution		
Food marketing and retailing		
Food consumption		
Waste management and recycling		

Understanding the Text

1 Describe the role of the primary food producer as the first step in the food system.

2 Explain what is meant by the term 'key agricultural inputs'. List three agricultural inputs that would be used on a dairy farm.

3 Outline two new forms of technology that farmers can use to improve their production practices.

4 Explain the difference between food processing and food manufacturing. Use examples to support your answer.

5 Draw up a knowledge map to identify some of the ways in which technology is being used by large food manufacturing companies.

6 Why is the marketing of a new food product important for the manufacturer? Describe two methods that a manufacturer may use to market a new fermented fruit drink with health promoting qualities.

7 Outline three ways in which technology has changed the way Australian households prepare, cook and consume food.

8 Copy and complete the table below to summarise the key issues in the disposal and recycling of food.

Household waste	Recycling food waste	Donating excess food

9 Identify and explain two stages in the Australian food system where the decisions and opinions of food citizens will have an impact.

10 Explain how a local food system differs from a global food system. Use examples to support your answer.

Answers
Understanding the Text

Trends, issues and influences on the Australian food industry sectors

Australian farmers face a number of threats in their ability to continue producing the high-quality food we are so accustomed to eating. A report titled *Consumption patterns and food demand in Australia to 2050* by research analyst Jack Di Nunzio outlined a number of issues facing the Australian food industry. The report highlights the fact that, while Australia is currently food secure, the nation may become more vulnerable as we move towards 2050 as a result of a range of factors, including climate change, population growth, and the impact of global competitiveness.

Australia must begin to plan ahead and increase agricultural production and improve economic and environmental sustainability. Developing **food sovereignty** will give farmers greater control over their decisions in order for them to produce food ethically and sustainably. This will ensure that Australia continues to have adequate **food security** – a food system that is available, accessible, acceptable, adequate and stable. Consumers must also become food citizens; that is, they must participate in and make informed choices about issues such as sustainability, ethics or health at any stage of the food system.

ENVIRONMENTAL SUSTAINABILITY OF AUSTRALIA'S FOOD SUPPLY

Scientific evidence suggests that the impact of climate change is emerging as the greatest threat to the security of Australia's food supply. Research shows that in the decades to come, agricultural production will be disrupted by prolonged droughts and more extreme weather events.

Climate change

The Australian Academy of Science defines **climate change** as being 'a change in the pattern of weather, and related changes in oceans, land surfaces and ice sheets, occurring over time scales of decades or longer'.

Evidence clearly shows that a changing climate will have a significant impact on agricultural conditions across Australia and will therefore impact on the

quality of our food supply and on Australia's food security. As our climate is changing, it is influencing both the intensity and duration of rainfall. A diminishing water supply in our most important food-producing regions such as the Murray–Darling Basin will mean less water is available for irrigation. This will impact on beef, grain and dairy production in particular.

Agricultural areas across Australia are experiencing higher temperatures and lower winter rainfall. As the temperature rises across the country, moisture levels in the soil will decline, making it difficult to grow crops, which will result in significantly reduced yields in the years to come. This could mean that Australia may no longer be a net exporter of grain crops and may have to rely on food imports, affecting our food security.

The result of loss of rainfall can have a devastating effect on the soil, as it is likely to result in soil erosion. Vegetation that covers the soil is reduced, and the soil is exposed to wind erosion and dust storms that remove the nutrient-rich topsoil. This will further impact on Australia's food security, reducing the availability of land suitable for agricultural production. Other environmental threats from droughts include damage to wildlife and loss of biodiversity.



Getty Images/John White Photos

A farm in drought conditions in Whyalla, South Australia

Another concern is that berry crops may no longer be able to survive in the hotter conditions that will prevail in Queensland and New South Wales and may be pushed further south to Victoria or Tasmania. Higher temperatures may also cause vegetables to be grown in cooler climates or under shade houses to protect them from sun and windburn. All of these factors impact on our ability to provide a secure food supply for the Australian population.

Drought brought about as a result of climate change also has a direct and substantial impact on the Australian economy as agricultural productivity is lost. These changes in climate have negatively affected farm profitability. There is a fall in crop production, and a loss of livestock, which severely reduces farm incomes. Drought can increase the price of feed and water supplies for animals as farmers cannot grow feed and pasture for their animals and purchased feed is often expensive or unavailable. Drought also leads to social issues for farmers, often referred to as 'drought stress', as farmers' health and wellbeing, particularly their mental health, are affected. They often need to make heartbreaking decisions about their animals, and find it difficult to survive economically without income.

Coal seam gas

Many people in Australia's farming community are concerned about the increase in the production of coal seam gas and the potential environmental impact it may have on the agricultural sustainability of their farm. Coal seam gas is natural gas (methane) that is found in underground coal formations or coal seams where it is contained by the pressure applied by water.

Farmers are concerned that the extraction of coal seam gas will draw water out of subterranean ground water supplies and limit the water available for agricultural production as well as damaging prime productive farmland.

ECONOMIC SUSTAINABILITY OF AUSTRALIA'S FOOD SUPPLY

Agriculture is the mainstay of the Australian economy. Australian farmers are predicted to produce more than 70 billion dollars' worth of goods in 2021–22. Increasingly, our agricultural production is an export commodity and Australia currently exports more than 60 per cent of our crop and livestock production. The agriculture industry supports 1.6 million jobs.

The food manufacturing and retail sectors are important components of Australia's food system and the nation's economy. According to the Australian Food and Grocery Council's data in 2019–20, 'the value of Australia's food and grocery manufacturing industry has grown by four per cent to almost $133 billion'. This sector also makes a significant financial contribution to the Australian economy through the employment opportunities it provides.

Australian retail food and beverage sales

In 2020, the Australian supermarket industry was worth approximately $125 billion, an increase from $79 billion in 2010, making a significant contribution to the Australian economy.

The Australian supermarket sector is fiercely competitive. The industry is controlled by supermarket giants Coles, Woolworths and Metcash. Metcash operates a large number of independent stores, including IGA and Foodland. In 2021, Woolworths Group held the greatest share of the grocery retail market in Australia with a share of 37.4 per cent, with Coles second with a little over a quarter of the market share. The three supermarket giants operate stores in cities and suburbs across the nation. However, this stranglehold on the sale of supermarket products has been reduced by the introduction of companies including Aldi and Costco. Aldi opened its first store in Australia in 2001 and now has more than 400 stores operating throughout the eastern seaboard states. Costco is another player in the supermarket scene and currently operates seven warehouses nationally.

Consumer trend to discount supermarket shopping

Increasing food prices have forced consumers to seek out products that give value for money and to search for similar products sold at lower prices. This has led a large number of consumers to purchase **private label products** – products that a supermarket sells under its own company name – and to do much of their weekly shopping in low-cost, discount or 'no frills' supermarkets such as Aldi.



Shutterstock.com/TY Lim

Private label products are popular with shoppers.

Food exports and imports

Collaborative Activity

Australia currently exports approximately 70 per cent of the food we produce. Japan, South Korea, the United States of America, China and Indonesia are some of our major export partners. Unprocessed grains, wheat, beef, sheep and dairy products are our key export commodities to these countries. According to the Department of Agriculture, Fisheries and Forestry, 'Australia exports around 70% of the total value of agricultural, fisheries and forestry production'. Their data for 2021 shows that approximately 75 per cent of the beef and veal produced in Australia is exported, as is more than 70 per cent of Australia's wheat and canola production.

There is also a trend for niche market products to be exported as high-value products. These include saffron, truffles and wasabi, all of which have only recently started to be grown in Tasmania and Victoria.



Alamy Stock Photo/Bruce Miller

Growing saffron in Tasmania

Free trade agreements

A free trade agreement is an international treaty whereby two or more nations agree to reduce barriers to trade between them; for example, by removing import tariffs. This means that Australian farmers and livestock producers can significantly increase the amount of produce they export to countries that have signed free trade agreements with Australia. This frees up more markets and leads to increased demand for the high-quality products the Australian farming community produces.

On 1 January 2022 the Regional Comprehensive Economic Partnership (RCEP) Agreement between Australia and 14 other Indo-Pacific countries came into force. This agreement seeks to provide better export opportunities for Australian farmers. According to a media release by the Prime Minister, 'RCEP has been driven by the ten ASEAN nations, who collectively

constitute Australia's second largest two-way trading partner and have successfully brought Australia, China, Japan, New Zealand and South Korea into this regional trading block with them'.

Foreign ownership of agricultural land

The sale of some of Australia's key pastoral and agricultural land to foreign owners in the past few years has led to considerable debate within the Australian community. In 2016, the federal government rejected the sale of Australia's largest landholding, S Kidman and Co, to a Chinese conglomerate. The property is enormous – almost half the size of Victoria – and includes 10 cattle stations located across three states. The sale of this property to overseas interests was not approved as it was considered to be contrary to the national interest and could impact on Australia's food security and food sovereignty.

Demand for 'clean green food'

One of the key reasons for the rise in our export market is the 'clean green' reputation of Australia's agricultural and food production industry. Overseas customers realise that they are guaranteed to receive clean, safe food, making Australia a desirable market from which to import food. Overseas customers are also guaranteed of the providence of food they import based on the high standards required by our food safety regulator, FSANZ.

Australian lobster exports to China were previously worth more than $720 million a year. In 2021, Australia's Trade Minister Dan Tehan commented that exports of lobster to China had been 'significantly impacted following the General Administration of Customs China (GACC) notification on 5 November 2020 [that] they would be subjected to enhanced inspection'. After trade restrictions to China were implemented, beef was also impacted and tariffs of 212 per cent were placed on Australian wine and 80 per cent on barley.

However, China now imports 90 per cent of Australia's infant formula and toddler drinks, which are valued at $787 million. The COVID-19 pandemic has spurred on baby formula exports to China.



AAP Image/AP/Imaginechina

Australian baby formula sold in a Chinese supermarket

SOCIAL INFLUENCES ON AUSTRALIAN FOOD INDUSTRY SECTORS

A report produced by Population Australia indicates that Australia's population is expected to reach approximately 40 million by 2050. The population will be older and more ethnically diverse, and most people will have a higher average income.

Increasing urbanisation

Australia's increasing population will put pressure on agricultural sectors to provide an adequate food supply for the local population while simultaneously trying to meet the demand from export markets. To provide the housing necessary for the increasing population, our major cities are now spreading into nearby rural areas. Today, many of our most productive horticultural areas on the fringes of our major cities have been subdivided into housing estates. It has been estimated that this urban sprawl now threatens approximately 70 per cent of our fresh vegetable production. Areas such as Werribee and Cranbourne on Melbourne's fringe have rich, fertile soils that have produced a range of high-quality vegetables and fruit for the past century. Finding suitable alternative land and developing the necessary farm and transport infrastructure may prove a significant challenge and could threaten the quality of the food we grow.



iStock.com/davidf

Productive farmland is being taken over by urban sprawl.

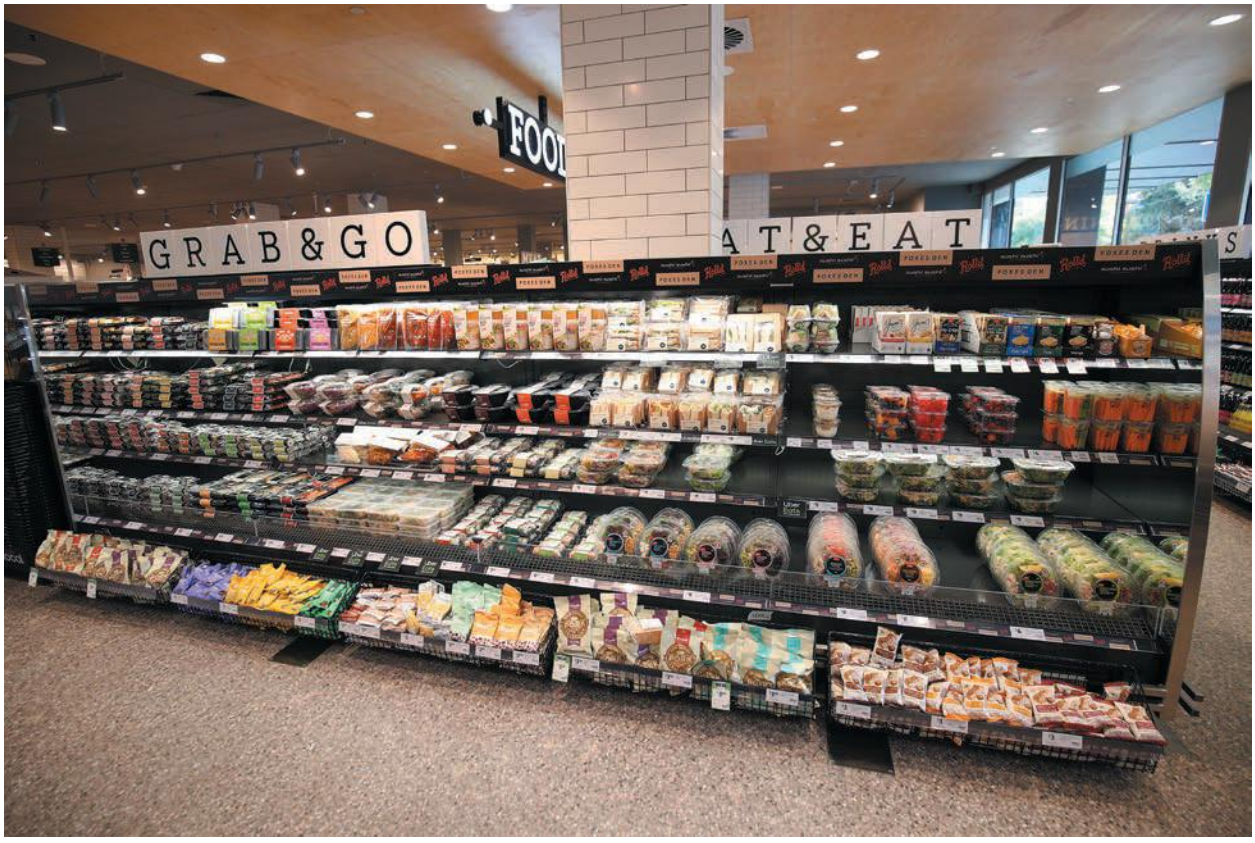
Increase in apartment dwelling

An increase in apartment dwelling, particularly in the central business districts (CBDs) of our capital cities, has led to the opening of express-style supermarkets in or close to the CBDs. Research suggests that the number of smaller concept stores, and specialty 'local' stores will continue to increase in the future. These stores will meet a demand for more convenient processed ready-to-eat meals that suit the 'time poor' lifestyle of city dwellers.

In 2019, Coles moved to optimise their network of stores by focusing store openings in sites with significant population growth. The style of store was to be based on a specific strategy relating to the area's demographic. Each store then specifically tailors products and services to the needs of the consumers in the area. A recently opened Coles Local, in Hawthorn, close to Swinburne University, offers an extensive range of convenience products to suit the large number of millennials that utilise this store. The store offers a large range of vegan and vegetarian options, a Japanese mochi ice-cream bar and over 350 meal options that the consumer can produce in 30 minutes. The store is committed to the environment by offering less packaging of fresh food items and offers recycled customer carry boxes in place of bags. It is also the first Coles Local supermarket to accept only card payments at the self-scanning check-out as this is the preferred payment method for this age demographic.

Coles have categorised their other stores into three formats:

- Format A – a premium, 'foodie' and convenience store with an extended range, targeting a demographic that is 'mid–high affluence' and has a high volume of consumers
- Format B – the standard store, targeted at 'medium affluence' and medium customer volume
- Format C – a low-cost, self-service operating model that is 'simple to shop', aimed at 'mid–low affluence' and low consumer volume.



Getty Images/Graham Denholm

A rise in apartment living has led to an increase in small, local supermarkets.

Activity 9.2

Shopping locally

Shopping locally for food is easier than ever. There has been an increase in high-density living in all urban areas, including the development of high-rise apartment buildings. These complexes have enabled supermarkets to open small concept stores at the ground level of the buildings or in nearby locations. These stores are designed to meet the consumer demand in the local areas.

1 Work in small teams to research all of the supermarkets in a 5-kilometre radius of your school.

2 List all of the supermarkets you have located and classify them according to whether they can be categorised as Format A, B or C.

3 Describe the social trends that have influenced the decision of supermarkets to offer a range of formats in your 5-kilometre radius.

4 Explain how a consumer might demonstrate food citizenship when shopping at a local supermarket.

Understanding the Text



Answers
Understanding the Text

11 Explain the relationship between food sovereignty and food security.

12 Outline four ways in which climate change will threaten Australia's food security.

13 Explain how the spread of urban housing into rural areas impacts on the security of the food supply.

14 Discuss the impact that climate change will have on the Australian economy.

15 Explain how coal seam gas may have a detrimental impact on the environmental and economic sustainability of Australia's agricultural sector.

16 Draw a simple knowledge map to highlight Australia's key food exports.

17 Explain how free trade agreements and foreign ownership of agricultural land impact on the Australian economy.

18 Why is Australia's reputation for producing 'clean green' food an advantage in the export market.

19 Describe the threat that the impact of increased urbanisation poses to Australia's food security.

20 Explain how the increase in apartment-style living close to the central business districts in cities has changed the traditional supermarket scene in these areas.

Primary food production in Australia today



Collaborative Activity

Australia is considered to be one of the world's most food secure nations. We produce a wide range of fresh, high-quality food to feed our population. Australia produces sufficient food today to feed approximately 60 million people. Our **agricultural sectors** include grains, oilseeds, sugar, dairy, livestock and fisheries production.

LARGE-SCALE DRY-LAND CROPPING

Food crops in Australia, including wheat, barley, canola, oats, chickpeas, lentils, broad beans, sugar cane and rice, are produced using large-scale broadacre cropping operations. Large-scale machinery, including computer-operated systems and GPS tracking are used to prepare the seedbed and to sow and harvest the crops.

Wheat is Australia's most valuable crop in terms of both the greatest production and the area of land



iStock.com/clintscholz

Wheat is grown as a broadacre crop.

under cultivation. Wheat is a winter crop and is grown in a region called the 'wheat belt', which includes parts of Western Australia, New South Wales, South Australia, Victoria and Queensland. Australia exports the vast majority of wheat produced to Asia and the Middle East.

Canola production has grown significantly in Australia over the past decade; it is now our major oilseed crop and one of our largest broadacre crops. Canola growing takes place in a similar region to that of wheat production across south-eastern Australia and in parts of Western Australia. Australia is the world's second largest exporter of canola seed, with international markets including Japan, China, Pakistan, Europe and Bangladesh.



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Canola is grown as a broadacre crop.

Pulse crops such as chickpeas, lentils, faba beans and lupins are also grown in these areas, and approximately 70 per cent are exported to India, where they are extensively used as an alternative protein source to meat. Other oilseed crops grown in Australia are safflower and linseed.

Rice growing in Australia is concentrated in the Murrumbidgee valley and Murray valley in southern New South Wales. Australia exports about 80 per cent of its rice crop to countries in the Middle East, North America and Asia.

Sugar cane grows in a tropical climate; in Australia, 95 per cent of sugar cane is produced in Queensland. Australia exports more than 80 per cent of the raw sugar produced to Asian markets, including South Korea, Indonesia, Japan and Malaysia.

THE LIVESTOCK INDUSTRY

Australia produces a range of livestock for human consumption, including beef, sheep, pigs, goats and poultry, and livestock is one of our most valuable agricultural sectors. More than 90 per cent of the fresh meat sold in Australian markets and supermarkets is domestically produced.

Beef production

Beef cattle are raised in all Australian states, with Queensland and New South Wales accounting for approximately 69 per cent of production. According to a 2020 report by Meat and Livestock Australia, the gross value of cattle and calf production was estimated at $15.1 billion.

Australia exports beef to the United States, Japan, Korea, China, the Middle East, Indonesia and Canada.

Sheep-meat production

The sheep-meat industry is also an important component of the Australian agricultural sector, adding $3.2 billion in value to the economy. The prime regions for lamb production in Australia are the Riverina, the Murray region of New South Wales, and regions of high rainfall in both Victoria and South Australia.

Australia exports approximately 56 per cent of lamb production and 95 per cent of the mutton produced. Australia exports live sheep to the Middle East, including the United Arab Emirates, Kuwait, Bahrain and Jordan.



iStock.com/JensenChua

Australian lambs raised for meat

Pork production

Australia also produces high-quality pig meat for both the domestic and the international markets. Pig meat is sold as fresh meat as well as being used in the production of processed products including bacon, ham and smallgoods.

Poultry and egg production

Poultry production is an important component of Australia's agricultural sector and has shown significant growth over the past 50 years. Australian consumers spend approximately $5.6 billion annually on chicken products purchased through the supermarket sector as well as in fast-food outlets and restaurants.

Australia consumes approximately 95 per cent of all chicken meat produced, leaving only 4 per cent available for export. Our main export market for frozen chicken cuts and edible offal – such as chicken livers and kidneys – are South Africa, Hong Kong, the Philippines, Papua New Guinea and Vietnam.

Egg production takes place throughout Australia. Eggs are a staple product in the diet of many Australians, and consumers purchase approximately $800 million worth of eggs annually. The egg market has seen a significant move away from cage-egg production towards free-range eggs, and Australian Eggs reported that this segment now makes up approximately 47 per cent of all the eggs sold in Australia.

THE AUSTRALIAN DAIRY INDUSTRY

The dairy industry is the third largest agricultural industry in Australia. It has a total value of approximately $13 billion, encompassing farming, dairy processing and the export trade.

Collaborative Activity

The dairy industry is spread across eight regions throughout Australia: Gippsland, Western Victoria, the Murray region, and Tasmania, New South Wales, southern Queensland, South Australia and the southern regions of Western Australia.

In the domestic market, drinking milk is the most popular product, followed by cheese, yoghurt and butter. Major importers of Australian dairy products are Japan, Singapore, China, Indonesia and Malaysia.

Dairy products

Fresh milk consumption in Australia is increasing and the demand for full-cream milk is shifting to modified milks such as low-fat milks. The popular 'coffee culture' in Australia is helping to drive milk consumption.



Shutterstock.com/Jaroslav Cips

Australian dairy cows

The production of butter, a product of milk, has decreased slightly in recent years with rising consumer health concerns, as consumers are choosing plant-based spreads. Australia exports butter to Egypt, Singapore, South Korea and Morocco.

Cheese is a major product of the Australian dairy industry for both domestic sales and export. In recent years, there has been a move away from firm cheeses, such as cheddar, towards soft cheeses such as brie, camembert and feta. Japan is the most important export market, consuming approximately 50.5 per cent of total exports. Other export markets include China, South Korea, Saudi Arabia and Taiwan.

FISHERIES PRODUCTION IN AUSTRALIA

Australian consumers have a great appetite for seafood, and this has led to an increase in the value of the fisheries industry to almost $3 billion. This trend towards increased fish consumption has seen seafood outstrip lamb as a choice for a main meal.

Australia harvests a wide variety of fresh and saltwater species for local consumption and sale to export markets. Atlantic salmon, prawns, barramundi, blue grenadier and snapper are among the most popular types of fish for Australian consumers. Gummy shark, one of Australia's most popular finned fish species, is caught off the coast of New South Wales, Victoria, Tasmania, South Australia and the southern half of Western Australia. Wild-caught fish still accounts for the majority of the seafood produced in Australia.

Aquaculture production, or fish farming, is a growing sector of the fishing industry in Australia and now supplies 43 per cent of the total fisheries production. Atlantic salmon, bluefin tuna, barramundi, prawns and oysters are among the most common species grown in aquaculture systems.

HORTICULTURAL PRODUCTION IN AUSTRALIA

Australia has an extensive horticultural industry, which includes fruit, vegetable and nut production. The horticultural industry is mainly confined to the eastern states, Tasmania and South Australia, with limited production in the south-west of Western Australia. There is a boom in almond growing in the Murray–Darling Basin region with 15 000 hectares of trees planted since 2016. Victoria now produces 61.68 per cent of Australia's almonds. According to the Almond Board of Australia, we are the second largest producer of almonds in the world. India is the largest buyer of Australian almonds, and almonds are also exported to Vietnam, Thailand, Indonesia and Japan.



Shutterstock.com/Rita Kapitulski

Almonds are a valuable Australian export crop.

Tropical fruit, including bananas, pineapple, mangoes and melons, are grown along the coastal strip of New South Wales and Queensland. Oranges, stone fruit and grapes are predominantly grown in New South Wales. Victoria produces a large proportion of the nation's apples and pears as well as fruit and tomatoes for processing. Strawberries, raspberries and blueberries are grown in Queensland, New South Wales, Victoria, Tasmania and Western Australia. Australia produces more potatoes than any other vegetable, and Tasmania produces much of the nation's processing potatoes. Tomatoes are also an important vegetable product.



Shutterstock.com/TRossJones

Leafy salad vegetables growing in Gippsland, Victoria

Understanding the Text

21 Explain what is meant by a broadacre crop.

22 Identify four of the main large-scale crops grown in Australia, where they are grown and their main export markets.

23 Outline the importance of sheep-meat production to the Australian economy and the main export markets for this meat.

24 Draw a knowledge map to demonstrate the key information relating to the consumption of poultry and eggs by Australian families.

25 Outline the importance of the dairy industry to the Australian economy.

26 Briefly describe the different types of dairy products produced in Australia.

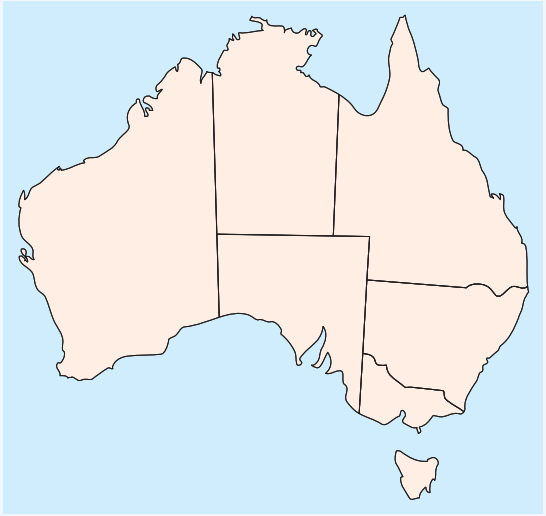
27 How has the consumption of cheese by Australian consumers changed over recent years?

28 List six of the main fish species consumed by Australians. Explain the meaning of the term 'aquaculture'.

29 Identify three of the main horticultural crops grown in Australia. Outline the changes that have occurred to the Australian almond industry in recent years.

30 Annotate a map like the one below to show the main growing areas in Australia for:

- apples and pears
- tropical fruit such as pineapples, bananas and mangoes
- tomatoes
- potatoes for processing.



Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

Identify the current key trends and issues that could influence the Australian food industry in the next 20 years. Rank environmental, economic and social trends or issues according to the impact they will have on the food industry from most to least. Justify your ranking decisions for both the top-ranked trend or issue and the one that you think will have the least impact.

Ragoût

A ragoût is a stew made from minced meat and vegetables cut into even-sized pieces and cooked in a thickened liquid that is flavoured with herbs and seasonings. Minced beef is a popular ingredient to use for everyday meals as it is inexpensive and very versatile.

1 tablespoon olive oil
¼ onion, finely diced
½ stick celery, finely diced
½ medium carrot, finely diced
200 grams lean minced beef
125 millilitres dry white wine or chicken stock
80 millilitres full-cream milk
pinch of freshly grated nutmeg
200 grams diced canned tomatoes
1 tablespoon tomato paste
pinch of salt and pepper

TO SERVE

180 grams dried spaghetti
1 tablespoon parsley, chopped
1 tablespoon grated parmesan cheese

METHOD

1 Select a heavy pan with a tight-fitting lid. Heat the oil over medium heat and sauté the onion until it is transparent. Add the celery and carrot and continue cooking for 2 minutes.
2 Crumble in the minced beef, stirring to ensure it separates. Cook only until the meat has lost its raw red colour. Then add the wine or stock and turn up the heat to medium high. Cook until the liquid has evaporated.
3 Return the heat to medium. Add the milk and nutmeg and cook until the milk has evaporated. Stir frequently.
4 When the milk has evaporated, add the tomatoes and tomato paste and reduce the heat.
5 Cover and simmer for 10–15 minutes. Season to taste.
6 Cook the spaghetti until al dente. Drain and serve with the ragoût. Garnish with chopped parsley and grated parmesan cheese.

Note: The ragoût can be refrigerated for 2–3 days, or frozen.

SERVES 2

EVALUATION

1 Describe the sensory properties of the ragoût – appearance, aroma, flavour and texture.
2 Why is the milk incorporated into this recipe?
3 Explain why in step 4 of the recipe, the pan is covered and the ragoût is simmered for 10–15 minutes.
4 Suggest some other high-carbohydrate products that could be served instead of pasta to accompany the ragoût.
5 Compare the ingredients of the ragoût to those in a traditional bolognaise sauce. Which recipe would be more suitable for a person on a low-fat, high-fibre diet? Explain your answer.



Mark Fergus Photography

Mediterranean risotto

Although risotto is a classic dish of northern Italy, it is now considered to be part of the repertoire of most contemporary Australian cooks. This recipe uses Arborio rice, a variety that cooks to a plump, tender state and is therefore perfect for making risotto. This rice can absorb up to four times its own volume, a valuable property in risotto making. When Arborio rice absorbs large quantities of stock, it provides a creamy consistency and delicious flavour.

¾ cup chicken stock
¾ cup water
2 teaspoons olive oil
½ onion, finely chopped
1 clove garlic, crushed
1 tablespoon pine nuts
½ cup Arborio rice
6 black pitted olives, sliced
2 tablespoons sun-dried tomatoes, chopped
½ cup cooked chicken diced in 2-centimetre cubes
¼ cup parmesan cheese
2 tablespoons cream
1 tablespoon basil, chopped
1 tablespoon shaved parmesan cheese to serve

METHOD

1 Heat the stock and water in a small saucepan.
2 Heat the olive oil in a medium-sized saucepan, add the onion and fry until soft, but do not allow to brown. Add the garlic and pine nuts.
3 Add the rice to the olive oil and stir to coat the grains with oil.
4 Stir in the hot stock, one-third at a time.
5 Stir constantly over very low heat so the mixture is barely simmering, until the stock is absorbed. This process cannot be rushed and will take approximately 20 minutes. Taste-test the rice to ensure it is al dente.
6 When all the stock has been absorbed, remove from the heat, cover and allow to stand for 10 minutes.
7 Return to the heat and stir in the remaining ingredients except for the parmesan cheese. Stir over a low heat for about 4 minutes.
8 Serve and garnish with shaved parmesan cheese.

SERVES 1

EVALUATION

1 Describe the sensory properties of the Mediterranean risotto – appearance, aroma, flavour and texture.
2 What are the advantages of using Arborio rice when making risotto?
3 Why is the rice stirred to coat it with oil before the liquid is added?
4 Explain the importance of making sure the stock is hot before adding it to the rice and stirring the mixture constantly until it is absorbed.
5 What is the purpose of removing the risotto from the heat, covering it and leaving it to stand for 10 minutes?



Mark Fergus Photography

Roasted eggplant with Puy lentils and crispy chicken

The eggplant is a member of the 'nightshade' family along with tomatoes and capsicum. There are many varieties of eggplant, including the large dark-purple, pear-shaped fruit widely used in Australia and the long thin varieties associated with Japanese cuisine, as well as purple-and-white striped eggplants. In this recipe the eggplant is partly peeled so that more of the tender flesh is exposed, giving a soft texture to the finished dish. Puy lentils are small and dark green-grey in colour and hold their shape well once cooked. They are a very nutritious food as they are high in protein and a good source of soluble fibre.

ROASTED EGGPLANT AND PUY LENTILS

1 large eggplant
olive oil spray
100 grams cherry tomatoes
⅓ cup Puy lentils
1 tablespoon olive oil
1 tablespoon lemon juice
½ clove garlic, crushed
¼ teaspoon salt
black pepper
2 tablespoons parsley, finely chopped
2 tablespoons Greek yoghurt
1 tablespoon picked parsley leaves to serve

CRISPY CHICKEN

2 teaspoons fennel seeds
1 tablespoon sweet paprika
2 chicken thigh fillets
½ cup buttermilk
½ cup plain flour
1 teaspoon baking powder
½ teaspoon salt flakes
¼ teaspoon black pepper
2 tablespoons sunflower oil

METHOD

Roasted eggplant and Puy lentils

1 Preheat the oven to 200 °C. Line a baking tray with baking paper.
2 Peel the eggplant from top to bottom in alternating strips so that it looks like the stripes of a zebra.
3 Cut the eggplant crosswise into circles 1.5 centimetres thick. Place the eggplant on the prepared tray and spray with olive oil spray. Bake in the preheated oven for approximately 35 minutes.
4 Add the cherry tomatoes to the eggplant and lightly spray with olive oil spray. Roast the tomatoes for 5–10 minutes until they are just beginning to collapse.

Crispy chicken

1 Dry-fry the fennel seeds in a small frying pan over a moderate heat for 2 minutes until aromatic. Grind to a fine powder in a mortar and pestle.
2 Combine the ground fennel seeds and sweet paprika on a piece of paper towel.
3 Open up each chicken thigh and flatten slightly with your hand. Slice into two pieces, cutting along the grain of the meat.
4 Toss each piece of chicken in the spice mixture. Place in a bowl and add the buttermilk. Cover and refrigerate for 30 minutes.
5 Meanwhile, place the lentils in a medium saucepan and cover with cold water. Bring to the boil quickly then drain.
6 Fill the saucepan with cold water three-quarters of the way and add the drained lentils. Bring to the boil, reduce the heat to simmer, and cook for 20 minutes until just tender. Drain and place in a serving bowl.
7 Prepare the dressing by combining the olive oil, lemon juice, crushed garlic, salt and pepper in a small screw-topped jar and shake well.
8 To complete the cooking of the chicken, combine the flour, baking powder, salt and pepper and place on a piece of paper towel. Remove the chicken from the buttermilk and drain. Thickly coat the chicken in the flour mixture.

9 Heat the sunflower oil in a frying pan over a moderate heat. Add the chicken and cook for approximately 5 minutes. Use an egg lifter to turn the chicken taking care not to break the crust. Cook the second side for a further 5 minutes or until the meat juices run clear when tested with a skewer. Drain on paper towel.

10 Add the roasted eggplant, cherry tomatoes and chopped parsley to the Puy lentils in the serving bowl. Gently stir through the dressing. Check the seasoning, adding more salt or pepper if desired. Swirl the yoghurt through and garnish with extra picked parsley leaves.

11 Serve accompanied by the crispy chicken.

SERVES 2

EVALUATION

1 Describe the sensory properties of the roasted eggplant with Puy lentils and cherry tomatoes – appearance, aroma, flavour and texture – using descriptive language.

2 Discuss the health benefits of baking eggplant instead of pan-frying it before incorporating it into the salad.

3 Outline how peeling the eggplant like a zebra improves its sensory properties.

4 Explain why the lentils are double boiled; that is, that the water is changed after the first time it comes to the boil.

5 Explain how marinating the chicken in buttermilk impacts on the sensory properties of the chicken.



Mark Fergus Photography

LEADING FOOD PROCESSORS AND MANUFACTURERS IN AUSTRALIA

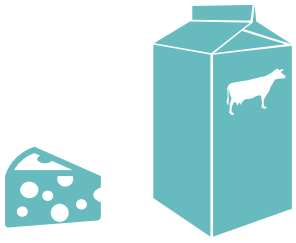
Food and beverage is the largest manufacturing sector in Australia = $133 billion.

The sector employs more than 275 000 people.

Australia International Foods Pty Ltd



a2 Milk Company



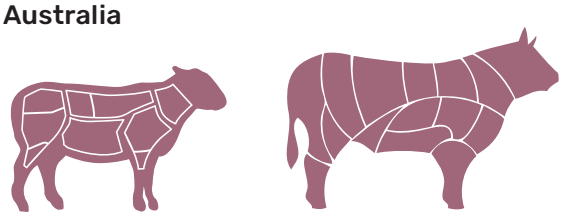
Fonterra



General Mills



JBS Australia



McCain



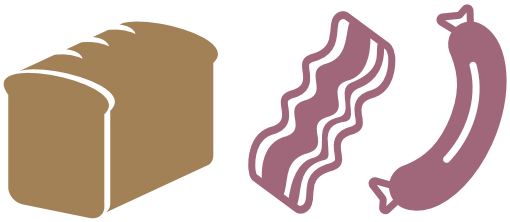
Goodman Fielder



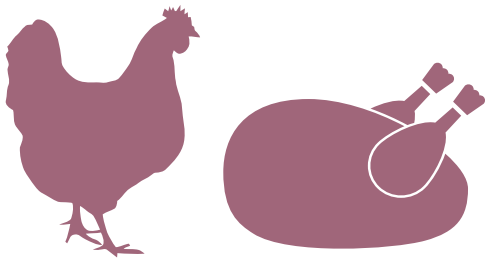
Devondale Murray Goulburn



George Weston Foods



Inghams Enterprises



Simplot



10

FOOD PROCESSING AND FOOD SERVICE IN AUSTRALIA TODAY

KEY TERMS

flavour house
a company that produces flavour compounds that can be used by a food-processing company to improve or enhance the natural flavours in food

food manufacturers
companies that process foods

food manufacturing
turning primary processed foods into other food products usually by combining them with other ingredients

food processing the practices used by food and beverage companies to transform raw plant and animal materials, such as grains, produce, meat and dairy into products for consumers

food service sector
cafés, fast-food outlets and restaurants where consumers eat, as well as the catering institutions that provide food for schools, hospitals and nursing homes

proprietary products
products that a company makes under its own brand

Resources
Study Design
links
Infographics
Flashcards

Food processing in Australia

According to the Australian Government Department of Agriculture, Water and the Environment, more than 90 per cent of the fresh fruit and vegetables, meat, milk and eggs sold in our supermarkets are grown and supplied by Australian farmers.

However, when we go shopping in the supermarket it is evident that a substantial proportion of the highly processed, shelf-stable foods that line the shelves are imported into Australia. Foods that are most likely to be imported are canned fish, canned vegetables, Asian ingredients such as pickled ginger, coconut milk and some rice varieties, and pasta products. While it might appear that much of the processed food we consume as a nation is imported, Australia does in fact have a successful food-processing industry that produces safe and nutritious food for consumers.

FOOD PROCESSING AND FOOD MANUFACTURING

The definition of **food processing** used by the John Hopkins University Bloomberg School of Public Health is that it 'refers to the practices used by food and beverage industries to transform raw plant and animal materials, such as grains, produce, meat and dairy, into products for consumers'. Some examples of food processing are: freezing vegetables such as peas; milling wheat into flour; making butter and cheese from milk; and dehydrating fruit.

Food manufacturing involves turning primary processed foods into other food products. During manufacturing, primary processed foods are mixed with other ingredients and the original form of the food can change quite significantly. Both food processors and food manufacturers use large factories or food-processing plants to transform the raw ingredients into food that is safe to eat and products that consumers can purchase.

Leading food-processing and manufacturing industries in Australia

According to data released in 2021 by Food & Drink Business: 'Food and beverage is the largest manufacturing sector in Australia, accounting for more than 30 per cent – $133 billion – of total manufacturing output. It employs more than 275 000 people and around 40 per cent of those jobs are in regional Australia.'

AUSTRALIAN FOOD PRODUCERS

Australia's food-processing industry includes large multinational companies, medium-sized companies and small family-run companies. The vast majority of the food we purchase on a daily basis is produced by major food-processing companies in Australia.

The *a2 Milk Company* is an Australian milk-processing company that is listed as one of the nation's top 100 food and beverage companies. The company produces specialist milk products for the fresh-milk market as well as cream, long-life milk and infant formula.



Mark Fergus Photography

a2 Milk products are popular with consumers.

Devondale Murray Goulburn is Australia's largest dairy foods company. The company produces dairy products for the retail market under the Devondale and Ascend brands. Its dairy products are also widely used in the **food service sector**. Almost half of the company's produce is exported to overseas markets.



Mark Fergus Photography

Devondale produces milk, cream and cheese for consumers.

Fonterra is one of Australia's largest milk processors. The company collects over 22 billion litres of milk each year, which it uses to produce milk for the fresh-milk market, cheese, yoghurt, dairy desserts and dairy spreads. Its brands include Bega Cheese, Mainland Cheese, Perfect Italiano, Riverina Fresh, Ski Yoghurt and Western Star.



Mark Fergus Photography

Bega Cheese is one of Fonterra's most popular brands.

General Mills is another major Australian food processor. It manufactures a wide variety of products, including Betty Crocker baking mixes and desserts, Latina fresh pasta and sauces, Nature Valley snack muesli bars, Old El Paso Mexican foods, and Pasta Master chilled Italian meals and pasta sauces.



Mark Fergus Photography

General Mills produces a wide variety of products for consumers.

George Weston Foods is one of Australia and New Zealand's largest food-producing companies. It produces a wide range of bread and smallgoods under a number of brands including Tip Top, Bürgen, Abbott's Village Bakery, Don and KR Castlemaine.



Mark Fergus Photography

KR Castlemaine hams, Abbott's Village Bakery and Tip Top bread are produced by George Weston Foods.

Goodman Fielder is one of Australia and New Zealand's leading food-processing companies. It produces some of the most well-recognised supermarket brands, including Meadow Lea, Praise, White Wings, Pampas, Helga's and Wonder White. The products it sells under these brands include bread, margarine, flour, dressings, condiments, mayonnaise, frozen pastry, cake mix, desserts, sauces, vinegar and cooking oils.



Mark Fergus Photography

White Wings, MeadowLea, Helga's and Wonder White are some of Goodman Fielder's top brands.

Inghams Enterprises is a major Australian processor of poultry products that operates in approximately 100 locations across Australia and New Zealand. The company supplies fresh and frozen poultry products to the supermarket sector for Australian consumers, and to the hospitality and food service industry.



Ingelwood Organic Poultry Farms

Inghams Enterprises produces a variety of fresh and frozen poultry products.

JBS Australia is the largest meat-processing company in Australia. It has five feedlots and a number of processing facilities in mainland Australia and Tasmania where it processes beef and lamb carcasses. The company exports to 80 countries worldwide.

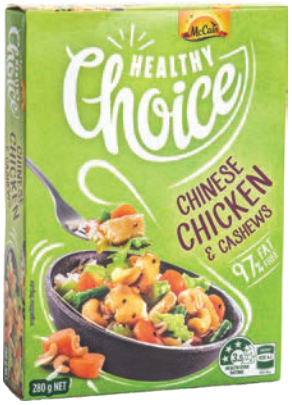


Courtesy JBS Australia

JBS Australia is one of Australia's major meat processors.

Teys Australia is another major Australian beef-processing and exporting company. It is located along Australia's eastern seaboard and produces fresh meat, delicatessen smallgoods and convenience meals.

McCain is an Australian food processor of frozen vegetables, main meals and pizzas and snacks for consumers. The company's range of frozen vegetables, potato products and some of its meals are marketed under the McCain brand. It also produces a range of healthy frozen food options under the Healthy Choice brand. McCain operates a major frozen-potato processing plant in Ballarat, Victoria. Recently, the company announced a $10 million upgrade of its potato-processing plant in Smithton, in northern Tasmania.



Mark Fergus Photography

McCain Healthy Choice Plus Chinese Chicken and Cashews

Simplot is one of Australia's leading food manufacturers and processes a wide variety of foods including vegetables, seafood and meat. It produces chilled, frozen and shelf-stable products under a number of brands, including Edgell, John West, Leggo, Birds Eye, Lean Cuisine and Seakist.



Mark Fergus Photography

John West seafood products are produced by Simplot.

Case study: Australian International Foods

Australian International Foods is an example of an Australian food-processing company that has been extremely successful in producing a wide range of high-quality food products for Australian consumers and international markets.

ABOUT THE COMPANY

Australian International Foods was the brainchild of Bala Mahendran and Padmini Balakumar who, after arriving in Australia from Sri Lanka, wanted to combine their love of food and sense of creativity by working in the food industry. They were able to use their combined skills in international banking and engineering to establish the company with

the aim of producing high-quality foods using ethically sourced ingredients. The company, located in Scoresby, Victoria, was established in 2000. Its products are sold in major Australian supermarket chains, including Coles, Woolworths, Aldi, Ritchies, IGA stores and the international membership warehouse chain, Costco. Its products are also widely used within quick service restaurants (QSRs), David Jones, BP service stations and the food service industry, and are exported to Japan, Taiwan and New Zealand.

WHAT DOES THE COMPANY PRODUCE?

Australian International Foods produces a wide range of chilled and frozen snack foods and meals for Australian and international consumers.

TABLE 10.1 Types of products produced by Australian International Foods

MARKETS	TYPES OF FOOD	BRANDS
Retail • Coles • Woolworths • Aldi • Costco • Ritchies • IGA **Food service** • Institutions • Aged care/ hospitals • Airlines **International Markets** • Japan • Taiwan • New Zealand	**Frozen & fresh** • Snacks • Meals and meal components • Value-added meat products	**Proprietary brands** • Darshan • Petite Cuisine • Chopstix • Dos Caminos • Spice Spoon • Plate Mate **Private label brands** • Major supermarket brands

Proprietary products

Australian International Foods produces a wide range of **proprietary products**; that is, products that it sells under its own brands. The company's proprietary brands are Darshan, Petite Cuisine, ChopStix, Dos Caminos, Spice Spoon and Plate Mate. The products marketed under these brands include a range of savoury snack foods for home entertaining such as samosas, pan rolls, spring rolls, haloumi chips, meatballs, arancini, croquettes, beef and veggie patties and schnitzels. Its proprietary-brand frozen meals include lamb rogan josh, chicken korma, beef massaman curry, butter chicken, chicken tikka masala and Thai green chicken curry.



Mark Fergus Photography

Australian International Foods' savoury snack foods for home entertaining are popular with consumers.

Private label products

The company also produces a wide variety of private label products that a supermarket sells under its own company name. The supermarket private label range of both frozen and fresh chilled products are Australian-made, using Australian ingredients wherever possible. Some of the private label products it produces are vegetable or lamb samosas, ham and cheese croquettes, haloumi chips, falafels, Greek-style meatballs, beef and pork schnitzels, pork chops, different flavours of fritters, arancini and spring rolls.



Shutterstock.com/nelea33

Cheese croquettes are a popular private label product.

FACTORS THAT HAVE CONTRIBUTED TO THE SUCCESS OF THE COMPANY

The success of the company has been built on five key factors.



FIGURE 10.1 Factors that have contributed to the success of Australian International Foods

Food safety and quality assurance

One of the most important factors in the success of Australian International Foods is its reputation in the food-processing sector as a producer of safe, high-quality food products.

As the company has two purpose-built factories in Scoresby, both built from the ground up, it has been able to establish the highest food safety standards of any Australian food-processing company in both of its facilities. One factory is classed as a 'high-risk' facility. In this facility:

- the high-risk area is sterile, and all workers enter this area enter only after sanitisation.
- the high-risk area is 'positive air pressure' controlled, with filtered air changed up to six times an hour, and is temperature-controlled. Positive-pressure rooms maintain a higher pressure inside the treated area than that of the surrounding environment so that potential contaminants in the surrounding environment will not enter the room.
- all products entering the high-risk area should to be fully cooked, meaning meat products are cooked to the equivalent of 90 °C for 10 minutes to kill Clostridium Botulinum and vegetable products are cooked to the equivalent of 72 °C for two minutes to kill Listeria Monocytogenes.

This high-risk facility is used to produce fresh/chilled products with a shorter shelf life. As all products produced in a high-risk facility are fully cooked, the end consumer only has to reheat them before consumption, whereas with products made in a low-risk facility, products usually have to be re-cooked by the consumer as they are either raw or partially cooked.

Along with every other food-processing company in Australia, it is a mandatory requirement that Australian International Foods meets the food safety standards of Food Standards Australia New Zealand (FSANZ). This means that before the company could begin producing their first product – their Darshan brand savoury beef rolls – it needed to ensure it had a Hazard Analysis Critical Control Points (HACCP) program in place.



HACCP certification is a mandatory FSANZ requirement.

The registered certification mark is owned by HACCP Australia Pty Ltd. www.haccp.com.au. Use of the certification mark without licence is not permitted.

The company's key food safety procedures include:

- A flow chart of the HACCP program for every product that is developed, identifying the hazards, critical control points (CCPs) and corrective actions to be taken. For example, in the production of meatballs, one of the key CCPs is to ensure the meatballs have a core temperature of –6 °C after they have been quick frozen.
- The establishment of a comprehensive traceability system – every batch number of every ingredient is recorded. The company also keeps a food sample of every production run, labelled with the batch number and date for traceability in case there is a product complaint or recall.
- All allergen ingredients being clearly labelled and separated in their storage areas and marked with an orange sticker in preparation for their use in a product. The production is also planned in such a way as to avoid cross-contamination of allergens.

Strategic planning

To be successful in any sector, it is essential that a company keeps abreast of industry trends and consumer demands. This type of strategic planning has been key to the success of Australian International Foods. The company ensures it stays up-to-date with the most recent developments in ingredients and flavours, health, food processing and packaging by examining the latest overseas trends as well as by examining consumer data obtained through local and international research companies. It also consults with some of Australia's main flavour houses to determine the latest trends in flavours that appeal to consumers. **Flavour houses** are companies that produce flavour compounds that can be used by a food-processing company to improve or enhance the natural flavours in food.

Food trends

The latest trends that will be evident in some of Australian International Foods' new product development include:

- flavours such as American barbecue, harissa, jalapeno chilli, truffle and Chinese Hoisin
- superfoods or health foods that contain ingredients such as quinoa, buckwheat and kale
- exotic spices and spice mixes such as Indian biriyani and South American peri-peri
- small, bite-sized finger foods and foods on skewers
- entertainment packs for casual dining
- convenience foods ready to eat after reheating.

When developing new products, Australian International Foods places emphasis on nutrients and functional or superfood ingredients, such as kale, quinoa, black beans, chia seeds and flax seeds, making their products appealing to the health-conscious consumer and the superfoods market.



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Small, bite-sized finger foods such as arancini balls are a popular trend.

Innovation, creativity and flexibility

To build a strong relationship with the supermarket sector, the company has needed to be very creative, flexible and responsive to the latest food trends. One key trend is the strong consumer demand for products that are precooked and ready to eat on reheating. Also, the demand for preprepared and ready-to-cook products remains strong as it still allows the family member to fulfil their desire to prepare a 'home-cooked' meal.



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Ready-cooked meals are increasingly popular with consumers.

Currently, Australian International foods is producing a variety of chilled products for the supermarket sector, aimed at filling a demand by consumers for fresh, fully cooked entertainment products. The new fully cooked, ready-to-eat deli products include:

- mushroom arancini
- haloumi chips
- truffle polenta chips
- hoisin pork spring rolls
- pumpkin falafel with harissa
- cheese and jalapeno croquettes
- zucchini/corn fritters
- karaage/satay/lemon herb chicken bites.

Product development

The development of products that consumers want to buy is critical to a company's success. In developing a new product, Australian International Foods explores the latest trends in the food industry and always works at least nine months in advance of the required delivery date.

The company is working closely with the supermarket sector in the production of many of its private label products. The product development process begins with a design brief established by the supermarket product development team, identifying the type of product desired. For example, the supermarket might want a new product that can be included in the main meal section of the freezer cabinets or it may want a fresh product suitable for the 'entertainment' sector that consumers can purchase from the deli.

The product development team will then begin developing products based on the information outlined in the design brief and may, in addition, submit two or three 'wildcard' products for the company to sample. During the development of the new products, the product development team will submit prototypes to the supermarket at three different times.

Understanding the Text

Answers
Understanding the Text

1 How much of the food that Australians consume is produced locally? Identify the types of food products that are more likely to be imported.
2 Explain the difference between food processing and food manufacturing.
3 Identify two of Australia's largest milk processors and give examples of the products they produce.
4 Identify the similarities between the products produced by George Weston Foods and Goodman Fielder.
5 Explain the difference between a proprietary product and a private label product. Use examples to support your answer.
6 Draw up a mind map to highlight the key features of Australian International Foods' 'high-risk' food manufacturing facility.
7 Identify one mandatory food safety standard that Australian International Foods needed to meet before it could begin operation.
8 Explain how the company can trace its products in the event of a product recall.
9 Identify four current food trends and explain how Australian International Foods stays abreast of the latest industry and consumer trends.
10 Outline four key steps that the company uses when it is developing a new product for a major supermarket.

Role of the food service sector and major food retailers in Australia

The Australian **food service sector** – that is, the cafés, fast-food outlets and restaurants, and the catering institutions that provide food for our schools, hospitals and nursing homes – have a major influence on the types of foods that are available for us to consume. The supermarkets we shop at also influence our food choices through the types of products they produce and sell.

ECONOMIC OPPORTUNITIES PROVIDED BY THE FOOD INDUSTRY

A report by market research company IBISWorld in September 2021, stated that there are approximately 6670 supermarkets and grocery store businesses operating in Australia and these businesses employ approximately 377 000 Australians. Many young Australians gain their first experience of the working world through part-time employment in the supermarket sector.



iStock.com/kali9

Many young Australians gain their first experience of the working world through part-time employment in the supermarket sector.

In recent years, the Australian café and restaurant scene has also grown strongly, and this sector alone employs close to 188 000 people. Positions such as wait staff, baristas, cooks, kitchen hands, bar staff, cleaners and managerial staff have made this an important avenue for employment and training for many young Australians.

INFLUENCE OF THE FOOD SERVICE AND RETAIL SECTORS ON FOOD CHOICE

Major food retailers and the food service sector have a major impact on the food choices of Australian consumers.

As our lifestyles become busier and we have less time available for leisure, many consumers want to purchase food products that are preprepared and require little cooking. Coles, Woolworths, IGA and Aldi use research companies to look at the latest consumer trends and then endeavour to produce food products to meet these demands. Consumers may indicate that they want to purchase foods that will provide them with added health benefits, such as being low in fat or sugar, or they may want to purchase foods from the chill cabinet that are already prepared and ready to cook. Food producers then work with the supermarket sector to develop food products that meet these needs.

However, there is limited shelf space in supermarkets and as some products are added, others must be removed. As a result, some of the products that have been family favourites might disappear and we are forced to choose from those that are currently available.



Alamy Stock Photo/Clynt Garnham Food & Drink

Supermarkets influence the types of products we buy, such as preprepared curry mixes.

Cafés and restaurants also influence our food choices. A new café might want to set themselves apart from their competitors. A quinoa muesli or poached eggs and kale might be on the breakfast menu, or they might follow the latest trend for serving raw or whole foods, so lunch might be a wholegrain and raw carrot and beetroot salad. A simple plate of scrambled eggs might not be such an easy-to-find option!



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Kale has become a popular food trend at many cafés.

Influence of consumer demand on Australia's food supply

Australian consumers are becoming more vocal in expressing their concern about a range of issues linked to their own health and welfare and to ethical issues in food production. Regardless of whether they are concerned about 'truth in labelling', animal welfare or the impact of food production on the environment, consumers are becoming more actively involved in expressing their food citizenship and influencing the types of foods that are available.

In recent years, there has been a groundswell in consumer activism, and consumers are using social media platforms such as Twitter and Tumblr to voice their opinions and to encourage change. Using social media, consumers can post multimedia and other short-form content onto a blog so that it can be shared with people who hold similar views or to inform others, with the aim of changing consumer behaviour.

ROLE OF THE MEDIA

Media organisations, including social media, newspapers and television programs, provide individuals with valuable information about a wide range of consumer-related issues. The media enables consumers to develop greater knowledge about an issue of concern to them, so they are in a better position to make a more informed choice when they purchase products.

The media also influences consumers to try new food products and flavours through social media influencers on platforms such as Instagram. New food products are often highlighted in food magazines and articles such as *The Age Good Food* weekly supplement. An *Age* article on the 'Top 10 new-wave hot sauces', for example, encouraged readers to experiment with some of the new chilli flavours that are available in our supermarkets and food stores.

Another article published in *The Age Good Food* in 2021, 'Impossible Beef taste test: America's most famous plant-based burger has finally launched in Australia', by Callan Boys, compared the new American meat-free burger with similar Australian beef-substitute patties. Articles such as these provide consumers with information and can influence the types of food they choose to buy.

Activity 10.1

Plant-based meats tick health boxes

Read the article, then answer the questions below.

1. Evaluate the validity of this news article. Consider the reliability of the sources of information used in the article, the context and presentation of evidence.
2. Give reasons why the report co-author Teri Lichtenstein decided to investigate this topic.
3. What health benefits did the Food Frontier report identify about plant-based foods?
4. Outline the main issues to consider when comparing plant-based foods with similar meat alternatives.
5. What role do you think a media organisation such as the *Sydney Morning Herald* or another media outlet has in the debate on plant-based foods versus similar meat alternatives?

PLANT-BASED MEATS TICK MORE HEALTH BOXES THAN REAL MEAT, REPORT FINDS

As more Australians flirt with the idea of reducing their meat intake, a new report has found that plant-based alternatives are on average nutritionally better or similar to their real meat equivalents.

Non-profit alternative meat think tank Food Frontier analysed the nutrition information and health rating of almost 100 plant-based meat products in Australia and New Zealand and compared them to their animal meat counterparts across six categories, including sausages, burgers, bacon, mince and schnitzels.

The report, released on Wednesday, finds that plant-based versions have, on average, much less saturated fat, more or comparable protein and lower or similar kilojoules and sodium. They are also a source of dietary fibre, which meat is not.

Report co-author Teri Lichtenstein, an accredited practising dietitian, says she was surprised by the findings and says as fake meat becomes more available in supermarkets, the study helps answer a critical consumer question by showing it is often a healthier direct swap.

'Obviously the gold standard is to eat as many whole foods as possible like fruits, vegetables and wholegrains, but consumers have been hearing these messages for many years and not enough behaviour change has occurred,' Lichtenstein says.

It's why she believes plant-based meats can play a key role in encouraging Australians to eat less real meat, while still satisfying needs for taste and convenience.

According to OECD data, Australians ate just over double the amount of recommended red meat in 2019. Overconsumption of processed and red meats is linked to illnesses like type two diabetes and heart disease.

The Food Frontier report found plant-based meats had better health star ratings in all categories except mince, which had the same rating as regular mince. Lichtenstein says this is because normal mince is less processed than products like sausages and bacon.

Plant-based meats are made using combinations of plant proteins (often peas or soy), oils, spices, seasonings, starches and additives. Lichtenstein says manufacturers have room for improvement with ingredients and nutrition.

With the study findings based on averages, she says it's important for shoppers to examine food labels as some plant-based products are better than others. She recommends choosing a product with a health star rating of at least 3.5 and one that has the least amount of sodium and the greatest amount of dietary fibre.

UNSW professor of food and health Johannes le Coutre says while he thinks people should just eat more fruit and vegetables, he welcomes plant-based meats as a way to reduce global consumption of animal products.

Accredited practising dietitian Nicole Dynan, director of Sydney clinic The Good Nutrition Co, stresses that while plant-based meats have a 'halo effect', they are processed foods and should only be eaten once or twice a week at most as an alternative to usual burgers or sausages.

'These products can be convenient options that you can rely on once in a while but generally speaking to increase plants, you want to go for more natural options,' Dynan says.

'When you look at the label and don't recognise the ingredients on there, you have to ask yourself the question, is that something you want to eat, or are you better off buying a piece of fish or chicken?'

With plant-based meats often criticised for being processed, Food Frontier chief executive Thomas King points out they are serving as alternatives to meats that are not health foods.

'We find it more useful to ask the question of whether they're healthier,' King says.

Previous Food Frontier research found that health was the number one reason Australians wanted to reduce their meat consumption, followed by factors including the environment and animal welfare.

King says plant-based meats can meet consumer needs by supporting them to make healthier choices 'without having to completely change recipes they're cooking or where they're shopping.'

'Plant-based meats tick more health boxes than real meat, report finds', Sophie Aubrey, *Sydney Morning Herald*, 12 August 2020 (adapted)

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ACTIVISM

Organisations such as the RSPCA have become important avenues for consumers to become informed about current issues, particularly in relation to animal welfare and nutrition. They also offer consumers information about strategies they can use to influence current debate and how they can make changes to their own shopping behaviour. In addition, these organisations work actively to influence government policy in relation to animal welfare issues and product labelling.

The RSPCA

One of the key objectives of the RSPCA – the Royal Society for the Prevention of Cruelty to Animals – is to 'educate the community with regard to the humane treatment of animals'. Based on this objective, the RSPCA has been involved in raising consumer awareness on several issues relating to farm animal welfare and its links to consumer purchasing behaviour.

Weblink
RSPCA



RSPCA Australia

Bye Bye Battery Cages

For several years, RSPCA campaigns have encouraged consumers to take action to persuade all Australian supermarkets to remove cage eggs from their stores. These campaigns have highlighted some of the key animal welfare issues associated with keeping layer hens in cages. They aim to educate consumers on the issues relating to egg production in Australia, including the life cycle of a

hen, the different systems used to produce eggs and how eggs are used in commercial food production. The campaigns asked consumers to demonstrate their food citizenship by choosing cage-free eggs in the supermarket and to check the product labels on processed food to ensure that the eggs used are cage-free.

In 2021, the RSPCA encouraged consumers to support their campaign to have the national Animal Welfare Standards and Guidelines changed to phase out all battery cages that are used to house layer hens.

Choose Wisely

The 'Choose Wisely' initiative has been developed by the RSPCA to encourage consumers to look for cafés and restaurants that serve higher welfare food. This includes the use of cage-free eggs or chicken and pork that has been produced using higher welfare production systems.

- Cafés and restaurants are encouraged to sign up to the initiative so that consumers can be alerted to their commitment to include food on their menu that has been made with higher welfare ingredients. Consumers can then easily find that company's business when they search for somewhere to eat in their locality.
- Consumers can use the website to search for a café or restaurant that has joined the initiative. Consumers are also encouraged to use social media to spread the word about humane food through Instagram, Twitter and Facebook, using a variety of hashtags such as #RSPCAchoosewisely #choosewisely and #cagefreeeggs.



RSPCA Australia

The 'Choose Wisely' initiative

Practical Activity 10.2

Evaluating a certification program

Worksheet
RSPCA Approved

The 'RSPCA Approved Farming Scheme' certification program has helped to improve the lives of Australia's most intensively farmed animals – egg-laying hens, pigs, meat chickens, turkeys, and farmed Atlantic salmon. Primary producers and organisations can become certified as part of this scheme and can display this logo on their products or where the product may be sold. This allows consumers to make informed decisions on the foods they purchase.

RSPCA APPROVED FARMING®

RSPCA Australia

Investigate the RSPCA Approved Farming Scheme and its aims of raising consumer awareness and changing consumer behaviour.

1. Visit the RSPCA website.
2. Describe the purpose of the RSPCA Approved Farming Scheme.
3. Select one of the farmed animals involved and provide an overview of how the scheme helps to improve the lives of these animals.
4. Why was it important for the RSPCA to start this certification program?
5. Explain how this campaign helps a consumer to practise food citizenship.

HEALTH PROFESSIONALS

Health professionals, including general practitioners, dieticians and nutritionists all provide valuable advice to individuals and families on the types of food they should consume for good health. In a consultation with a patient who is overweight or obese, a family doctor might offer advice on how to modify their diet to reduce the amount of food they consume that is high in saturated fat. For example, they might recommend cutting down on their consumption of snack foods such as potato crisps or sweet biscuits as these foods are high in fat, salt and sugar, and substituting them for fresh carrot or vegetable sticks served with a dip instead. They might also advise new parents on the problems associated with feeding their infant many of the commercially available preprepared toddler foods, as many of these are high in sugar and contain little dietary fibre.

Dieticians and nutritionists too offer advice on how individuals can become active food citizens and take control of the food they consume. The website of Dieticians Australia provides consumers with a wide range of resources to help them make healthy food choices. They also aim to influence the foods consumers purchase, directing them to buying and preparing fresh, whole foods at home, rather than purchasing preprepared products. One of their information sheets *Healthy eating on a budget* asks the question 'is healthy food more expensive?' This fact sheet compares the cost of purchasing fresh potatoes, for example, with potato chips and potato crisps, highlighting how much cheaper it is, and the value to good health of purchasing fresh vegetables and cooking them at home. Under their *Smarter eating recipes* tab, Dieticians Australia provide householders with a wide variety of everyday meals so that they can prepare a delicious yet simple meal at home, rather than having to resort to purchasing preprepared or takeaway food if time is limited.



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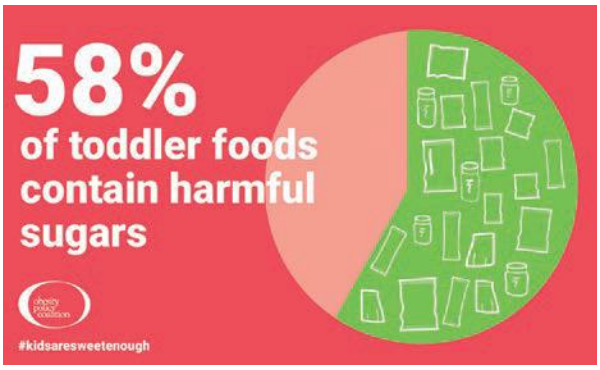
Dieticians provide advice on how to make healthy food choices.

CONSUMER RIGHTS ORGANISATIONS

Consumer rights organisations including the Obesity Policy Coalition and Choice, provide consumers with information so that they can be informed about a range of issues and become active food citizens.

The Obesity Policy Coalition

The Obesity Policy Coalition (OPC) is an organisation that aims to influence change in government policy and regulations to improve the diet of all Australians and help prevent obesity, particularly in children. The Obesity Policy Coalition uses their website to publish information to help inform Australians and to exert political influence on all levels of government to improve the food system so that healthier food choices are available to consumers. One of their key campaigns has focused on highlighting issues associated with the composition and labelling of infant and toddler foods. The marketing and advertising of junk food to children, and food labelling, are other areas that the Obesity Policy Coalition is actively endeavouring to change.



With permission of the Obesity Policy Coalition

A key campaign of the Obesity Policy Coalition is to ensure products marketed to children are accurately labelled.

Choice

Weblink
Choice

Choice is a consumer rights organisation that advocates on behalf of Australian consumers. One of their key aims is to inform and support Australian consumers about issues that are of concern to shoppers and helping them to exercise their food citizenship. In recent years, Choice has been involved in a number of consumer rights campaigns.

Free-range products

For many years, Choice has provided consumers with information about the certification schemes linked to free-range eggs and pork, and has clarified some of the language commonly used in relation to these issues. The information it provides enables consumers to understand issues such as animal welfare and the current regulations for egg, poultry and pork producers.

Palm oil labelling

Another consumer-rights campaign that Choice has been involved in is the campaign to ensure 'truth in labelling' for products that contain palm oil. The current food standards allow food companies to label palm oil simply as 'vegetable oil'. This means that consumers are not aware which products contain palm oil when they go shopping and therefore cannot make an informed decision.

Hundreds of thousands of hectares of rainforest are being destroyed in Indonesia to establish palm oil plantations, which is having a devastating effect on the environment by releasing climate-changing greenhouse gases. The destruction of the forests is also endangering the lives of the orangutans and Sumatran tigers that live in these areas.

In addition to the devastating impact it has on the environment, palm oil is high in saturated fat and is therefore associated with a number of severe health conditions including heart disease. Along with Choice, other organisations such as Zoos Victoria and Greenpeace are encouraging Australian consumers to become involved and to speak out against the misleading labelling of palm oil.



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Orangutans are endangered as a result of deforestation for palm oil plantations.

Understanding the Text

11 Based on your own experience, identify two employment opportunities young people may have in the supermarket sector. Outline the skills a young person may develop from this type of employment.

12 Explain how the food retail sector can influence the food choices of consumers.

13 How might the development of a new food product impact on other products available in supermarkets?

14 Give an example of how the food service sector can influence the types of foods available to consumers.

15 Draw up a knowledge map to highlight how the media can influence consumer demand.

16 Discuss the role of the RSPCA in ensuring caged eggs are removed from supermarket shelves.

17 Explain how campaigns such as 'Choose Wisely' influence consumer food choice.

18 Discuss the role that health professionals play in providing individuals with information about food and health.

19 Outline how the Obesity Policy Coalition influences consumer food choices.

20 Why has Choice become involved in the campaign to have clear labelling of palm oil on food products? Your answer should refer to both the environmental impact of palm oil production and the impact on endangered species.

Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

These sentence starters will help you focus your summary notes on the critical content of this chapter.

Worksheet

I learned that food processing is ...	
Some of the milk-processing companies in Australia are ... and they produce ...	
I changed my thinking about the role of the food service on the food choices of Australian consumers because ...	
I am aware that the media has an influence on our food choices because ...	
I noticed that the RSPCA influence the food supply by ...	
Something I learned about consumer rights organisations such as Choice is ...	

Nutty sweet potato soup with macadamia dukkah

Soups such as this nutty sweet potato soup demonstrate the way contemporary Australian cuisine is a fusion of classic ingredients, such as sweet potato, with Asian flavours, including curry, coriander and coconut. Dukkah and two varieties of nuts are used in this soup to enhance its flavour, texture and nutrient value. Sautéing and boiling are the two cooking techniques used in this recipe.

NUTTY SWEET POTATO SOUP

1 tablespoon vegetable oil

2 teaspoons curry powder

1 tablespoon coriander roots and stems, finely chopped

1 onion, peeled and diced

500 grams sweet potato, peeled and cut into 1-centimetre cubes

500 millilitres vegetable stock or water

50 millilitres coconut cream

50 grams unsalted roasted cashews, chopped

coriander leaves for garnish

MACADAMIA DUKKAH

½ cup macadamia nuts

¼ cup sesame seeds

½ teaspoon fennel seeds

2 teaspoons ground coriander

1 tablespoon ground cumin

½ teaspoon crushed black pepper

1 teaspoon flaked sea salt

½ teaspoon chilli flakes (optional)

METHOD

Nutty sweet potato soup

1 In a medium saucepan, heat the oil and add the curry powder and coriander roots and stems. After 30 seconds, add the onion and sauté until soft.
2 Add the sweet potato and stir through the spice mixture until coated.
3 Add the water or stock and bring to the boil. Cover and simmer the soup for 20–30 minutes or until the sweet potatoes are falling apart.
4 Remove from the heat, add the coconut cream and the cashews. Blend the mixture until smooth. Reheat gently. Do not boil.
5 Garnish with coriander leaves and serve.

SERVES 2–3

Macadamia dukkah

1 Preheat the oven to 180 °C. Line a baking tray with baking paper.
2 Place the macadamia nuts on the lined baking tray and roast in the preheated oven for 10 minutes or until golden. Set aside to cool.
3 Heat a frying pan over a moderate heat and gently toast the sesame seeds and fennel seeds until golden. Transfer them to a bowl and set aside to cool.
4 Place the ground coriander and cumin in the pan and cook, stirring, until fragrant. Add to the bowl with the sesame seeds.
5 When the nuts are cooled, place them in a food processor and pulse for a couple of seconds until chopped finely.
6 Add the rest of the ingredients and process again for a few seconds or until it reaches the desired texture. Don't over-process or the nuts will turn into a paste.
7 Store any excess in an airtight container or a sterilised jar.
8 Serve with the nutty sweet potato soup

EVALUATION

1 Describe the sensory properties of the nutty sweet potato soup and macadamia dukkah – appearance, aroma, flavour and texture.
2 Why are the curry powder and the coriander stems heated in the oil for 30 seconds before the other ingredients are added?
3 Explain why it is important to sauté the onion in step 1 of the recipe.
4 What problem could occur with the soup if it were boiled after the coconut cream and nuts were added?
5 Outline why, according to the nutritional rationale of the Australian Dietary Guidelines, it is important to include nuts in the diet.



Mark Fergus Photography

Spicy onion and pea bhajis with mint raita

Onion bhajis or fritters are a popular Indian appetiser or snack and are often sold as a street food. This recipe uses a combination of red onion and peas, but bhajis are also often made with spinach or potato. The creamy texture and cooling mint flavour of the raita counterbalances the crisp, light texture and spicy flavour of the bhajis.

SPICY ONION AND PEA BHAJIS

1 red onion, thinly sliced
¾ cup of frozen peas, thawed and drained
½ teaspoon salt flakes
½ teaspoon yellow mustard seeds
¼ teaspoon fennel seeds
¼ cup chickpea flour
¼ cup plain flour
¼ teaspoon baking powder
½ teaspoon turmeric
1 teaspoon curry powder
100 millilitres water
100 millilitres rice bran oil for frying

MINT RAITA

¾ cup of firmly packed mint
¼ cup coriander leaves
½ cup plain Greek-style yoghurt
1 clove garlic, peeled and crushed
½ small green chilli, thinly sliced
½ lemon, zested
1 tablespoon lemon juice
¼ teaspoon salt

METHOD

1. To make the mint raita, place all the ingredients in a small food processor and process until smooth and bright green in colour. If a food processor is unavailable, place the ingredients in a small jug and process using a stick mixer. Chill until required.
2. Combine the finely sliced red onion, peas and salt flakes in a bowl and mix gently to combine.
3. Place the yellow mustard seeds and fennel seeds in a small frying pan and stir over a moderate heat for 2–3 minutes until they begin to pop and become aromatic. Remove from the heat and crush in a mortar and pestle to a fine powder.
4. Sift the chickpea flour, plain flour, baking powder, turmeric and curry powder in a medium bowl. Add the ground mustard and fennel seeds.
5. Add 100 millilitres of water to the flour mixture and beat well with a wooden spoon until smooth. Fold the onion and pea mixture through the chickpea batter until coated well.
6. Place 100 millimetres of oil in a deep frying pan and heat to 180 °C. If a thermometer is unavailable, drop a cube of bread into the oil. It should rise to the surface and brown in 15 seconds.
7. Cook the bhajis in batches by gently dropping 1 tablespoonful of the bhaji mixture into the hot oil. Cook for 2 minutes then carefully turn the bhajis over and cook for a further 2 minutes. Drain on absorbent paper.
8. Cook the remaining bhajis and serve with the mint raita.

MAKES 10 BHAJIS

EVALUATION

1 Describe the sensory properties of the spicy onion and pea bhajis with mint raita – appearance, aroma, flavour, texture – using descriptive language.

2 Explain why it is necessary to test the temperature of the oil before deep-frying the bhajis.

3 Raitas are designed to provide a cooling counterbalance for spicy Indian dishes. Research, then make a list of other vegetables, herbs and spices that are often used in raitas.

4 Recommend the changes that could be made to the ingredients in the recipe for bhajis to ensure a person with coeliac disease could eat them.

5 Discuss why bhajis should be eaten as an occasional snack food rather than something to enjoy every day.



Mark Fergus Photography

Indian-style fish cakes with quick mango chutney

Bite-sized finger food such as these Indian-style fish cakes are popular to serve when entertaining friends. Pouring boiling water over the fish poaches the delicate flesh without overcooking it. The fresh but slightly spicy flavour of these fish cakes is balanced by serving them with mango chutney. Fish cakes are a very healthy snack food as they are high in protein but low in fat.

INDIAN-STYLE FISH CAKES

200 grams firm white fish, such as flake or ling
1 tablespoon vegetable oil
½ onion, diced finely
pinch of salt
1 clove garlic, crushed
2 centimetres fresh ginger, peeled and chopped
½ long green chilli, chopped finely
½ teaspoon ground cumin
½ teaspoon garam masala
1 egg
1 cup fresh breadcrumbs
2 tablespoons vegetable oil for frying
sprigs of fresh coriander for serving

QUICK MANGO CHUTNEY

1 tablespoon vegetable oil
1 red onion, thinly sliced
2 garlic cloves, crushed
1 centimetre ginger, peeled and diced finely
1 mango, peeled and chopped
3 tablespoons caster sugar
3 tablespoons white wine vinegar

METHOD

Indian-style fish cakes

1 Place the fish in a heatproof bowl. Boil 3 cups of water and pour over the fish in the bowl.
2 Cover with cling wrap and leave for 10 minutes. When cool, drain and flake fish, then set aside.
3 Heat 1 tablespoon of oil in a small frying pan over a medium heat and sauté the diced onion and a pinch of salt. Sauté for 3–4 minutes until the onion has softened but not browned.
4 Add the garlic, ginger, green chilli, cumin and garam masala, and cook for 2 minutes. Remove from heat and leave to cool.
5 Combine the flaked fish, onion and spice mix, egg and breadcrumbs and mix together. Wet hands in cold water and shake off excess moisture, then roll the mixture into patties 2 centimetres thick.
6 Heat the 2 tablespoons of oil in a frying pan over medium heat. Fry the fish cakes for 2 minutes on each side until golden brown. Drain on paper towel.

Serve with the quick mango chutney as a dipping sauce and fresh coriander.

Quick mango chutney

1 Use a small saucepan and heat the oil over medium heat. Add the onion, garlic and ginger and sauté until the onion begins to soften.
2 Add the mango, sugar and white wine vinegar and bring to the boil. Reduce heat and simmer for 8–10 minutes until the mixture is thick and glossy. Stir regularly.

Serve as an accompaniment to the Indian-style fish cakes.

SERVES 2

EVALUATION

1 Describe the sensory properties of the Indian-style fish cakes with quick mango chutney – appearance, aroma, flavour and texture.
2 Identify and explain the process that occurred to the fish when it was covered with the boiling water in step 1 of the recipe.
3 What is the purpose of cooking the spices for 2 minutes?
4 Why is it important to sauté the onion, garlic and ginger when making the chutney?
5 Explain why nutritionists recommend that Australians increase their consumption of fish.



Mark Fergus Photography

Pork and soba noodle stir-fry

Stir-frying is a cooking technique that was introduced into Australia by the Chinese during the gold rush; the technique was also popular with the Vietnamese migrants who arrived during the 1970s. It is considered to be a healthy form of cooking because it uses little fat, and the food is tossed quickly over the heat so it retains most of its nutrients. It is now a popular cooking method with a wide range of families. This recipe uses a very low-fat cut of pork and a variety of vegetables that will provide many important micronutrients as well as dietary fibre.

MARINADE

1 tablespoon honey

2 teaspoons soy sauce

1 tablespoon kecap manis

½–1 teaspoon sambal oelek

STIR-FRY

150 grams pork scotch fillet, sliced thinly

1 portion soba noodles

2 tablespoons oil, for frying

½ onion, cut into wedges

2 centimetres ginger, sliced finely

1 clove garlic, crushed finely

½ carrot, julienned

¼ red capsicum, julienned

6 snow peas

¼ cup water or stock

2 spring onions, sliced into 4-centimetre lengths

¼ cup coriander, finely chopped

METHOD

1 Combine the honey, soy sauce, kecap manis and sambal oelek, add the slices of pork scotch fillet, and marinate in the refrigerator 15–20 minutes.
2 Cut all the vegetables into the appropriate sizes, as listed.
3 Bring a medium-sized saucepan of water to the boil. When the water is boiling, add the soba noodles and cook for 4 minutes. Drain and rinse in warm water, then drain again.
4 Drain marinade from pork scotch fillet and heat 1 tablespoon of oil in a wok on high.
5 Fry onion for 30 seconds then add half the meat strips. Cook for 1 minute then add the remainder of the meat. Stir-fry until almost cooked. Remove from heat and keep warm.
6 Wipe out the wok with paper towel and heat the remaining oil on high.
7 Add the ginger and garlic, then the carrot, capsicum and snow peas, allowing 30 seconds between the addition of each ingredient.
8 Add the water or stock and cook until vegetables are just tender.
9 Add the spring onions and cook for 30 seconds.
10 Return the meat and onion to the wok, then stir through noodles. Serve and sprinkle with coriander.

SERVES 1

EVALUATION

1 Describe the sensory properties of the pork and soba noodle stir-fry using descriptive language.
2 Why is it important to rinse the noodles after they have been cooked?
3 Why does the recipe recommend allowing 30 seconds between adding each of the vegetables to the wok in step 7 of the recipe?
4 Explain why stir-frying is a popular method of cooking in Australian homes today.
5 List other vegetables that could be added to the pork and soba noodle stir-fry. Outline the health benefits of increasing the fibre content of this recipe.

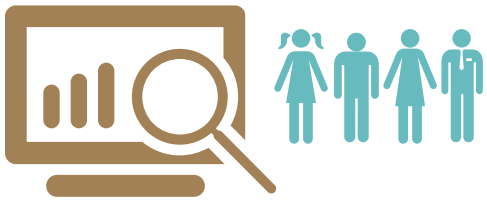


Mark Fergus Photography

THE PROCESS OF PRODUCT DEVELOPMENT

RESEARCH

- Research is conducted to establish information about consumers, such as their age, lifestyle and general buying patterns.



DESIGN BRIEF

- It provides an outline for the new product, which contains specifications, considerations and constraints.
- It gives the aims and intentions of the new product and guides the producer.

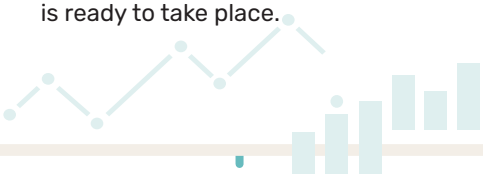


PROTOTYPE

- The development of a sample or trial product allows manufacturers to determine whether the new product is viable. Aspects tested include sensory properties, shelf life, and physical properties such as size, shape and packaging size.

PRODUCTION

- The manufacturer produces a scaled-up version of the product to determine whether it is ready for full-scale production.
- Packaging and labelling will be designed and full-scale production is ready to take place.





EVALUATION

- The product is evaluated against the previously established criteria to determine whether it meets the specifications outlined in the design brief.
- Product evaluation is conducted using tasting panels, and consumer testing determines the appeal of the product and its packaging to consumers.
- An evaluation is also carried out to determine whether sales and profit margins make the new product economically viable.

11

FOOD PRODUCT DEVELOPMENT

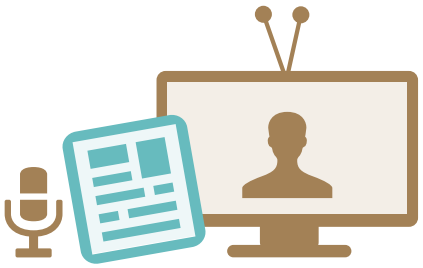
CRITERIA FOR SUCCESS



- Questions are used to evaluate the finished product. They will determine whether the product has met the needs of the client outlined in the design brief.

MARKETING

- A marketing plan is developed.



- Consideration is given to the '4Ps' of marketing – product, price, place and promotion.



KEY TERMS

considerations more flexible than constraints and may not direct the outcome of the product in the same way as a constraint

constraints aspects over which the designer has little control, but which can restrict or create problems in the development of the product

mouthfeel the way the food feels against the skin on the inside of the mouth

organoleptic the sensory properties of food such as appearance, aroma, flavour and texture

prototype a sample product or trial model of the product idea that was outlined in the design brief

qualitative or sensory analysis sensory tests that are used to rate and/or rank the organoleptic or sensory properties of food such as appearance, aroma, flavour and texture

quantitative tests scientific techniques that can be used to measure physical features such as size, height, weight, volume, texture, colour, viscosity, shelf life, gel and nutrient content

specifications the constraints and considerations that will impact on the product development

umami usually described as a savoury, meaty or 'moreish' flavour; it is often described as the fifth taste

Resources
Study Design
links
Infographics
Flashcards

Process of product development

Whether an existing product is to be redeveloped through a line extension, a new product is to be developed in response to competition, or a new product range is to be developed, food manufacturers will approach the problem by following the design process. The design process is a series of systematic steps that the manufacturer takes to develop the new food product.

However, while the company will begin the process of design in a systematic way, sometimes the design process may be interrupted at various stages as problems arise. This often occurs in the stage of developing alternatives, or when the company is designing a plan for the production of the product. If problems do occur, the project team may need to revert to the investigation or research stage, so that additional information can be found, and solutions suggested.

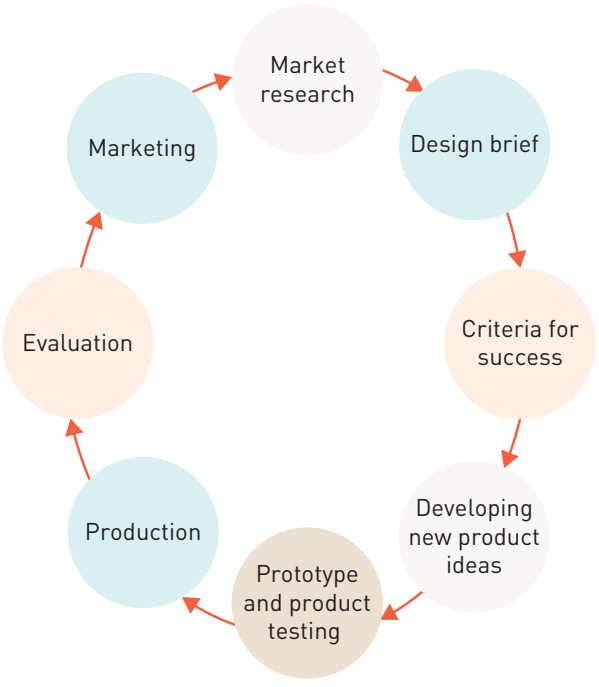


FIGURE 11.1 The process of product development

MARKET RESEARCH

Market research is a vital part of all new product development. Companies collect and analyse a wide range of information to assist them in their decision-making throughout product development. Through market research they find out about the demographics of their consumers, including information about their gender, age, socio-economic background, lifestyle, work and family life, and general buying patterns.

Market research specialists also observe the societal trends and influences in the marketplace, which can create opportunities. They are especially interested in any consumer needs they have identified that have not been met, such as the demand of health-conscious consumers for fat-free foods, or foods that are low in sugar or high in fibre. Increased work participation has also led some consumers to demand products that make their meal preparation easier and less time-consuming.

The company then uses the information collected as a result of market research to develop the concept for a new product.

DESIGN BRIEF

Collaborative Activity

The design brief – a statement or outline of the new product – clearly defines the aims and intentions of the new product and includes all the specifications or constraints and considerations. It provides directions for the product development teams.

Specifications – constraints and considerations

An important aspect of the development of the design brief is establishing the specifications that will impact on the product development. **Specifications** are the constraints and considerations that will impact on the product development. They act like sign boards that provide information, and direct and guide the design team to ensure the product will meet consumer needs and be an economic success.

Constraints are those aspects over which the designer has little control, but which can restrict or create problems in the development of the product. They can include the following:

- The company policy limits production to a specific product type, such as biscuit manufacture, pasta production or frozen desserts because of the technical expertise they have developed. There may also be a requirement by management to use the current expertise available within the company, rather than having to purchase knowledge and skills from outside the company.
- There could be certain processing constraints, such as needing to use the existing plant and equipment. Investment in any new machinery would add significant cost to the development of the product.
- Legislative and environmental constraints will also impact on the product development. Compliance with the Food Standards Code, the *Competition and Consumer Act 2010* and industry codes of

practice will all impact on the way in which a new product is designed and produced.
- The requirement to develop a new product within a given time frame will also be a significant constraint. The marketing strategy for a new product may require that it be launched at a particular time of the year, such as a new soup just prior to winter or a special Christmas product several months before the festive season.

Considerations are more flexible and may not direct the outcome of the product in the same way as a constraint. Commercial considerations can include:
- competition from other manufacturers that produce similar products
- success of similar products in other countries
- availability and suitability of raw ingredients; for example, some berries have more appealing sensory properties in food products than others, and fruits such as melons may not be suitable for use in desserts or as a flavouring ingredient in yoghurts because of the way they react during processing



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Questions to be asked when establishing the specifications

CRITERIA FOR SUCCESS

The aim of every company is to develop products that will be well accepted by consumers and therefore help the company to make a profit. A key part of the design process is the development of criteria that can be used to evaluate the product. This will help the company to determine whether the product is likely to meet the needs outlined in the design brief well before the product is launched in the marketplace.

The key aspects likely to be evaluated include issues such as whether the product will:
- meet the constraints set out in the design brief
- have acceptable sensory properties
- utilise current expertise and resources available to the company
- be profitable for the company.

DEVELOPING NEW AND INNOVATIVE PRODUCT IDEAS

There are two stages in developing ideas for a new product – the innovative ideas stage and the evaluation and screening of these ideas.

Innovative ideas stage

This stage is the brainstorming or ideas stage, when marketing and technical experts in the company think up new ideas and try to determine which products will meet the needs of consumers.

To generate new ideas, the company will use a range of strategies.

Direct research

Direct research may involve:
- visiting international trade shows to research the latest trends and developments in food products
- examining trade journals to identify current trends in manufacturing techniques, raw materials and packaging
- exploring current patents to ensure that they keep in touch with competitors
- scrutinising the products of competitors to determine whether their ideas can be modified or copied
- seeking consumer opinion about existing products to identify their strengths and weaknesses
- seeking information on current trends from existing wholesalers and retailers, and searching for new suppliers of raw materials.

Creative methods

The company will also use a variety of creative methods to generate ideas.

Groups of marketing and technical experts will work together to generate new product ideas. These sessions can take the form of:
- creative discussions or brainstorming, in which all new ideas are accepted and reviewed later; ideas generated in these sessions are often described as 'light bulb' moments
- detailed questionnaires given to focus groups to stimulate ideas about emerging needs and on-trend ideas in the community – consumers are asked what they like to eat, when and where they are eating it and what they would like to see in a new product.

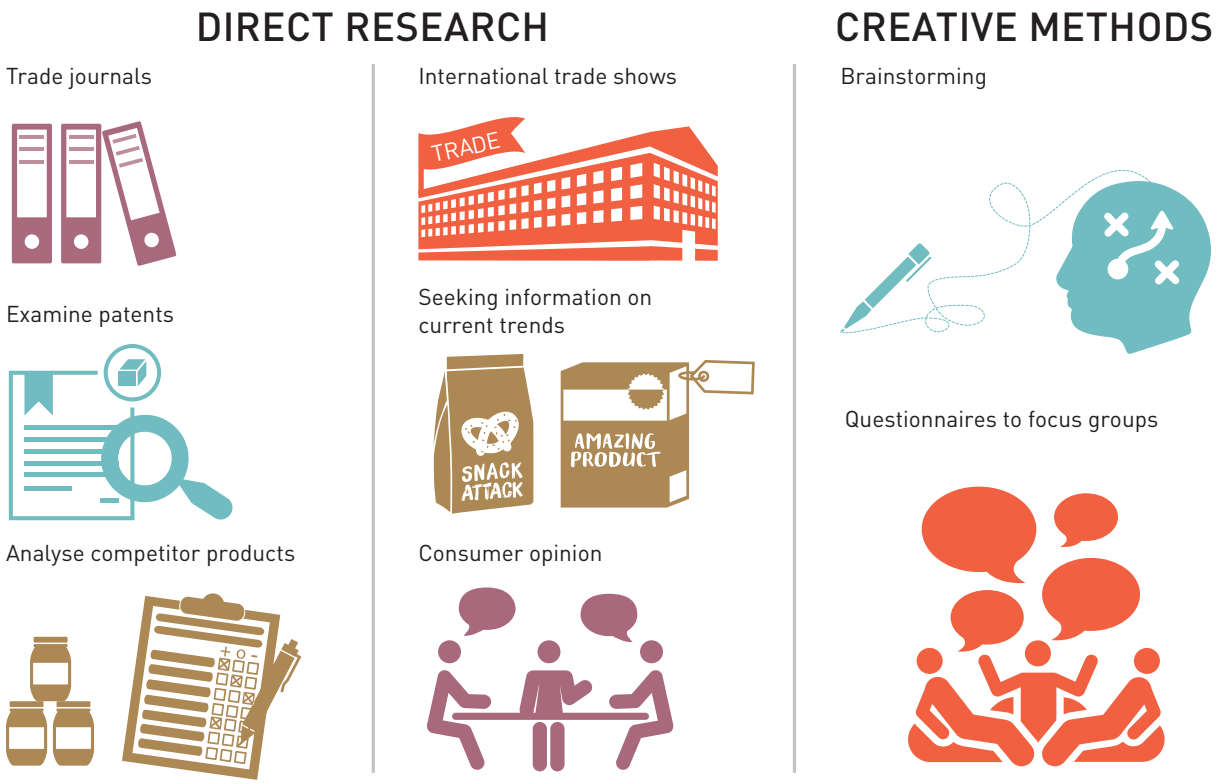


FIGURE 11.2 Methods used to develop new product ideas

Evaluating and screening of ideas stage

Once a broad range of ideas has been generated, the initial step is to undertake first-stage screening, where each idea is assessed against a set of criteria to determine whether it meets these minimum requirements. This is often presented as a matrix table with a simple pass/fail test. Of the original ideas, approximately 30 per cent will proceed to the next stage.

Second-stage screening involves a detailed analysis of the raw materials required to produce the new product, the equipment requirements and availability, the cost of new equipment, the availability of technical expertise, likely consumer demand and prospective sales. This screening will ensure that only the two or three products with the potential to succeed will be developed further.

TABLE 11.1 A matrix table for a new product

PRODUCT IDEAS	CRITERIA FOR ANALYSING A NEW DESSERT				
	Production technology	Existing skills	Consumer acceptance	Marketing and distribution	Rating
PRODUCT 1	Pass	Pass	Fail	Pass	Fail
PRODUCT 2	Pass	Pass	Pass	Pass	Pass
PRODUCT 3	Fail	Pass	Fail	Pass	Fail

PROTOTYPE AND PRODUCT TESTING

The next step in the development of a product is to develop the ideas into a sample product or **prototype**. A prototype is a sample product or trial model of the product idea that was outlined in the design brief. It is produced on a very small scale to see whether the product idea is likely to be viable.

In developing the prototype, the food technologists carry out a range of experiments to determine the best combination of ingredients to ensure the product has appealing sensory properties and the shelf life of the product is maximised. Their experiments also establish the processes to make the best product possible. Another important aspect is the need to develop a prototype for the packaging to be used for the product, considering issues such as shelf life, product protection, ease of handling and distribution, labelling requirements, consumer appeal and environmental sustainability.

The development of a prototype is a critical stage in the development of a product because it enables the company to:

- determine the ingredients required to produce the product and evaluate whether they will be available during production
- evaluate the nutrient content of the product and make adjustments if necessary
- assess the sensory properties of the product to ensure they will be appealing to consumers
- evaluate and adjust the physical properties of the product, such as its size, shape, weight, packaging size, and its ability to be reheated or frozen
- determine whether the product can be manufactured using available equipment
- evaluate whether current staff have the technical expertise and knowledge to develop the planned product
- estimate the costs involved in manufacture and evaluate whether the product will be economically viable
- evaluate the shelf life of the product.

Once a prototype has been produced, it is subjected to qualitative or sensory analysis such as taste-testing by the project team and focus groups to evaluate the appearance, aroma, flavour, texture and mouthfeel of the product, and suggestions for improvements are made. Comparison screening may also be undertaken by the company to ensure that the product will be competitive with similar products in the marketplace. This can involve purchasing a competitor's product and undertaking both a quantitative analysis and qualitative evaluation of the product and comparing it with the prototype. This will identify areas for improvement so that the product can offer enhanced features to the consumer.

Sometimes products are rejected at the prototype stage because it is apparent that while, in theory, they seemed appropriate, the ideas will not translate into a feasible product. If it appears that the product is likely to be acceptable, a recipe will be formulated ensuring that it meets all legal requirements.

PRODUCTION

Having developed a successful prototype, the company will then move into the production phase of the product development. To do this, the company begins production trials in which the prototype is scaled up for production. The production trials take place in a pilot factory, which has similar equipment to that used in the main factory, but on a smaller scale.

The purpose of the production trials is to determine whether it is possible to replicate the prototype using full-scale equipment and commercial volumes of ingredients. Often the process engineer who is responsible for the scale-up to full production must make changes to the formulation developed for the prototype. For example, sometimes the types of ingredients used in the prototype don't perform as well when used in large quantities, and adjustments may be needed. Alternatively, it could be that the proportion of ingredients needs to be altered to make the product as close as possible to the prototype.

During the scale-up, the process engineer will test the performance of any new equipment to check that any manufacturing problems can be overcome before it goes into commercial production.

Finally, the process engineer designs the production line to be as efficient as possible, specifying:

- the exact ingredients to be used
- the precise processes required in the production; for example, whether the melt-and-mix method or the creaming method is used
- the processing conditions such as oven temperature and length of baking or chilling
- a detailed Hazard Analysis Critical Control Points (HACCP) system.

Understanding the Text

1 What type of information does a company gain through market research? Why is this information important when developing a new food product?

2 Outline the main information contained in a design brief.

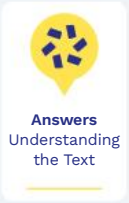
3 Explain the difference between constraints and considerations in a design brief.

4 Complete the diagram below by identifying three possible constraints and three possible considerations that a food manufacturer might face in the development of a new food product.

Constraints	Considerations

5 Explain why it is important to develop criteria for success.

6 Outline the two ways in which new product ideas are developed. Why are questionnaires given to consumer focus groups an important research tool?



7 Describe the two methods used for screening and evaluating ideas for a new product.

8 What is a prototype? Explain why the development of the prototype is a valuable process for the food manufacturer.

9 Outline the main steps in the production phase of the development of the new food product.

10 What is meant by the term 'scaling-up' a recipe and why is it important to test this during production trials?

Packaging and labelling

Packaging and labelling is an important stage in the development of the product, as the packaging often sells the product.



FIGURE 11.3 Considerations when designing food packaging

EVALUATION OF A NEW FOOD PRODUCT

A comprehensive evaluation of all stages in the development of the product is undertaken by the company to make sure that the product meets the requirements set out in the design brief. This is to ensure that it will be successful in the marketplace, so that the company then makes a profit. This evaluation will include an assessment of the product, including its qualitative and quantitative characteristics, the production processes and its economic viability.

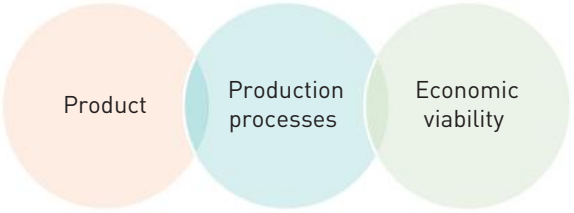


FIGURE 11.4 Evaluation of a new food product

Evaluation of the product

One of the most important aspects of food product development is to complete an evaluation of the physical and sensory properties of the product once the final prototype and scale-up have been completed. Although the company will undertake

a similar evaluation during the development of the prototype, the company usually does some follow-up product evaluation using tasting panels and consumer testing to test the appeal of the product and its packaging to consumers. This assists the marketing team to develop marketing strategies to successfully launch the product in the marketplace.

Evaluation of the production processes

Both the process engineer and the production manager will review all stages of the production. This includes the resources used, the type of ingredients and availability, and other materials required to make the product. Consideration is also given to the suitability of the cooking methods, flavourings and presentation of the food. They also review the technical expertise required to produce the product and whether staff require retraining or if additional staff are needed. They evaluate the effectiveness of the production processes and the problems that arose during the scale-up and full production process. It is also important to review the HACCP system to determine if identified hazards were monitored effectively and the corrective actions were successfully implemented.

Evaluation of economic viability

When a new product is in the development stage, the company will undertake an economic analysis of costs involved in its production. These are really a forecast of the anticipated costs of the design and development of the product, and the likely profit if sales meet their target. This process is called a financial feasibility study and is used to determine a 'break-even point' based on the costs of development, marketing, production and number of sales required to make a profit.

This evaluation is based on the projected product life cycle, including production costs and anticipated returns over several years. These are reviewed once the development stage has been completed and the product is launched in the marketplace to ensure that the company can recoup the cost of development of the product.

Initially, the economic returns will be low as the new product finds acceptance among consumers. However, the success of the product in the marketplace will be critical to maintaining its continued viability in the company's product range. The sales of the product must rise to a level that will cover the development costs, including any investment in new equipment, as well as the cost of raw materials, labour and other overheads.

Data is also reviewed from the information supermarkets collect as food items are scanned through the check-outs. This will include information on the number of products sold per shop, the most popular package size of the food product, which supermarket sells the majority of the product and whether the food is a seasonal item.

MARKETING

A marketing campaign must be developed to help launch the new product into the marketplace. The company may have its own marketing department, which is responsible for developing a promotional campaign for the product, or it may use the services of a professional marketing company. The goal of the marketing campaign is to encourage consumers to try the product – it doesn't matter how good the product is if no one buys it.

After consumers have made their initial purchase, the marketing campaign must encourage them to become repeat purchasers to maintain market sales.

The company will start planning the marketing campaign long before the first products come off the conveyor belt.

Product, price, place and promotion

A key feature of the development of a successful marketing plan is establishing the marketing fundamentals for the campaign, the '4Ps' – product, price, place and promotion. This means answering some key questions about the product:

- What is the product and who is the target market?
- What price can it be marketed at to make a profit for the company but still be acceptable to the target market?
- Where is the best place or location to sell the product so that it is accessible to the target market?
- What is the best way to promote the product so that it is widely recognised by consumers?

The product launch is a key feature of the marketing campaign and is when the new product is introduced into the marketplace on a large scale. The launch usually includes an intensive advertising campaign, often involving television and magazine advertising, social media, billboard signage, in-store promotion and taste-testing.

The marketing campaign must be exciting and create interest in the product to encourage consumers to purchase the product, not just once, but regularly so that the product continues to make a profit for the company.

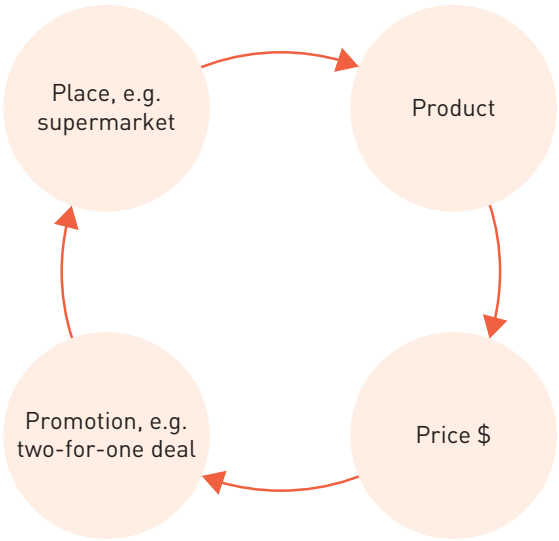


FIGURE 11.5 The marketing mix

Evaluation of the marketing campaign

Finally, the company evaluates all aspects of the marketing campaign, including the promotional strategies such as television and magazine advertising, social media, promotional displays, any competitions that have been run in conjunction with the product launch, supermarket demonstrations and free samples. Company employees, consumers and industry specialists are all asked for feedback on all aspects of the marketing mix.

The company also undertakes a SWOT analysis of the marketing plan to identify whether minor adjustments need to be made. A key aspect of the SWOT analysis is to evaluate the competition from other manufacturers, determining the strength of the product in comparison with similar products in the marketplace.



FIGURE 11.6 SWOT analysis

Another key aspect of the evaluation of the marketing plan is a review of the target market. An analysis of sales identifies whether the needs of the target market are being met as anticipated. If sales are below expected levels, these needs may not be being addressed. The product packaging is also evaluated to ensure that it is achieving its aim of protecting the product, as well as being a key feature of the marketing plan.

Establishing sales targets will be one of the important features of the marketing plan. If initial sales rise quickly and stabilise at a level that will ensure a profitable return to the company and meet the target, the company generally maintains the product in its range. However, if the product does not prove to be economically viable, it is unlikely that the company will continue to support the product's promotion. Equally, if for any reason problems arise with the design or in the production of the product, the company may decide to 'kill' the product to protect the reputation of the company and the sales of other products in its range.

Practical Activity 11.1

Design brief – Snacks for a road trip

Work in pairs to complete the activity that follows.

Design brief

You and your best friend are going on a road trip to Sydney. The drive will take approximately 10 hours. Together, you will need to prepare two snacks that can be eaten on the drive to Sydney. You and your friend prefer natural, organic and sustainable foods that can be easily eaten in the car or when stopping for a break. As you both love chicken, you have decided to use this ingredient in one of your snacks, and you want to challenge traditional flavours and combinations of ingredients. You will have an esky to keep the products cool but there will be no way to reheat any of the food you bring. You will need to prepare the snacks the day before, and this should take no more than 90 minutes as you both have a very busy day finalising the itinerary and packing.

Part A – Designing and investigating

1. Highlight the constraints and considerations within the brief.
2. Develop five criteria questions to assess the success of your snack choices.
3. Develop a mind map of a range of snack foods that could be taken on your trip considering the specifications within the design brief.
4. Investigate and research recipes that utilise your preferred snack choice to ensure they can be produced in time.
5. Select two recipes that best fit the specification in the design brief.

Part B – Producing and evaluating

1. Complete a food order for your teacher.
2. Produce the food items following all safety and hygiene procedures.
3. Evaluate the success of your products based on your five criteria questions.

Note: Part A of the activity can be completed without Part B.

Understanding the Text

11 Outline four factors a company would need to consider when developing the packaging for a new food product.

12 Explain why a company would undertake a final evaluation of the physical and sensory properties of the new product before it is launched.

Answers
Understanding the Text

13 List four aspects of the production processes that will be reviewed during the evaluation of the product.

14 Why is it important to review the HACCP system when evaluating the production processes?

15 Explain what is meant by the term 'break-even point' when conducting an economic evaluation.

16 Explain how the data a company receives from supermarkets will assist it in its evaluation of a new food product.

17 Explain why marketing is a critical step in the development of a new food product.

18 Suggest some important considerations when determining the price of a product.

19 Why it is important to consider the competition from other manufacturers when reviewing the marketing campaign?

20 Explain why many companies would use a SWOT analysis to evaluate their marketing campaign.

Evaluating food products

Evaluation of food products may be based on a person's subjective opinion; that is, their personal taste or opinion. This is called qualitative analysis. Another method of evaluating food products is to use objective data such as the measurement of weight or volume. This is called quantitative analysis.

QUALITATIVE ANALYSIS

A person using qualitative analysis to evaluate a food product needs to consider the effect the food has on all of their senses – what it looks like, what it smells like, the taste of the food, what the food feels like when they put it in their mouth and even what it sounds like. Sensory descriptors like those in the table on the following page may help you to describe food.

Qualitative analysis of the sensory properties of food happens every time we eat. Sometimes, if we are eating with others, we might share and discuss the properties of the food; at other times, we might make a mental note to ourselves to try it again or never eat it again. **Qualitative or sensory analysis** involves sensory tests that are used to rate and/or rank the **organoleptic** or sensory properties of food, such as appearance, aroma, flavour and texture.

A food manufacturer needs to analyse the organoleptic properties of food to ensure it is appealing to consumers and is more desirable than their competitors' product. They do this by conducting sensory analysis or taste tests to determine consumers' reactions when they eat their food

TABLE 11.2 Sensory descriptors

SENSORY PROPERTY	SENSE USED TO DETECT PROPERTY	DESCRIPTIVE EXAMPLES OF THE PROPERTY
Appearance	Sight	Colour – light, dark, golden, pale, translucent, clear, transparent, shiny, dull, glossy, speckled, white, bright, vivid Shape – oval, round, square, rectangular, irregular, half moon Texture – curdled, runny, lumpy, foamy, smooth, rough, prickly, greasy
Aroma	Smell	Pungent, aromatic, strong, weak, burnt, spicy, yeasty, fruity, sweet, sugary, citrusy
Flavour	Taste	Sweet, sour, bitter, salty, acidic, spicy, hot, mild, strong, weak, sharp, smooth, umami (savoury), chocolate, citrusy, garlic, ginger, mint, fruity
Texture	Touch	Mouthfeel – sharp, smooth, soft, crunchy, firm, greasy, juicy, moist, watery, dry, chewy, rough, tender, tough, oily, waxy, spongy, crumbly, flaky, lumpy, gritty, coarse, velvety, granular, sticky Temperature – hot, cold, warm, cool, sizzling
Noise	Sound	Crisp, crunchy, bubbling, crackling, fizzing, slurping, popping, dull

products. These tests can be carried out by an expert tasting panel and/or consumers because everyone has an opinion of the organoleptic properties of food, so it is important that the manufacturers receive feedback and identify preferences. Usually, one of three types of sensory testing is used when developing a new product:

- *preference tests* – to try to establish how much or how little the testers liked or disliked a given product
- *difference tests* – to try to determine whether consumers can tell the difference between individual samples of food
- *profiling tests* – to give a more detailed description of the sensory properties of the product.

Preference tests

A preference test is used when a company wants to gain extra detail about consumer likes and dislikes for a product. Participants in these taste tests use hedonic (relating to pleasure) descriptors which can describe the 'pleasure' a food gives them. Hedonic descriptors can be presented and recorded in a variety of ways:

- Participants describe the food using terms such as delicious, tasty, yummy, luscious, appetising, nice, good, revolting, horrible, dreadful and foul.
- Participants rate food on a nine-point scale (between 1 and 9), with 5 being a neutral reaction: 9 is generally 'liked very much' and 1 is usually 'disliked very much'.
- Participants use a facial hedonic descriptor to describe their reaction to tasting food. This type of descriptor is a simpler technique for measuring food preferences and is often used with children. Participants indicate their preferences using a range of different facial expressions, from one that is very unhappy, to one that is smiling broadly, indicating considerable pleasure.



FIGURE 11.7 Facial hedonic descriptors

Difference tests

A number of tests can be undertaken to distinguish the difference between two food products. The results are then analysed statistically to determine whether or not differences are significant.

- Triangle test – This is one of the most commonly used tests. Three samples are presented to the testing panel, two of which will be the same. In this type of test, differences between the samples are often very small. Test panel members can also be asked specific questions about the characteristics of the samples.
- 'Two-out-of-five' tests – This type of test includes three samples that are the same, and two that are different from the other three and from each other. The samples are presented randomly, and the panel must decide which two of the samples are different.

Practical Activity 11.2

A triangle test for Australian cheddar cheese

In this test it is important to offer the different testers different orders of samples. Six different orders of samples are possible: AAB, BAA, BBA, ABB, ABA, BAB.

Aim: To determine how many class members can tell the difference between two brands of Australian cheddar cheese.

Method

1. Your teacher will prepare the samples of cheddar cheese cut into 10-gram cubes and they will be arranged in one of the combinations above for each class member to taste.
2. Sit quietly and take your time tasting each sample of cheese. Consider the sensory properties of each sample – appearance, aroma, flavour and texture.
3. Sip some water after each sample has been tasted.
4. Record which one of the samples is different in a table like the one opposite. Inform your teacher, who will then record the information on the class results sheet. Add extra rows to match the number of students in the class.

Analysis

1. Was the number of correct responses to the taste test as you expected?
2. Identify some factors that could have influenced the results from your class.
3. Explain why getting the correct response in a triangle test could be difficult.
4. Scientists recommend that 80–95 per cent of testers should get the correct response for the data to be of value. How many testers do you think need to take the test for the results to be statistically significant? Justify your answer.



Shutterstock.com/Sunny Forest

Cheddar cheese

Conclusion

How many class members can tell the difference between two brands of Australian cheddar cheese? How would this information be of value to a food manufacturer developing a new food product?

Results

TESTER NUMBER	DID THE TESTER PICK THE SAMPLE THAT WAS DIFFERENT? (MARK WITH AN X)	
	Yes	No
1		
2		
3		
4		
5		
6		
Sample size	Total number of 'yes' results	Total number of 'no' results

Profiling tests

When a food manufacturer wants to find out about the specific properties of a product it will ask trained tasters to complete a profiling or descriptive test. This type of test is the most complex of all sensory testing and aims to evaluate the individual components of a product. Food manufacturers can use this type of test to evaluate the characteristics of their own product in comparison with a competitor's product. Each member of the testing panel will rate all the sensory properties of a food product. A star diagram, such as the one on the following page, is used to record the results and to evaluate the differences.

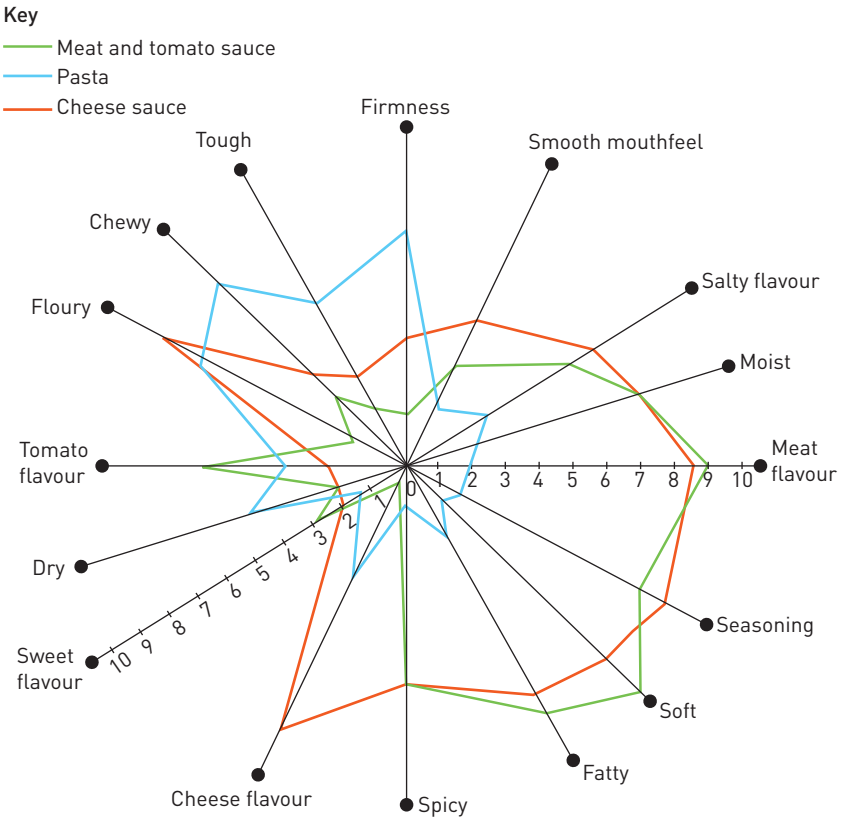


FIGURE 11.8 A star diagram used to record data for a profiling test for lasagne

CONDUCTING A TASTE TEST

Each of the sensory analysis tests – preference test, difference test or profiling test – requires the food to be tasted. The aim of a sensory analysis is to taste-test and identify preferences among different samples of food, generally using a small panel of experts. These experts are meant to represent the consumers.

When a new product is being developed, trained testers will be given samples of the food to evaluate. They will use a variety of descriptors and tests to produce their results. On other occasions, food producers will use a large group of consumers to evaluate a specific feature of their product, such as flavour. Because consumers will give highly variable responses, a group of 50–100 people is used to ensure they have a representative sample.

When organising a tasting panel, the following points should be considered:

- Only one characteristic of a food should be evaluated in each test.
- No more than five tests should be carried out in one session, as the ability of testers to distinguish different characteristics will become less accurate.
- A sensory evaluation sheet should be prepared for the members of the tasting panel to ensure each person carries out the same test.
- The members of the tasting panel should also have water to drink or a small portion of dry biscuit to eat to refresh or cleanse the palate after each sample has been tasted.



iStock.com/webphotographeer

Assessing the sensory properties of food

QUANTITATIVE ANALYSIS

Food sold to consumers must meet the requirements of the Food Standards Code, so the manufacturer undertakes a range of scientific tests. The evaluation of food products is done using quantitative or objective tests that are measurable and can provide accurate data. **Quantitative tests** are scientific techniques that can be used to measure features such as size or height, weight, volume, texture, colour, viscosity, shelf life, gel and nutrient content. The test also includes a description of the optimum features of the product to provide a benchmark against which the new product can be compared. These tests use appropriate scientific techniques, giving an accurate report on specific features. On completion of the tests, the company will chart the data in a comparative fashion.

Weight

One of the simplest quantitative tests to undertake is the comparison of the weight of two products. The weight or mass of a product is easily determined by using a set of scales. Digital scales are used because they provide very accurate measures, even for very small weights. It is important for a food manufacturing company to ensure its scales are accurate by having them calibrated or checked for accuracy on a regular basis.



Getty Images/Camille Delbos/Art In All of Us

Digital scales provide an accurate measurement when weighing food.

Size

Features such as height or circumference are measured to compare either the product before and after cooking, or to compare different products to each other. The size of a product can be measured using a ruler or tape measure.



Shutterstock.com/Akimov Igor

Measuring size

Colour

Colour is one of the most important visual features of a food product and often influences our perception of the food. Most of us have an opinion about what colour a particular food should be, and this can influence our reaction to a food product. In food manufacturing it is important to be able to obtain a consistent colour in baked goods, so that, for example, every loaf of bread is the same golden colour when it comes out of the oven. Computer technology enables companies to make accurate colour comparisons between products. A very simple method of evaluating colour is to use a five-point colour graduation scale; for example, from very pale to very dark.



iStock.com/Bhakpong

A hand-held colorimeter is a flexible tool used to measure the colour of different food products.

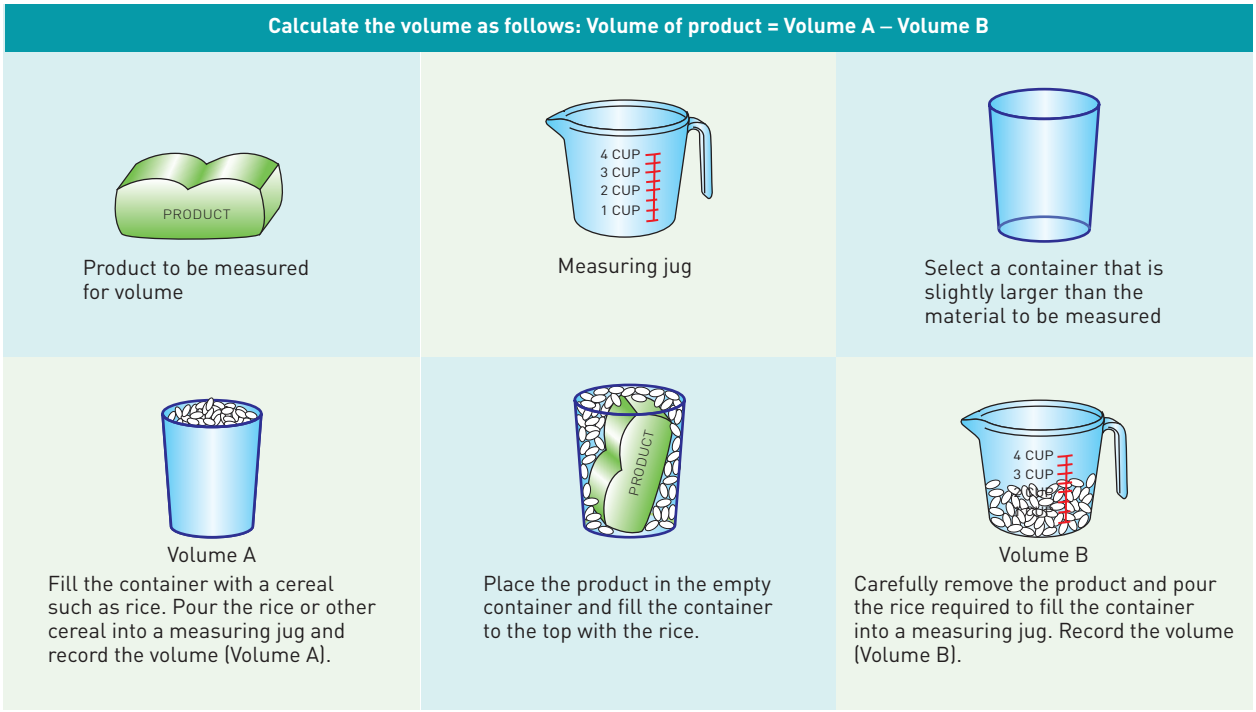


FIGURE 11.9 A method of measuring volume

Volume

A simple test for measuring the volume of some foods is to use a graduated measuring jug. However, the calculation of volume in products such as bread or biscuits that are substantial in size and uneven in shape is more difficult. Figure 11.9 shows one way of measuring the volume of some products.

Viscosity

Viscosity is a term used to describe the resistance of semi-solid foods to flow. Some substances, such as mayonnaise, are quite thick or viscous, meaning that they do not flow or run very easily. Others, such as oil, are relatively thin or less viscous. To compare the viscosity of two substances, a simple flow test can be developed by drawing two parallel lines approximately 20 centimetres apart on a foil-covered board. Place a marker at 10 centimetres, 15 centimetres and 20 centimetres. Lift one end of the board to form a slight incline. Place a spoonful of the mixtures to be measured at the top of the incline and then record the length of time it takes for each mixture to travel each of the measured distances down the slope.

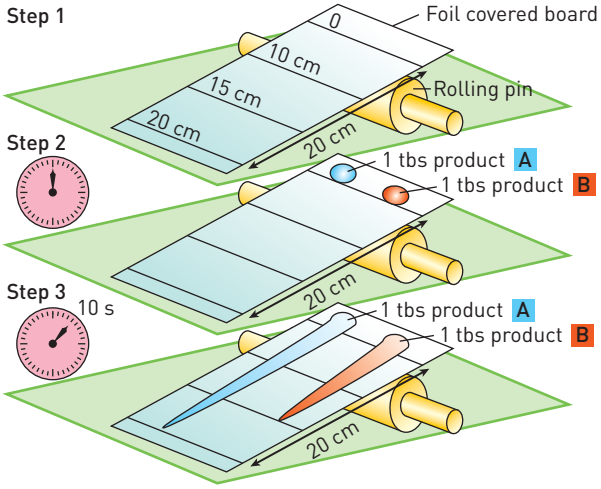
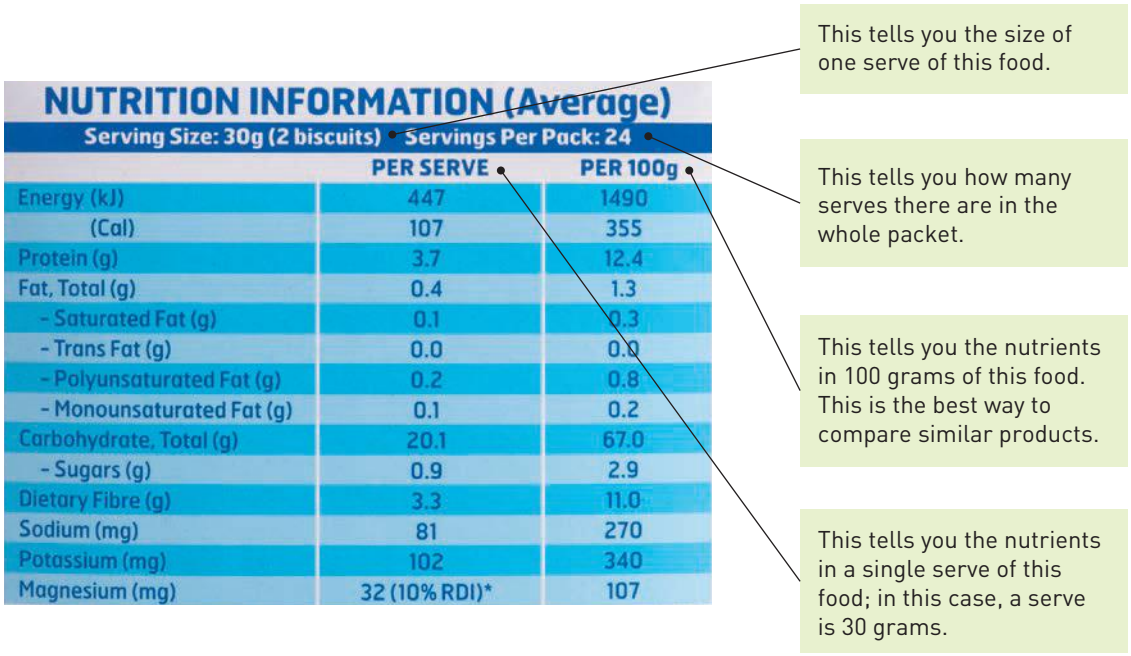


FIGURE 11.10 Measuring viscosity

Nutrition or chemical analysis

A nutrition or chemical analysis involves calculating the nutrients in a food product. This testing would be carried out in the manufacturer's food product development laboratories or in a specialised food laboratory, and it measures the precise levels of nutrients in the food. This ensures that the information included on the product label meets the regulations of the Australia New Zealand Food Standards Code.



A food label contains information on the nutrient content of the product.

The nutrient content of each food product is available in two formats – per 100 grams to allow for comparisons between similar products, and per serve.

The nutrition information panel on the food product also allows consumers to evaluate the product and to compare the nutrient content of similar products. This enables them to make an informed choice before purchasing a product.

DIETARY ANALYSIS

A dietary analysis is a nutritional assessment of the food and drink an individual consumes over a given period of time, usually a day, several days or a week. The person completing the dietary analysis would normally keep a food journal or food diary, to record all of the foods they ate over this period. This data would then be analysed to determine, for example, their total kilojoule intake, or to measure their intake of specific nutrients such as protein or fat. A dietary analysis can also identify the variety of nutrients consumed by the individual and determine whether their diet contains too little of a particular nutrient such as calcium.

A simple dietary analysis may involve the individual merely recalling what they ate over a 24-hour period rather than keeping a written or electronic record of all the food they ate. This method will simply give an overview of the individual's diet and may not be a true reflection of the foods they consume over an extended period. For individuals, a very basic dietary analysis can be undertaken by classifying the food eaten during one meal, or over the day, into the five food groups that are the basis of the Australian Guide to Healthy Eating. This would involve them analysing the number of serves of each food group they had consumed over the day, as well as determining how many serves of discretionary food they had consumed.

A more accurate method is to keep a detailed record of all of the food eaten over a longer period; for example, 72 hours. A medical professional, such as a dietician, can then analyse the data to determine whether the individual's food intake is in line with a recognised food selection model, such as the Australian Guide to Healthy Eating, or is in line with the principles of the Australian Dietary Guidelines. Today, a variety of food journal apps that can be downloaded onto a smartphone, are available to help individuals log and track the food they eat each day.

CSIRO Healthy Diet Score

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) has developed a dietary analysis survey – the CSIRO Healthy Diet Score – to help adults assess their diet. The CSIRO states that their free online assessment tool is 'designed to assess the quality of your own diet against Australia's healthy eating guidelines and can help you improve your eating habits based on your results'.



Image by CSIRO Total Wellbeing Diet

The CSIRO Healthy Diet Score enables individuals to assess the quality of their diet.

The CSIRO Healthy Diet Score asks an individual to respond to a series of online questions to assess the quality of their diet and the variety of foods they consume daily, weekly or monthly. It also analyses how healthy the diet is based on the consumption of a range of food groups including vegetables, wholegrains and dairy products, as well as the amount of discretionary food items eaten. Once all of the questions in relation to food consumption have been answered, the program compares the individual's food intake against the Australian Dietary Guidelines. A higher score means that they have addressed these guidelines more adequately than others who had a lower score. The program also offers suggestions about foods to focus on to improve the diet, and those foods that the individual should avoid or consume in smaller quantities.

Practical Activity 11.3

A quantitative and qualitative test of rice crackers

Aim: To compare the physical, nutritional, chemical and sensory properties of different brands of rice crackers.

Method

1. Purchase two brands of similar-flavoured rice crackers.
2. Complete a quantitative test to evaluate the physical properties of size, weight and colour of each sample.
3. Use the information on the label to provide details about the nutrient content and ingredients of the rice crackers.
4. Undertake a qualitative test using a preference test. Taste the rice crackers to evaluate the sensory properties of appearance, aroma, flavour and texture of both brands of crackers.
5. Record your results in tables like the ones on the following page.

Analysis

Worksheet

1. Was there any difference in the weight of the rice crackers?
2. Were the rice crackers different in size – in thickness or circumference?
3. Identify the similarities and differences in the sensory properties of the two samples of rice crackers. What could be the reasons for these differences?
4. Examine the nutrient content of each sample and discuss the differences.
5. Why was it important to use the nutrient content per 100 grams and not per serve?
6. Describe the differences you noticed in the sensory properties of each of the rice crackers.
7. Consider ingredients in each sample to help explain your results in the preference tests.

Conclusion

Which of the rice crackers did you prefer overall with regard to the physical, nutritional, chemical and sensory properties of the products? Justify your answer.

Quantitative results

	RICE CRACKER SAMPLE 1	RICE CRACKER SAMPLE 2
Name of product		
Manufacturer		
Size of rice cracker: • circumference • thickness		
Weight of rice cracker		
Colour of rice cracker		
Key ingredients		
Nutrients per 100 grams		

Qualitative results using a preference test

	RICE CRACKER SAMPLE 1	RICE CRACKER SAMPLE 2
Sensory descriptors		
Appearance		
Aroma		
Flavour		
Texture		
Ratings		
Nine-point scale 1 = dislikes very much 5 = neutral 9 = likes very much		
Facial hedonic descriptor		

Understanding the Text

21 Identify three features of the appearance of food that can be used to describe food and give three examples of each of these features.

22 What are the organoleptic properties of food?

23 Why do food manufacturers carry out sensory testing on food products?

24 What is a 'preference test'? Give an example of a method of recording a preference that can be used with small children.

25 Identify and describe two 'difference tests' that are used for measuring sensory qualities of food.

26 Outline a commonly used 'profiling test' and explain why this type of test is often useful to food manufacturers.

27 Define the term 'quantitative analysis'. Prepare a knowledge map to demonstrate the features of a product that could be analysed in this way.

28 What is 'viscosity' and how could this property of a product be measured?

29 Explain how consumers could determine the nutrient and chemical properties of a food product.

30 What is a dietary analysis? Outline the advantages of completing a dietary analysis for the individual.

Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

1 Draw a flow chart to demonstrate the process of food product development. Annotate each stage to highlight the most important feature of each stage of the process.

2 The development of a prototype is a key feature of food product development. Justify the importance to the manufacturer of developing a prototype for a new food product.

Meatball and tomato soup

In this recipe the capsicum is roasted in the oven to develop its flavour, soften the texture and make the skin easy to remove. The onion and garlic are shallow-fried to develop the flavour and create a soft texture. The vegetables are simmered to blend the flavours of the soup and cook the pasta. The meatballs are simmered to cook the proteins and ensure they retain their shape.

MEATBALLS

250 grams chicken or pork mince
½ cup fresh breadcrumbs
1 clove garlic, crushed
1 tablespoon parsley, finely chopped
2 tablespoons grated parmesan
1 egg
salt and pepper
1 tablespoon oil

TOMATO SOUP

1 red capsicum
olive oil spray
2 tablespoons olive oil
20 grams butter
1 onion, finely diced
1 clove garlic, crushed
800 grams chopped canned tomatoes
¼ teaspoon dried oregano
2 cups water
¼ teaspoon salt
½ cup small soup pasta
fresh basil for garnish

METHOD

Meatballs

1 Mix all the meatball ingredients together except the oil.
2 Roll into small balls (each ball should be about one teaspoonful of the mix) and fry until just brown.

Tomato soup

1 Preheat oven to 220 °C. Spray the whole capsicum lightly with oil and place on a baking tray. Roast until the skin of the capsicum is brown and has blistered. Remove from oven, wrap in foil and cool.
2 In a large saucepan, heat the oil and butter and gently sauté the onion and garlic just until they are a pale-golden colour.
3 Add the tomatoes, oregano, water and salt and bring to boil. Cover the saucepan and simmer for 20 minutes.
4 Peel the skin, remove the core and seeds from the capsicum and cut the flesh finely. Add to the tomato soup.
5 Add the pasta to the soup and cook for 5 minutes before adding the meatballs.
6 Gently lower the meatballs into the soup and simmer for 10 minutes or until the meatballs are cooked through and the pasta is soft.
7 Serve and garnish with chopped fresh basil.

MAKES 2 LARGE PORTIONS

EVALUATION

1 Complete a profiling test to evaluate the sensory properties of the individual components of the meatball and tomato soup. Use the example on page 270 as a guide when developing the attributes to be assessed.
2 Describe the physical changes that occurred when the whole capsicum was roasted.
3 Identify the process that occurs to the pasta when it is cooking in the soup.
4 Explain the functional property of the egg in the meatball mixture.
5 Compare the health benefits of eating a bowl of soup such as this meatball and tomato soup for lunch instead of a fast-food burger.



Mark Fergus Photography

Middle Eastern sausage rolls

Perhaps the only similarity between these Middle Eastern sausage rolls and sausage rolls traditionally eaten in Australia is their shape and that they are made from minced meat wrapped in pastry! This recipe uses kataifi pastry to encase a sweet, yet spicy lamb mince to make an equally delicious finger food or light meal. Kataifi pastry is best used at room temperature so that the long, thin, vermicelli-like strands can be easily moulded around a filling or into a desired shape.

185 grams kataifi pastry, at room temperature
2 tablespoons currants
⅓ cup boiling water
2 tablespoon pine nuts
2 teaspoons olive oil
½ onion, finely diced
1 clove garlic, crushed
250 grams minced lamb
½ lemon, zested
½ teaspoon zaatar
½ teaspoon sumac
¼ teaspoon dried chilli flakes
2 teaspoons tomato paste
2 tablespoons mint, finely chopped
2 tablespoons parsley, finely chopped
2 tablespoons coriander, finely chopped
salt & pepper
2 tablespoons butter, melted

TO SERVE

Greek yoghurt
tomato chutney

METHOD

1 Preheat the oven to 200 °C. Line a baking tray with baking paper.
2 Ensure the kataifi pastry is at room temperature and is well covered in plastic wrap.
3 Cover the currants with the boiling water and allow to soak for 10–15 minutes until soft and plump. Drain and set aside.
4 Toast the pine nuts in a small frying pan over a moderate heat for approximately 4 minutes until golden. Stir or shake the nuts constantly, taking care they do not burn.
5 Heat the oil in a small saucepan over a low heat. Add the finely diced onion and sauté for 4–5 minutes until tender but not browned. Add the crushed garlic and sauté for a further minute.
6 Combine the minced lamb, soaked currants, toasted pine nuts, sautéed onion and garlic, lemon zest, zaatar, sumac, dried chilli flakes, tomato paste, mint, parsley, coriander, salt and pepper in a medium bowl. Massage the mixture well with clean hands until the mixture is well combined.
7 Divide the lamb mixture into 6 even pieces (about 65 grams each) and roll into fat sausage shapes.
8 Remove the kataifi from the plastic wrap and gently unfold it. Loosen the strands of pastry, gently pulling it apart with your fingers. Use scissors to cut the kataifi into pieces that are 14 x 7 centimetres in size.
9 Place one of the rolls of lamb mince on the short end of one of the pieces of kataifi pastry and roll it up tightly.
10 Place on the prepared baking tray. Repeat, encasing each of the rolls of lamb mince in the kataifi pastry. Brush each sausage roll with melted butter.
11 Bake the sausage rolls in the preheated oven for approximately 20 minutes or until golden brown and cooked through.

SERVES 2

EVALUATION

1 Describe the sensory properties of the Middle Eastern sausage rolls – appearance, aroma, flavour and texture – using descriptive language.
2 Outline the cooking process of sautéing and explain why the onion and garlic are cooked before being combined with the other filling ingredients.
3 Explain why many meat dishes of Middle Eastern origin are based on lamb, not beef or pork.
4 Zaatar and sumac are commonly used in recipes of Middle Eastern origin. Research these two spice mixes and list the spices in each product and provide three examples of Middle Eastern recipes which include them.
5 Discuss why consuming sausage rolls wrapped in kataifi pastry instead of puff pastry would be considered a healthier option.



Mark Fergus Photography

Edamame fritters

In Japan, edamame beans are a popular snack food that are usually eaten straight from their pod. They are green in colour and, because they are the young or immature soy beans, they have a soft texture when hulled. They are an ideal plant food to boost the nutritional value of fritters because they are high in protein and dietary fibre and are a good source of potassium, magnesium, iron, vitamin B6 and calcium.

200 grams podded, frozen edamame beans

½ cup picked coriander leaves

1 tablespoon pickled sushi ginger, drained

185 grams canned tuna in olive oil, drained

1 small red onion, thinly sliced in half moons

2 eggs, lightly beaten

¼ cup self-raising flour

1 teaspoon salt flakes

⅓ cup olive oil

TO SERVE

1 tablespoon pickled sushi ginger

1 tablespoon soy sauce

2 tablespoons Japanese-style mayonnaise

1 teaspoon wasabi

METHOD

1 In a food processor, combine the edamame beans, coriander leaves and the pickled sushi ginger. Pulse 3 times to roughly combine the ingredients, then transfer to a mixing bowl.

2 To the bean mixture, add the drained tuna, onion slices, beaten eggs, self-raising flour and salt flakes. Stir to combine. The mixture will be quite soft.

3 Add half the oil in a large, non-stick frying pan and heat over medium-high heat. When the oil is hot, place half a cup of fritter mixture into the hot oil. Cook the fritters in batches of 2 or 3 using a half cup to measure out each fritter.

4 Flatten each fritter slightly into rounds and cook for approximately 4 minutes on each side until golden and crisp. Remember, it is a delicate mixture so only turn the fritters once. Drain on paper towel.

5 Add the remaining oil to the pan and cook the remaining fritters.

6 Serve warm with the accompanying ingredients plated individually

MAKES APPROXIMATELY 6 FRITTERS

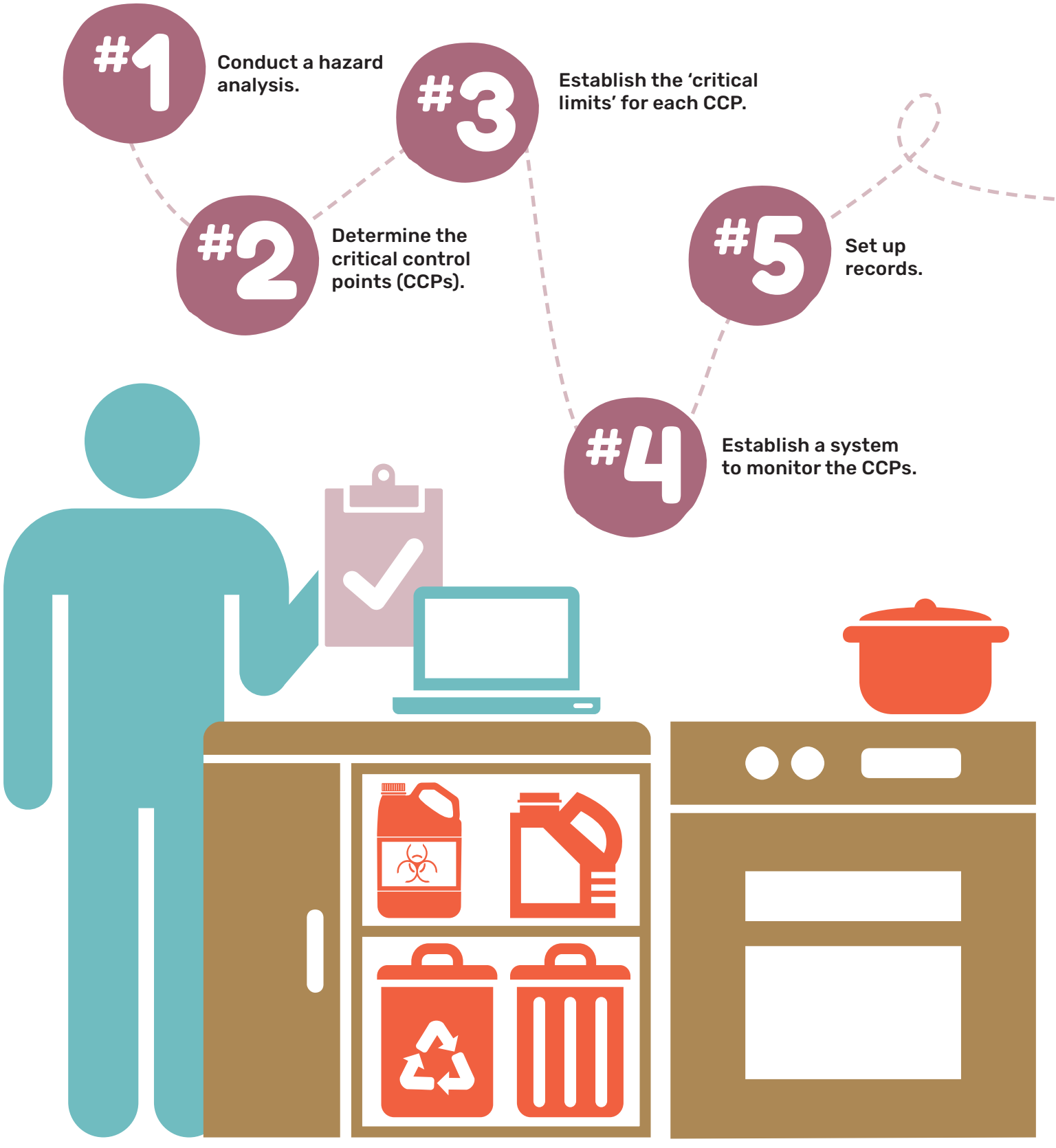
EVALUATION

1 Describe the sensory properties of the edamame fritters – appearance, aroma, flavour and texture – using descriptive language.
2 Explain the effect on the final sensory properties of the fritters of only pulsing the ingredients in step 1. Predict the outcome if the edamame beans were not pulsed.
3 Identify the functional properties of the eggs in the recipe.
4 Explain why it is suggested that fried foods such as fritters should only be eaten sometimes and in small amounts.
5 Suggest some other ingredients or products that could be served with the fritters to create a light meal.



Mark Fergus Photography

STEPS IN A HAZARD ANALYSIS CRITICAL CONTROL POINTS (HACCP) SYSTEM





#6 Verify that the HACCP system is working correctly.

#7 Set up records.

12

FOOD SAFETY

KEY TERMS

Australia New Zealand Food Standards Code a code developed by FSANZ covering locally grown and processed food that prescribes exactly what every food must contain or may contain; nothing else is permitted in that food

Department of Agriculture, Fisheries and Forestry operates at a national level and is responsible for the inspection of imported foods, food exports from Australia and border protection and quarantine

food additives chemicals added to foods to keep them fresh or to enhance their colour, flavour, texture or processing properties

food product recall an action taken to remove from distribution, sale and consumption, food that may pose a health and safety risk to consumers

Food Standards Australia New Zealand (FSANZ) a partnership between the Commonwealth (federal), New Zealand, state and territory governments to develop and implement uniform food standards

Hazard Analysis Critical Control Points (HACCP) a food safety system that identifies potential food hazards and their control points at all stages in the production of food

mandatory warning statements prescribed statements that must be included on food labels using the exact words listed in the standard

Resources
Study Design
links
Infographics
Flashcards

Regulating food safety in Australia

One of the most important issues in optimising the health of any community is to establish a safe food supply. In Australia, a framework involving authorities from all three levels of government – national, state and local – has been established to develop and implement a range of stringent regulations and standards to ensure that consumers have access to safe food.

National authorities

The federal government has the overall responsibility for ensuring a safe food supply for Australian consumers.

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

The **Department of Agriculture, Fisheries and Forestry** operates at a national level and develops and reviews all legislation in relation to our food supply. The Department also regulates and monitors the importation of raw foods and manufactured food products into Australia, as well as the export of food from Australia, and provides quarantine inspection for all plant and animal goods arriving in Australia.

FOOD STANDARDS AUSTRALIA NEW ZEALAND (FSANZ)

Food Standards Australia New Zealand (FSANZ) is a federal government statutory body that is responsible for developing and reviewing the Food Standards Code. FSANZ, is a bi-national independent statutory agency that was established by the *Food Standards Australia New Zealand Act 1991*. It is a partnership between the Commonwealth (federal), New Zealand, state and territory governments to develop and implement uniform food standards. The Food Standards Code in Australia and New Zealand is based on world standards of the Codex Alimentarius Commission, a body established by the United Nations and the World Health Organization.

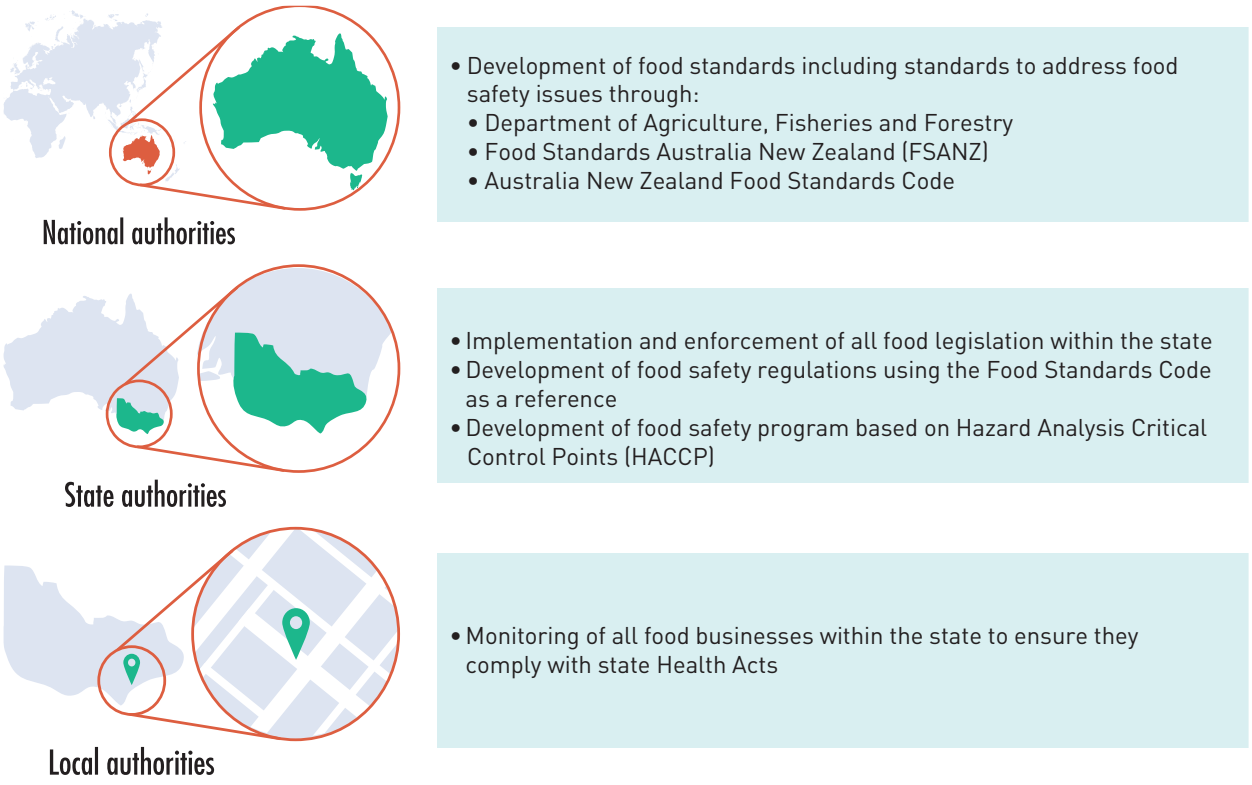


FIGURE 12.1 Overview of roles and responsibilities of national, state and local authorities

The roles and main responsibilities of FSANZ are to:

- develop food standards for food manufacturing and labelling
- develop codes of practice with the food industry
- coordinate national food surveillance
- coordinate a food recall system
- provide food-handling advice to consumers
- conduct research
- develop Australia-only food standards that address food safety issues:
  - in primary production
  - regarding maximum limits for agricultural and veterinary drug residues.

AUSTRALIA NEW ZEALAND FOOD STANDARDS CODE

One of the main responsibilities of FSANZ is to develop and administer the Australia New Zealand Food Standards Code.

The **Australia New Zealand Food Standards Code** is made up of a series of standards. Food sold in Australia must comply with the food standards in the Code – in Australia it is a criminal offence to supply food that does not comply with these standards. The Code covers locally grown and processed food as well as imported foods. There are four chapters within the Food Standards Code.

Collaborative Activity

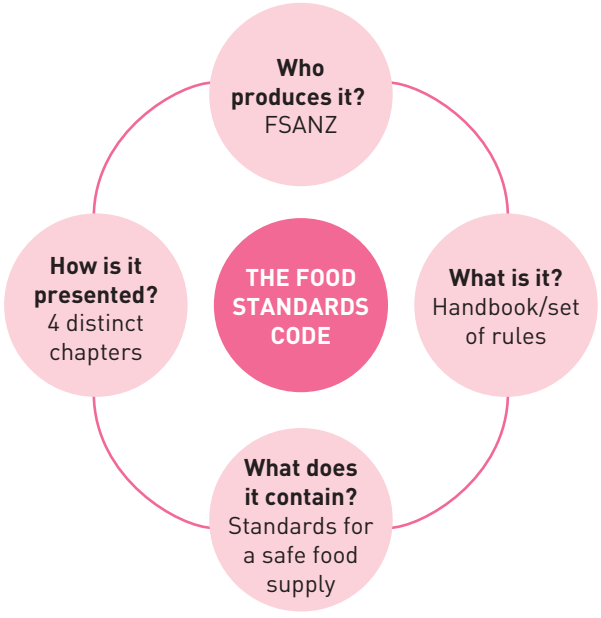


FIGURE 12.2 The Australia New Zealand Food Standards Code

Chapter 1: General food standards

Chapter 1 sets out the standards that apply to all foods. It contains information about:

- definitions relating to the standards
- food labelling requirements
- substances added to food, such as food additives and vitamins and minerals
- contaminants and residues; for example, the maximum agricultural and veterinary chemical residues that are permitted in food.

Chapter 2: Food product standards

Chapter 2 contains standards for particular classes of food, including cereals, fruits and vegetables, meat, eggs and fish, edible oils, dairy products, non-alcoholic beverages and sugars and honey.

The standards for each of these classes of foods prescribe exactly what the food must or may contain; nothing else is permitted in that food. The standards include information on the:

- identity of the particular food – describes or defines the food; for example, cheese
- composition – describes the make-up of the food, such as the list of ingredients, permitted additives, the minimum nutritional content, and the maximum amount of contaminants and residues; for example, as of September 2009, all wheat flour used for making bread in Australia must be fortified with folate and thiamin, and iodised salt must be used in place of non-iodised salt
- microbiological make-up – includes the types and limits of microorganisms permitted; for example, the proportion of microorganisms that can be added in the production of yoghurt
- analytical standard – refers to the methods used to measure components of the food, such as fibre content
- additional labelling requirements for specific foods, such as the types of fats.

Chapter 3: Food safety standards

Chapter 3 establishes standards for food hygiene to ensure that only safe and suitable food is sold to consumers. The standards within this chapter apply to Australia only. It includes standards for:

- food safety programs, based on the Hazard Analysis Critical Control Points (HACCP) system
- food safety practices; for example, the requirements necessary at all stages of food production, such as storage, processing, packaging, distribution and

the recall of food. It also includes requirements regarding the skills and knowledge of food handlers
- food premises and equipment; for example, premises must be designed to minimise food contamination and allow all fixtures and fittings to be cleaned thoroughly
- food service to vulnerable persons; for example, food that is produced for patients in hospital, residents in aged-care facilities and children in childcare centres.

Chapter 4: Primary production standards

Chapter 4 includes standards relating specifically to primary production requirements of food in Australia. This chapter has been developed as a 'whole food chain' approach to ensuring a safe food supply in Australia. The Primary Production and Processing (PPP) Standards:
- apply to the primary production sector to ensure that risk-management strategies are developed for the whole food supply chain from producer to consumer
- are based on HACCP principles.

FOOD LABELLING

The Australia New Zealand Food Standards Code includes labelling regulations (Standard 1.2) that apply to food for sale in Australia and New Zealand and food imported into both countries. Food labelling regulations apply not only to food for sale through the retail market, but also to food that is prepared in restaurants, schools and canteens or by catering institutions.

Information that *must* appear on a food label

Food labels carry useful information that helps people make informed choices about the food they select to purchase. All products that are not weighed and packaged in front of the purchaser *must* contain the information in Table 12.1, written in English and clearly visible to the consumer.

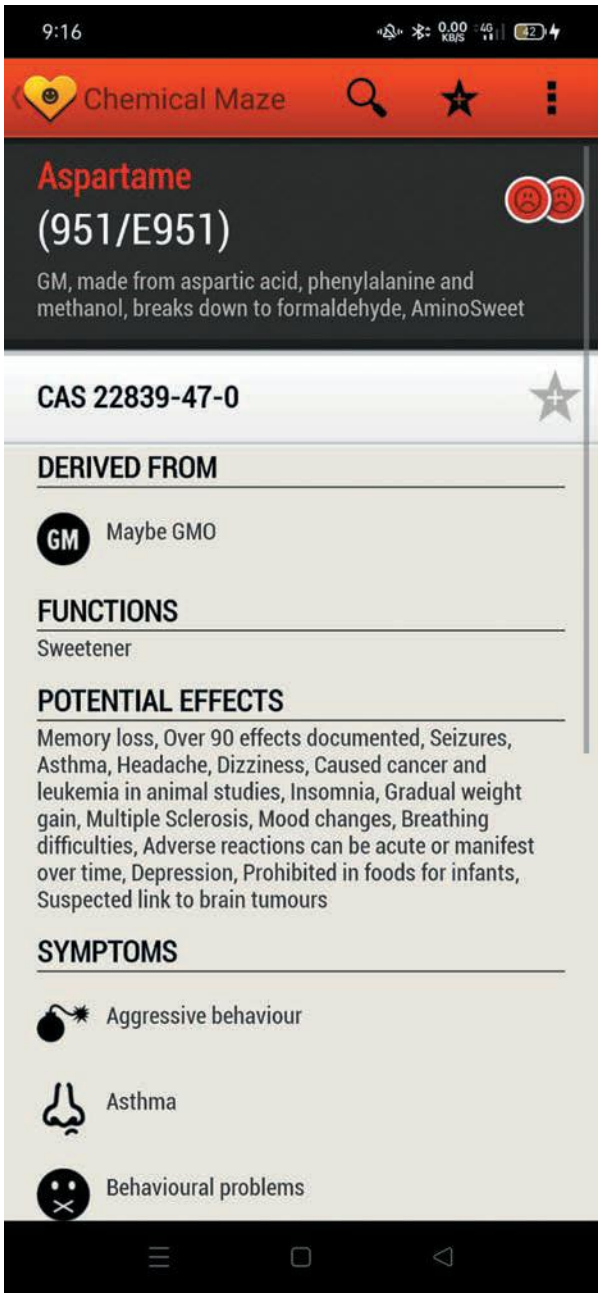
TABLE 12.1 Information that *must* appear on a food label: Standard 1.2

LABELLING REQUIREMENT	PURPOSE OF THE REQUIREMENT
Name and/or description of the food	Identifies the product and enables it to be easily recognised. The label must not be misleading.
Identification of packaging premises and job lot	Coded in numbers and/or letters. This identifies products in the case of a food recall.
Name and address of the manufacturer	Address must be shown in sufficient detail to ensure the purchaser can contact the manufacturer directly.
Mandatory warning statements and declaration of any allergens present in the food	Enables consumers who have a particular food allergy or food sensitivity to avoid these products, e.g. nuts, milk, egg, gluten.
List of ingredients	All ingredients listed in descending order by weight. Food additives must be shown in the ingredients list by category and number.
'Use-by' date or 'best-before' date	Applies to foods with a shelf life of less than two years. This enables consumers to eat food while it is in its best condition.
Nutrition and health-related claims	A nutrition content claim or health claim can only be included on a label if it is approved by FSANZ or is supported by scientific evidence.
Nutrition information panel	Must show the amount of nutrients per serve and per 100 grams.
Characterising ingredient or percentage labelling	The proportion of characterising ingredients must be shown in percentages.
Use and storage	Provides information about the storage and use of the product necessary to protect the health of consumers, e.g. 'refrigerate after opening'.
Country of origin	Identifies where the food was made and/or produced or packaged.
Weight and measure of contents	The weight must be stated in metric units of measurement and the word 'NET' must be included.

Information that *may* appear on a food label

The following information *may* appear on a label.

- Bar codes are a useful feature for both food manufacturers and food retailers. They can be scanned to provide food outlets with information about the price, date of manufacture and batch number of the product.
- Serving suggestions help consumers with ideas about accompaniments that could be served with the product or alternative methods of cooking the product.



Bill Statham, author of the Chemical Maze

Smartphone apps help consumers identify the additives on a food label.

FOOD ADDITIVES

Most processed foods contain **food additives**, which are chemicals added to food to keep them fresh or to enhance their colour, flavour, texture or processing properties. The more processed a food, the more food additives it is likely to contain.

Before a food additive is approved for use, FSANZ reviews evidence about how safe it is for human consumption. Food additives are listed on a food label according to use and number:

- colours – used to add colour to a food or to restore colour lost during processing
- preservatives – help extend the shelf life of food
- antioxidants – slow the rate at which foods 'go off'; for example, when fats and oils become rancid
- artificial sweeteners – provide a sweet flavour to food but with fewer kilojoules than sugar
- flavour enhancers – used to improve the flavour or aroma of food
- emulsifiers – enable oil and water mixtures to remain in suspension and not separate
- stabilisers and thickeners – increase the viscosity of foods so that they have an improved consistency.

Food labelling regulations require food processors to list additives on the label of a food product according to its number so that consumers can easily identify any they may be sensitive to and wish to avoid.



Shutterstock.com/Olga Popova

Food additives are often used to add colour to a food, but there are natural alternatives. Turmeric, for example, serves as a natural food colour and can be used to turn foods yellow.

Collaborative Activity

Activity 12.1

Examining the food additives in popular snack foods



Mark Fergus Photography

Method

1 Select four popular snack foods – one from each of the following categories:
   - crisps, such as chicken potato chips
   - dry biscuits, such as Barbecue Shapes
   - sweet snacks, such as Monte Carlo biscuits
   - confectionery, such as M&M's, Smarties or Snakes Alive

2 Read the food labels and record the information in a table like the one that follows.

Worksheet

SNACK FOOD	LIST OF ADDITIVES

3 Search online to identify food additives that may be considered harmful to some people.

4 Highlight the additives in the snack foods you have examined that could be considered harmful.

5 Explain why food colours are thought to harm the health of some children.

6 Outline three strategies you could use to minimise the amount of additives you consume.

FOOD SAFETY STANDARDS

FSANZ has developed a series of standards to ensure that food is kept safe by controlling any hazards that could occur in food production or food handling. Standard 3.2.1 – Food Safety Programs is based on the principles of HACCP.

Hazard analysis critical control points (HACCP)

The **Hazard Analysis Critical Control Points (HACCP)** system (pronounced 'hass-up') is a food safety system that identifies potential food hazards and their control points at all stages in the production of food.

HACCP has become the basis for ensuring that all food is prepared, manufactured and handled safely. In Victoria, Standard 3.2.1 was made into law in the 1997 amendment to the *Food Act 1984*. This legislation requires that all food premises have a food safety program that outlines the HACCP system to be implemented. The food safety program must be approved by the local health authorities before registration of the business is approved.

HACCP AUSTRALIA
FOOD SAFETY PROGRAMME
CERTIFICATION

HACCP is a food safety system that identifies potential food hazards

The registered certification mark is owned by HACCP Australia Pty Ltd. www.haccp.com.au. Use of the certification mark without licence is not permitted.

Preventing food spoilage and poisoning using HACCP

Although hazardous situations may still arise in the food chain, a system such as HACCP reduces the risk of unsafe food reaching the consumer. The main purpose of the HACCP system is to prevent food spoilage and food poisoning and to ensure a safe food

supply for consumers. The HACCP system does this by operating throughout the whole food supply chain, including all areas of primary production, as well as in the food manufacturing and food retailing systems.

The HACCP system enables primary producers and food manufacturers and retailers to:

- examine every stage of production and identify any hazards that may occur
- note each point where a hazard poses high risk – these are noted as critical control points
- take steps to prevent, remove and reduce hazards
- closely monitor the critical control points in the HACCP system at regular intervals to ensure safety control procedures are being carried out
- monitor the steps where serious problems occur and address the problems as they arise.

Steps in the HACCP system

1 Conduct a hazard analysis – hygiene and food production safety hazards need to be identified, such as potentially hazardous ingredients; for example, eggs or chicken. Other possible hazards include cooking or holding temperatures for the food or the use of chemical cleaning agents in the production process.

2 Determine the critical control points (CCPs) – the CCPs during each stage of manufacture must be identified. CCPs are the points at which important things can go wrong in relation to temperature control and sanitation.

3 Establish the 'critical limits' for each critical control point – this varies for each business, but includes both minimum and maximum limits; for example, the acceptable temperature range within which foods should be cooked or chilled.

4 Establish a system to monitor the CCPs – a process for systematically checking that the critical limits are not exceeded must be established. Observations or measurements must be taken and recorded on a regular basis.

5 Establish corrective actions – identify the actions that are to take place if a problem occurs. These actions are intended as a safeguard and may require more than one corrective action; for example, food being discarded and/or staff retrained.

6 Verify that the HACCP system is working correctly – the system must be reviewed on a regular basis, including as part of an annual independent audit. The outcome of the reviews must involve amending and updating the system as required. During the verification process, the business needs to check that there is improvement in the end product. Microbiological testing could indicate the microorganism count is in the target range, sanitation procedures have improved or food-handling practices have changed.

7 Set up records – accurate and reliable records of results must be kept for auditing and to check for improvements.

Practical Activity 12.2

Identifying potential CCPs in food processing

Chicken and chilli noodle stir-fry is one of the most popular dishes with customers at a local noodle bar. The following ingredients are used in the preparation of this dish.

CHICKEN AND CHILLI NOODLE STIR-FRY

250 grams fresh egg noodles
1 tablespoon oil
1 fresh chicken breast, thinly sliced
1 clove garlic, crushed
1 small red chilli, chopped finely
1 onion
½ red capsicum, sliced thinly
½ carrot, sliced thinly
½ bunch bok choy, sliced
½ teaspoon five spice powder
1 tablespoon soy sauce
1 tablespoon oyster sauce
1 tablespoon honey

Worksheet



Chicken and chilli noodle stir-fry

Getty Images/PhotoStock-Israel

Method

Copy and complete the table below, identifying the potential hazards that could occur at each stage of food processing of the chicken and chilli noodle stir-fry. Suggest appropriate corrective actions that would need to be implemented to overcome these hazards.

HACCP SYSTEM FOR THE PRODUCTION STEPS FOR CHICKEN AND CHILLI NOODLE STIR-FRY

Production step	Possible hazards at CCPs	Corrective action
Freshness of raw ingredients • chicken • fresh egg noodles		
Storage of ingredients • raw chicken • perishable ingredients – fresh egg noodles, vegetables • non-perishable ingredients – five spice powder, honey, oyster and soy sauces, oil		
Preparation of ingredients • personal hygiene • preparation of chicken and vegetables		
Cooking • time		
Storage • hot-holding time in a bain marie • chilled storage		
Reheating for hot service		

Understanding the Text

1 Explain the role of the federal government in ensuring a safe food supply for Australia.

2 Develop a knowledge map of the main responsibilities of FSANZ.

3 How does the information in Chapter 1 of the Food Standards Code help ensure a safe food supply?

4 What is the purpose of the standards in Chapter 3 of the Food Standards Code? Give two examples of food safety practices addressed in this chapter.

5 What is a mandatory warning statement and why are some food products required to include these warnings on their labels? Give an example to support your answer.

6 Explain the difference between the list of ingredients and a nutrition panel on a food label, and why both are required by law.

7 Why is a 'best-before' or 'use-by' date included on a food label? Explain how this information is an advantage to consumers.

8 What are food additives? List three types of food additives commonly used in processed food and explain why they are used.

9 Explain why the HACCP system is an essential feature of all food safety programs. Why would a company need to analyse the hazards in a food production system?

10 Explain the three main steps in the HACCP system that a company would need to follow once hazards have been identified.

Answers
Understanding the Text

State authorities

State and territory governments throughout Australia have two key responsibilities in relation to all national food legislation:

- implementation
- enforcement.

They are required to make sure that the food standards developed by FSANZ are implemented by becoming law in their state or territory.

In 1984, the Victorian Government introduced legislation in the form of the *Food Act 1984*, which outlined the legal responsibilities of all food manufacturers and retailers in Victoria to ensure a safe food supply. This Act, and amendments to it in 1997, 2001 and 2009, are the means by which the Australia New Zealand Food Standards Code is applied as law in Victoria. The *Food Act* covers all food premises that manufacture, package, transport or sell food in the state, including restaurants and takeaway food outlets.

IMPLEMENTING AND ENFORCING FOOD SAFETY LEGISLATION IN VICTORIA

Within Victoria, the Department of Health and Human Services Food Safety Unit is the authority responsible for implementing the *Food Act*. Its major responsibilities include:

- developing guidelines to assist food businesses to prepare a food safety program before they can register their business
- approving all food safety auditors and food analysts who will review the food safety program of food businesses
- overseeing any food contamination or food poisoning incident within the state
- issuing 'closure orders' against a food premises if a food contamination or food poisoning incident occurs. The food manufacturer or food retailers must close until the premises are cleaned and the source of the food poisoning is identified and removed
- appointing food recall action officers should any food product need to be recalled
- notifying municipal councils of any food recalls
- providing advice on policy matters to local governments relating to food safety and food safety regulations.



FIGURE 12.3 Implementation of food safety legislation in Victoria

Local authorities

Local municipal councils are at the 'grass-roots' level of ensuring the safety of our food supply. They are responsible, on a daily basis, for monitoring the implementation of the *Food Act* within their local area.

The major responsibilities of municipal councils include:

- employment of environmental health officers
- registration of food businesses, including the approval of a suitable food safety program
- inspection of all food premises on an annual basis before the business can apply for re-registration
- follow-up of 'closure orders' and ensuring food premises are cleaned up in cases where there has been a food poisoning incident
- enforcement of food product recalls and overseeing of the destruction and disposal of recalled food
- education of food retailers and their employees in best practice to safeguard the quality of food sold
- requirement for environmental health officers to take food samples within their local municipality to assess compliance with microbiological, chemical and nutritional standards. Samples are also taken to assess any food about which there has been a complaint. The samples are taken from any premises involved in the food industry, including food manufacturers and retailers, hospitals and childcare facilities in their area

- registration of all mobile food vehicles that are used to manufacture, heat, prepare or sell food; for example, ice-cream vans or hot-dog and pie vans
- issuing of permits for all temporary food stalls at public events, including community markets, special open-air events, fetes, street stalls and cultural festivals.

Food industry safety programs

One of the key responsibilities of any government, whether within Australia or internationally, is to ensure that its population has access to a safe food supply. In Australia, legislation has been developed to ensure that food is produced and sold in a safe and clean environment. However, if an incident occurs along the food supply chain that is likely to cause a risk to public health and safety, policies are in place to remove such a risk.

Each of the three levels of government has defined roles and responsibilities and must take particular action so that the safety of our food supply is ensured, including:

- the development and implementation of a food safety program for food premises
- responding to unsafe and/or unhygienic food production premises
- a food product recall.

FOOD SAFETY PROGRAM

One of the most important means of ensuring a safe food supply is to guarantee that the premises in which food is to be produced are clean and hygienic. National, state and local authorities all have key roles in developing, enforcing and monitoring legislation so that new food premises are established and operated safely and hygienically.

A food safety program is a document prepared by a food manufacturing company that outlines how it will manage the production of its food products so that they are safely prepared, served, manufactured or sold.

A food safety program contains information on:

- personal hygiene of employees
- safe food handling
- cleaning of equipment and premises
- pest control
- the monitoring of temperatures throughout all stages of preparation and processing
- procedures to manage food safety hazards.

FOOD PRODUCT RECALL SYSTEM

FSANZ defines a **food product recall** as 'action taken to remove from distribution, sale and consumption, food that may pose a health and safety risk to consumers'.

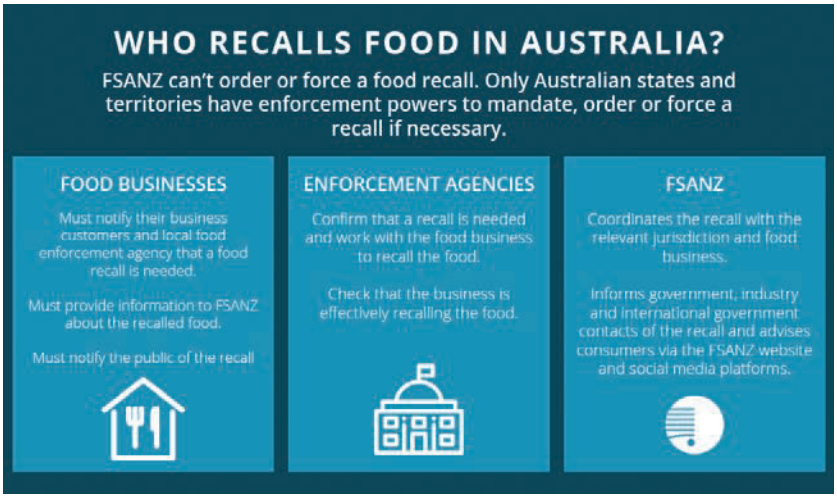
Food product recalls are usually a result of a report to FSANZ from food manufacturers or wholesalers, government agencies such as health authorities that undertake testing, or medical practitioners; or complaints from consumers.

The primary responsibility for food product recalls lies with the food manufacturer or food importer.

Some examples of food products that have been recalled are:

- food that has been incorrectly labelled; for example, the original label may not indicate that it contains ingredients to which some consumers may be allergic, such as nuts or gluten
- a batch of food that contains a contaminant, such as metal fragments, plastic or glass
- food items such as processed meat that may be contaminated with a bacterium such as Salmonella
- food that has been chemically contaminated
- food for which a problem has arisen during processing; for example, UHT milk that has not been heated to the correct temperature, or canned foods that have not been correctly sealed or sterilised.

Like all other products that are recalled from the marketplace, food product recalls must include specific information to assist consumers to identify the product.



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Responsibilities for food recalls in Australia

Activity 12.3

Worksheet

Food product recall

Read the food recall notice and answer the questions below.

1 Copy and complete the table below to identify the following features of the notice:

FEATURES	
The type of recall	
The name of the product being recalled	
How the recalled product can be identified by consumers	
The reason for recalling the product	
The potential hazard the product poses to consumers	
What the consumer should do with the recalled product	
How the consumer can make contact with the company if necessary	
Information about other products that might be affected	

2 Based on the information above, develop a list of information that a company would be required by FSANZ to include in any food product recall.

FOOD RECALL

LITTLE POSSUM BABY APRICOT and APPLE PUREE (150 mL), BEST BEFORE 20/6/22

Green-a-way Health Foods Australia is undertaking a precautionary recall of the above product.

A small batch of this product was incorrectly labelled and consequently does not declare the presence of egg and milk.

The recall applies only to Little Possum Baby Apricot and Apple Purée, batch code CA 65772, best before 20/6/22.

Customers are asked to return the product to the point of purchase for immediate full refund.

A customer care line has been established. If customers have any concerns or queries about this product, they can call 1800 662 221 113.

Green-a-way Health Foods Australia apologises for any inconvenience.

Activity 12.4

Food product recall for Health Lab chocolate products

Worksheet

Read the article then answer the questions below.

1. Evaluate the validity of this news article. Consider the reliability of the sources of information used in the article, the context and presentation of evidence.
2. Outline the reason for the recall of the vegan chocolate products.
3. Based on the information in this chapter, explain Health Lab's role in recalling its products from sale.
4. Outline the responsibilities of FSANZ and the Victorian Department of Health and Human Services in this food recall. Refer to the information in this chapter to answer this question.

RECALL FOR HEALTH LAB CHOCOLATE PRODUCTS SOLD AT WOOLWORTHS AND BIG W

An urgent recall has been issued for three vegan chocolate products sold at Woolworths and Big W stores across Australia over fears of contamination.

Food Standards Australia and New Zealand announced on Friday that Health Lab was recalling its Mylk Chocolate Zillions 100g, Whyte Chocolate Zillions 100g and Mixed Kwalas 96g products with date markings of best before 23 August 2022 and 23 October 2022.

The products, which are aimed at kids, are being recalled due to the presence of an undeclared allergen – milk.

The authority stated those who have a milk allergy or intolerance should not eat any of the listed products as they may have a reaction.

Health Lab, known for its products being 'plant-based', 'all natural' and 'allergen friendlier', said an investigation was being conducted over the matter.

'We are currently working closely with the Victorian Department of Health and the Food Standards Australia New Zealand (FSANZ) to investigate how this event occurred and manage this recall process,' they said.

Consumers with a milk allergy or intolerance are advised to return the products to the place of purchase for a full refund.

However, the company has reassured customers that no other products are contaminated.

'The remainder of our Health Lab and Health Lab Kids collections are without contamination. Please always read the ingredient list and 'may contain' call-outs to ensure they are suitable for any allergies or intolerances,' Health Lab said.

Those who would like further information on the recall alert are advised to contact Health Lab.

'Recall for Health Lab chocolate products sold at Woolworths and Big W', Manoli Luxford, *Daily Mail Australia*, 27 November 2021



Shutterstock.com/gowithstock

Vegan chocolate does not contain dairy and it is suitable for consumers with milk allergies or intolerances.

Understanding the Text

11 Why did the Victorian Government introduce the *Food Act 1984* and make amendments in 1997, 2001 and 2009?

12 Outline three major responsibilities of the Department of Health and Human Services in relation to ensuring a safe food supply in Victoria.

13 What is the meaning of the term 'closure order' and which level of government is responsible for issuing such an order?

14 Explain why an environmental health officer will take a food sample from a local food business.

15 List three other actions an environmental health officer may be required to take within their local municipality.

16 Identify the level of government responsible for issuing a permit for a temporary food stall. List three examples of this type of permit.

17 What is a food safety program and why are food manufacturing companies required to develop this document?

18 Draw a knowledge map to identify the information that must be included in a food safety program.

19 What is a 'food recall' and who is responsible for issuing a food recall notice?

20 Outline three reasons a food recall notice might be issued.

Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

1 Prepare a knowledge map of the roles and responsibilities of the federal government in ensuring food safety in Australia.

2 Explain what action a local environmental health officer would take if they received a complaint from a consumer who had purchased a box of oatmeal from a local supermarket and found it to be contaminated with weevils.

Empanadas with tuna and green olives

Empanar is Spanish for 'to bake in pastry'. Empanadas are usually single-serve savoury pastries with a meat or fish and vegetable filling. They feature some of the most important ingredients in Spanish cooking such as olive oil, olives and smoked paprika. Smoked paprika is one of the signature spices of Spain and it adds an intensity of colour and depth of flavour to the filling. The pastry can be made and frozen until required.

SHORTCRUST PASTRY

1 cup flour

1 cup self-raising flour

pinch of salt

125 grams cold butter, roughly chopped

¼ teaspoon lemon juice

⅓–½ cup iced water

FILLING

2 eggs, at room temperature

2 tablespoons olive oil

1 onion, diced finely

1 small green capsicum, diced finely

1 long green chilli, sliced

½ cup canned diced tomatoes

1 tablespoon tomato paste

1 teaspoon smoked paprika

salt and pepper

185 grams canned tuna in oil, drained

8 pitted green olives, chopped

2 tablespoons parsley, chopped

½ lemon, juiced

EGG WASH

1 egg

2 tablespoons cold water

METHOD

Making the shortcrust pastry

1 In a food processor, pulse the flours and salt to combine.
2 Add the chopped butter and process until the butter is rubbed into the flour and the mixture resembles fresh breadcrumbs.
3 Combine the lemon juice with the water. With the motor running, gradually pour in sufficient liquid until the dough just starts coming together.
4 Turn the dough onto a lightly floured bench and gently knead until the dough is smooth.
5 Cover the dough with plastic wrap and refrigerate for 30–40 minutes to rest the dough.

Making the filling

1 Place the eggs in a small saucepan and cover with cold or warm water and bring to the boil. Turn the heat to low and cook for 8 minutes. Cool and peel the eggs. Chop roughly.
2 Dice the vegetables. Heat the olive oil in a frying pan over medium heat, add the onion, capsicum and chilli. Sauté for approximately 8 minutes or until soft but not brown.
3 Add the tomatoes, tomato paste, paprika, salt and pepper, and cook for 10 minutes or until the mixture is very thick and most of the liquid has evaporated. Remove from the heat.
4 Transfer the tomato mixture to a bowl and add the tuna, olives, chopped hard boiled eggs, parsley and lemon juice. Stir to combine and leave to cool.

Assembling the empanadas

1 Preheat oven to 200 °C and line two baking trays with baking paper.
2 Prepare the egg wash – in a small bowl, lightly beat the egg with the cold water. Set aside.
3 Roll out the pastry and cut into 10–13-centimetre rounds. Re-roll and cut the leftover pastry.
4 Place 1 tablespoon of the filling onto the pastry round, lightly brush half of the pastry round with egg wash, then bring the pastry together to seal. Crimp the edge with your fingers or the tines of a fork.
5 Brush the empanadas with the egg wash and bake for 20–25 minutes until golden brown.

MAKES APPROXIMATELY 16 EMPANADAS

EVALUATION

1 Describe the sensory properties of the empanadas with tuna and green olives – appearance, aroma, flavour and texture – using descriptive language.
2 Explain why the pastry is rested in the refrigerator before being rolled out.
3 Explain how the baking process creates a golden-brown colour on the empanadas.
4 Research and list other filling combinations that are used in empanadas in Spain.
5 Explain why, according to the Australian Dietary Guidelines, pastry products such as empanadas should only be eaten sometimes and in small amounts.



Mark Fergus Photography

Raspberry and yoghurt cake

Yoghurt is used in cake baking to develop a very moist and tender texture. It also extends the shelf life of the cake by reducing the rate of staling. The creaming method is used as it incorporates air into the mixture and, along with the chemical raising agents, helps to create a cake with a light texture. The raspberries are stirred through frozen as this helps to keep them suspended in the cake and prevents them from breaking up.

TOPPING

20 grams butter

1½ tablespoons flour

1½ tablespoons sugar

¼ teaspoon cinnamon

¼ cup flaked almonds

CAKE

¾ cup plain flour

1 teaspoon baking powder

100 grams butter, at room temperature

½ cup caster sugar

1 egg, lightly beaten

½ teaspoon vanilla essence

¼ cup Greek yoghurt

100 grams frozen raspberries

METHOD

1 Grease and line an 18-centimetre round tin or a 20-centimetre ring tin. Alternatively, use a round foil container – this does not need to be lined.

2 Preheat oven to 180 °C.

Topping

1 Combine the butter, flour, sugar and cinnamon, and rub in the butter to form a crumble.

2 Stir through the flaked almonds and set aside in a cool place until needed. Refrigerate if the kitchen is very hot.

Cake

1 Sift the flour and baking powder together.

2 In a large bowl, cream the butter and sugar until light and fluffy and pale in colour.

3 Gradually beat in the egg until well combined. Add the vanilla essence.

4 Stir in half of the sifted flour and baking powder. Stir in the Greek yoghurt. Then stir in the remaining sifted flour and baking powder.

5 Fold the frozen raspberries through the cake mixture and place in the lined cake tin. Sprinkle the crumble topping over the cake and bake for 25–30 minutes.

EVALUATION

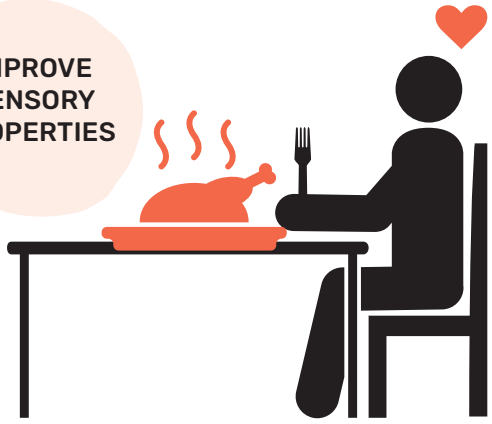
1 Describe the sensory properties of the raspberry and yoghurt cake – appearance, aroma, flavour and texture.
2 Describe the most effective way to rub butter into dry ingredients.
3 Explain why the topping for the cake is prepared and may be refrigerated before the cake mixture is made.
4 Identify the chemical and mechanical factors that contribute to the leavening of this cake.
5 List the type of information on a food label that consumers could find out about a product such as Greek yoghurt.



Mark Fergus Photography

WHY WE COOK FOOD

IMPROVE SENSORY PROPERTIES

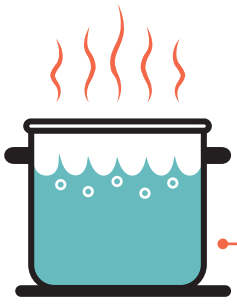




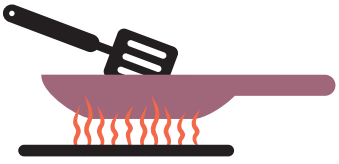
DESTROY HARMFUL BACTERIA

HOW WE COOK FOOD

METHODS OF HEAT TRANSFER



Convection



Conduction



Electromagnetic radiation

DRY METHODS OF COOKING



BAKING

GRILLING





FRYING

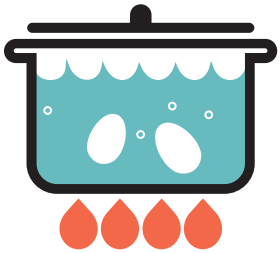
ROASTING



13

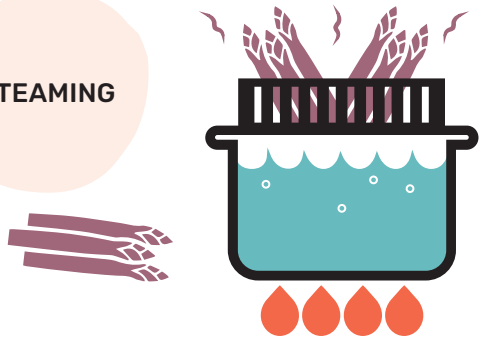
COOKING FOOD

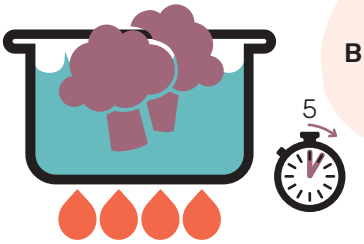
MOIST METHODS OF COOKING



BOILING

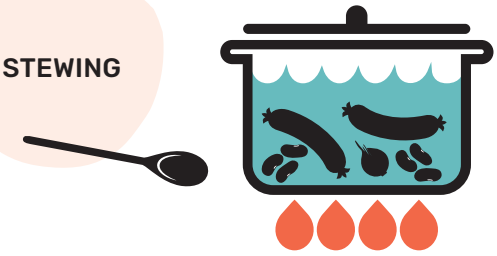
STEAMING

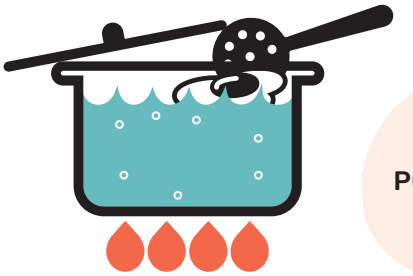




BLANCHING

STEWING





POACHING

KEY TERMS

baking the cooking of food in an oven without the addition of fat or oil

blanching a method of partly cooking food by plunging it briefly into boiling water.

boiling cooking food in water at 100 °C

conduction occurs when heat is transferred from one molecule to another by collision or movement

convection occurs when the molecules in liquids or gases move from a warmer area to a cooler one

cooking the application of heat to ingredients to cause physical and chemical changes

electromagnetic radiation when electric currents cause electrons within food to move rapidly and generate heat that cooks the food, as occurs during microwaving and induction cooking

frying cooking food by total or part immersion in fat or oil that is heated to temperatures between 150 °C and 220 °C

grilling a fast, dry method of cooking that uses intense heat radiated by an electrical element, a gas flame, glowing charcoal or an open wood fire

poaching a method of cooking delicate foods in liquid at a temperature just below simmering point (85 °C)

roasting the cooking of food in an oven using some fat or oil

steaming the cooking of food in the steam from boiling water

stewing a long, slow method of simmering food in a small amount of liquid

Resources
Study Design
links
Infographics
Flashcards

Why do we cook food?

The aim of all methods of food preparation is to produce food that is palatable, appetising and attractive – food that people will want to eat. Cooking involves the transfer of energy from a heat source to food, making it more enjoyable to eat. During cooking, harmful micro-organisms in food and some of the enzymes that cause food to spoil are destroyed, and so it extends the life of the product. The physical and chemical changes in food that take place during cooking make eating, digestion and absorption of nutrients easier and more efficient.

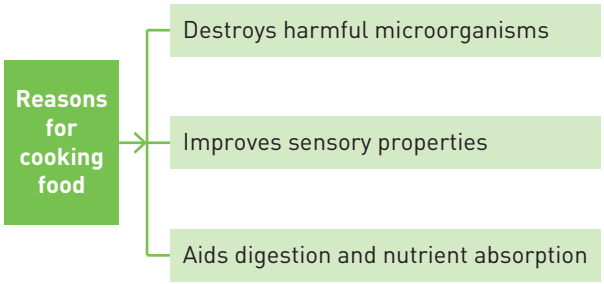


FIGURE 13.1 Reasons for cooking food

How food is cooked

Cooking is the application of heat to ingredients to cause physical and chemical change. Energy is transferred from a heat source to food to alter its properties. Techniques or cooking methods such as boiling, baking and frying achieve their results by using the different mediums of water, air and oil, and draw on different principles of heat transfer to cook foods. There are three methods of transferring heat to food: conduction, convection and electromagnetic radiation.

CONDUCTION – DIRECT CONTACT OF HEAT

Conduction is the process of cooking food by direct heat. Conduction of heat occurs when energy is moved from one particle to another by collision or movement. Heat is conducted through the base of a frying pan by direct contact with the gas flame or the electric element of the cooktop. As the heat is absorbed on the surface of the food, it is also transferred by conduction to the inside of the food, cooking it through. Frying pans are made of metal which is a very good conductor of heat and so enables quick transfer of heat to the food.

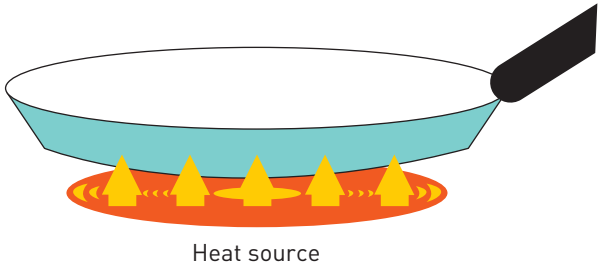


FIGURE 13.2 The metal base of a frying pan conducts heat.

CONVECTION – HEAT TRANSFERRED IN LIQUIDS AND AIR

Convection is the transfer of heat in liquids and air which is brought about when the molecules move from a warmer area to a cooler area. The circulating hot liquid or air against the cold food causes the two materials to undergo conduction to transfer the heat.

When baking or roasting, the hot air in the oven transfers the heat. Convection currents are formed as the air in the oven is heated, the hot air rises and forces the colder air at the top to flow down the sides of the oven, creating a current. In a traditional oven, the top is the hottest zone and the bottom of the oven is always cooler. In fan-forced ovens, a fan is used to distribute the heat evenly throughout the oven.

Worksheet

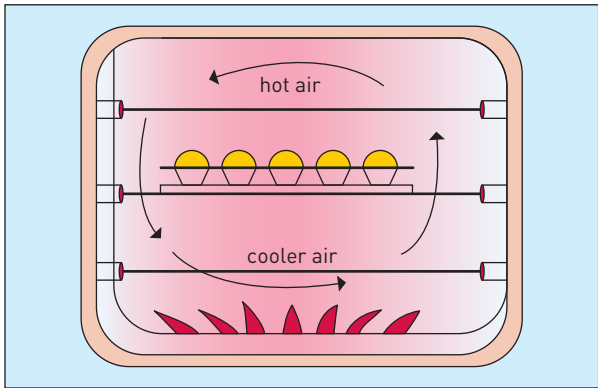


FIGURE 13.3 Convection currents in a traditional oven

Moist methods of cooking such as boiling, simmering and steaming involve water as the material that transfers heat via conduction. For example, when boiling potatoes, the hot water in the saucepan moves against the surface of the cold potatoes. As the water molecules absorb energy from the heat source, they heat up and rise, and then sink again when they cool off.

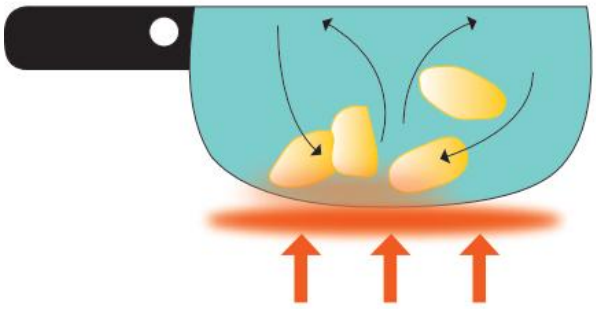


FIGURE 13.4 Convection currents in a liquid

ELECTROMAGNETIC RADIATION

Electromagnetic radiation is when electric currents cause electrons within food to move rapidly and generate heat which in turn cooks the food. Put simply, radiation is the transmission of energy through a medium such as food and it is transferred by wave motion in the form of electromagnetic waves.

When the waves fall on the food, they cause the molecules in food to vibrate, which causes it to heat up and subsequently cook. The food does not come into contact with the heat source, but the waves are absorbed on the surface and the food is cooked by conduction of heat through the food. Microwaving and induction cooking transfer heat to food using electromagnetic radiation.

Microwave cooking

In microwave cooking, energy is transferred to the food by electromagnetic radiation. The microwave oven contains a magnetron, that converts electricity to microwaves by rapidly switching electromagnets on and off to set up a wave pattern. The microwaves are channelled into the oven space by the waveguide, but as they cannot penetrate the metal lining of the oven, they bounce off the sides of the oven and return to the magnetron for recharging. A fan called a 'mode stirrer' and the turntable ensure even distribution of the microwaves throughout the oven.

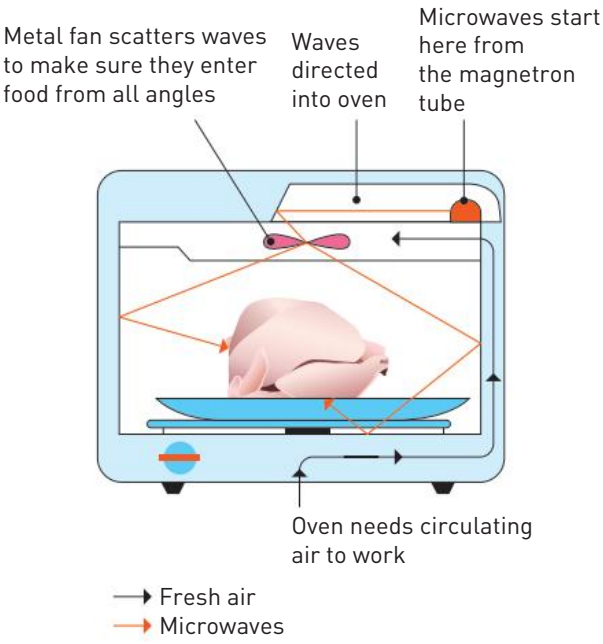


FIGURE 13.5 How a microwave oven works

Induction cooking

The induction cooktop works by heating up the pot that then heats up the food. An electrical current is passed through a copper coil underneath the cooktop surface which creates a magnetic field and, if the saucepan is made of magnetic material such as cast iron or some types of stainless steel, an electric current is produced in the saucepan. This causes the electrons in the saucepan to move rapidly and generate heat to cook food.

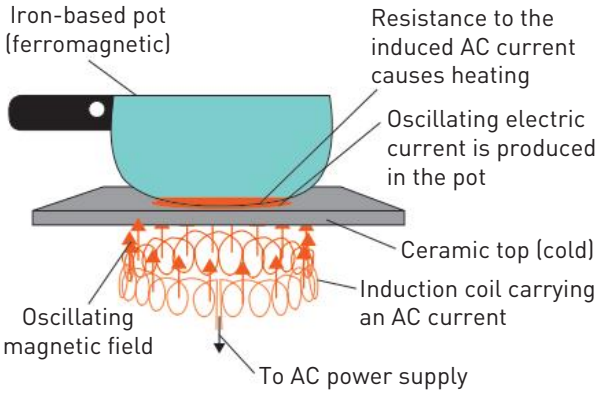


FIGURE 13.6 How an induction cooktop works



Collaborative Activity

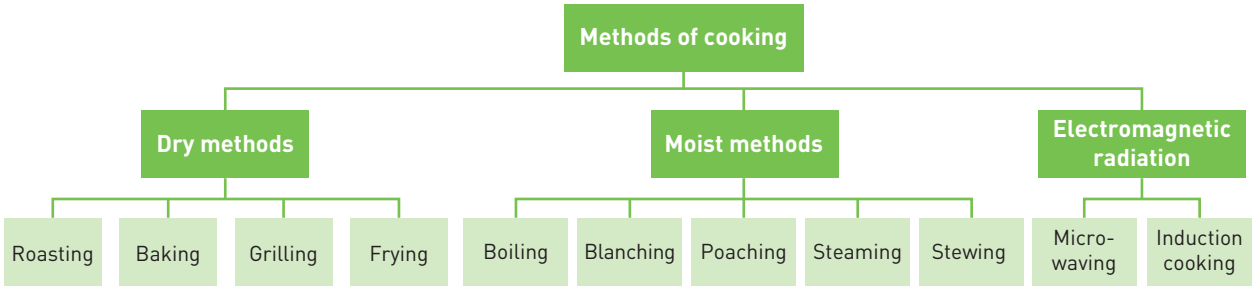


FIGURE 13.7 Methods of cooking food

Methods of cooking food

Methods of cooking food can be divided into dry methods, moist methods and electromagnetic radiation, as shown above. All methods of cooking food depend on the principles of the transfer of heat. The heating method does not change the temperature at which chemical reactions such as Maillard reactions, caramelisation and denaturation occur; however, the rate of heat transfer differs. For example, the time to cook a porterhouse steak will vary depending on whether it is pan-fried, roasted or grilled.

Dry methods

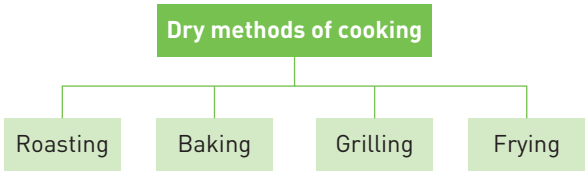


FIGURE 13.8 Dry methods of cooking food

ROASTING

Roasting is a method of cooking food in an oven using a small amount of fat or oil. The heat for oven roasting is provided by convection heat from the air currents circulating through the oven. Foods suitable for roasting include red meat such as beef and lamb, white meats such as chicken and pork, and vegetables including potatoes, carrots, pumpkin, eggplant and zucchini.



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Roasting is a dry technique used for cooking meat and some vegetables.

BAKING

Baking follows a similar principle to oven roasting, with heat provided by convection heat from the air currents circulating through the oven. However, baked food is cooked without the addition of fat or oil. The products best suited to baking are those that must not come into direct contact with liquids. Fish, fruit such as apples, egg custards, lasagna and flour products such as breads, cakes, biscuits and pastry are all baked using convection heat.



iStock.com/domoyega

Pastry products such as croissants are baked in the oven using convection currents.

GRILLING

Grilling is a fast, dry method of cooking that uses intense heat radiated by an electrical element, gas flame, glowing charcoal or open wood fire. The surface of the food is cooked by dry radiant heat and the interior is cooked by conduction. This is a very quick method of cooking food and is suitable for foods that are tender or require a short cooking time.

Foods suitable for grilling include tender cuts of meat such as fillet steak, lamb chops, chicken fillets and kebabs, fish, and vegetables such as tomatoes, mushrooms, capsicum and corn.

FRYING

Frying food means that it is cooked by total or part immersion in fat or oil, which is heated to temperatures between 150 °C and 220 °C. Convection currents heat the fat or oil as it moves over the outer surfaces of food, and conduction transfers the heat from the hot fat or oil into the food. Frying gives foods a crisp, flavoursome, brown crust thanks to the Maillard reaction and caramelisation.

Foods that are fried may be coated with flour, breadcrumbs or batter. Some foods may be covered in wrappers, such as won tons or spring rolls, while others are covered in pastry, such as samosas. Foods must be drained carefully – first by shaking in a sieve-like basket and then by draining on absorbent paper.

Smoke point

The 'smoke point' is the temperature at which fats and oils begin to burn or denature (break down). As the fat overheats, a bluish haze will begin to appear, giving off acrid fumes and leaving foods with an unpleasant flavour. This temperature, at which fat or oil has become dangerously hot and is ready to burst into flames, is called the 'flash point'.

Methods of frying

- *Dry-frying* – This uses only the fat that runs from the food as it is heated. Bacon is usually cooked by this method.
- *Shallow-frying* – This uses small quantities of fat or oil to cover the base of the pan. It lubricates the food, prevents it from sticking and adds flavour and aroma while cooking.
- *Stir-frying* – A little oil is heated in a wok and the food is stirred and lifted during the short, hot cooking process.
- *Deep-frying* – Food is totally submerged in preheated fat or oil. The oil or fat is heated to a temperature twice that of boiling water and so the food cooks quickly, forming a brown crust all over and a crisp texture.

Foods suitable for frying include tender cuts of meat such as pork chops, sausages and schnitzel, and vegetables such as potatoes, mushrooms, onions and eggplant. Other foods such as eggs, omelettes, pancakes, fritters and pikelets can be shallow-fried, while potato chips, doughnuts, spring rolls and won tons can be deep-fried.



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Stir-frying is a quick and healthy technique for cooking vegetables.

Understanding the Text

1 Outline three reasons for cooking food.

2 Explain how food is cooked by both conduction and convection.

3 Identify the methods of cooking food using electromagnetic radiation and explain how the heat is transferred to food.

4 What is roasting? List four examples of food suitable for roasting.

5 Explain how baking differs from roasting. Which products are best suited to baking? Give two examples.

6 Why is grilling described as a fast method of cooking?

7 Explain the role of both convection and conduction when frying food.

8 Explain how food is drained after frying and why this is important.

9 Describe what happens to the physical and chemical properties of fats and oils when they reach the 'smoke point'.

10 List the similarities and differences between dry-frying, shallow-frying and deep-frying.

Answers
Understanding the Text

Moist methods

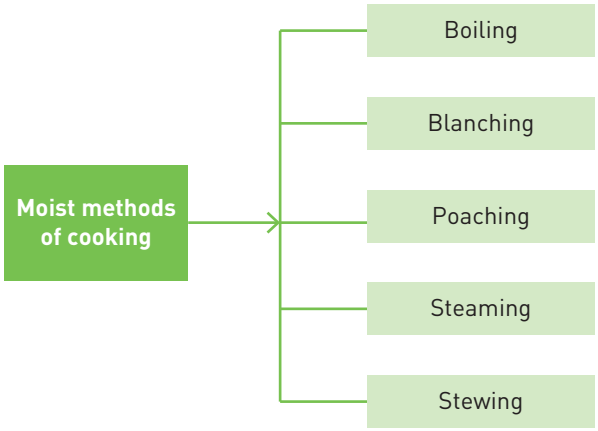


FIGURE 13.9 Moist methods of cooking food

BOILING

- **Boiling** is cooking food in water at 100 °C. Boiling produces rapid bubbling all over the surface of the pan and evaporation of water as steam. Boiling allows the liquid to come into contact with the whole surface of the food, and heat is therefore transferred to the food quickly and efficiently, with no drying out or browning. Flavourings such as spices, herbs, salt or wine can be added to the liquid to flavour the food.
- *Simmering* is not true boiling because food is cooked at a lower temperature of 85 °C, and bubbles rise slowly at one side of the pan. This gentle cooking method allows flavours to develop, and ingredients to soften without liquid evaporating.

Soups and stocks, vegetables such as potatoes and carrots, pulses, rice, pasta, tougher cuts of meat and poultry and shellfish including prawns and mussels can all be boiled.

BLANCHING

Blanching is a method of partly cooking food by plunging it briefly into boiling water. Some vegetables such as snow peas are blanched to brighten and soften them slightly before using them in a salad; while others, such as tomatoes, are blanched to make it easier to remove their skin. In order to retain its colour and texture, food is 'refreshed' after blanching by plunging it into cold or iced water to retard the cooking process.

POACHING

Poaching is a method of cooking delicate foods in liquid at a temperature just below simmering point (85 °C). The surface of the liquid should not bubble, but will appear to tremble. Heat is transferred to the food through the convection currents in the liquid. The food remains tender and moist but is not damaged by the rough action of boiling.

Fish, eggs and fruit, including peaches, cherries, apricots, apples and pears, are suitable for poaching.



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Poached pears retain their shape.

STEAMING

Steaming is cooking food in the steam from boiling water. The food must not come into contact with water, but the steam must be able to circulate freely around it. The boiling point of water occurs at 100 °C and, at that point, the liquid is turned into a gas or vapour and steam is produced.

Heat is transferred to the food in two ways during steaming. First, convection currents carry the heat



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Steaming produces a moist heat that prevents foods from drying out.

via the steam from the heat source to the food. Second, condensation transfers the heat from the steam to the surface. When the steam touches the food, it condenses; that is, it changes back into water. The energy or latent heat is released again and heats the food. Steaming produces a moist heat that prevents foods from drying out.

Methods of steaming

- *Graduated or atmospheric steamer* – Boiling water is placed in a pan to create steam, then a series of cooking compartments, such as tiered bamboo steamers or a metal container with a perforated base, are stacked on top of each other to hold the food. The steam rises through the perforations of the bamboo basket or perforated steamer, circulating around the food and cooking it. A tight-fitting lid must be used to prevent the steam escaping.

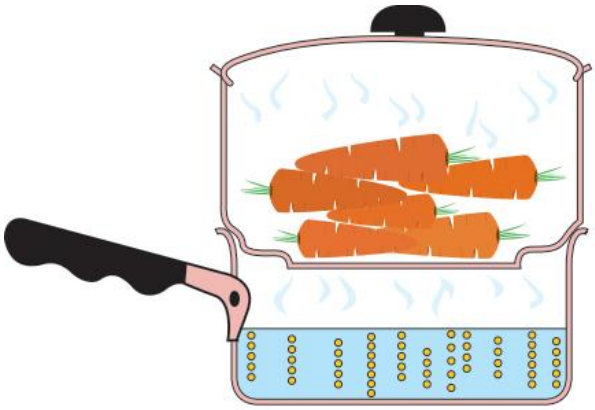


FIGURE 13.10 Cooking food in an atmospheric steamer

- *Sealed container* – Food is placed in a covered basin or lidded steamer bowl and securely covered so that no moisture can enter. The bowl is then placed in a saucepan of boiling water that comes halfway up the bowl. This method is used for making steamed puddings.



FIGURE 13.11 Steaming food in a basin

Foods suitable for steaming include vegetables and fish. Fish has very short muscle fibres, very little connective tissue and almost no fat. Steaming enables fish to be cooked just to the point of coagulating the muscle protein without toughening or drying out the flesh.

STEWING

Stewing is a long, slow method of simmering food in a small amount of liquid. The cooking liquid provides a moist environment to break down the connective tissue or collagen in tough cuts of meat into soluble gelatin. The liquid adds and absorbs flavours throughout cooking and retains the nutrients that have escaped from the food. This liquid forms part of the finished dish and is flavoured with other ingredients to contribute to the overall flavour. Cheaper cuts of meat, poultry, fish and a variety of fruits, particularly stone fruit are all suitable to stew.

Electromagnetic radiation

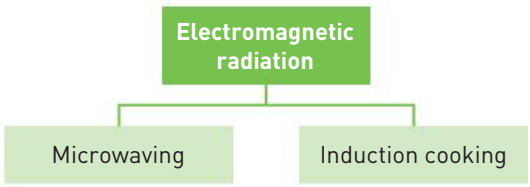


FIGURE 13.12 Electromagnetic radiation methods of cooking food

MICROWAVING

When microwaves are absorbed by food, the molecules of water in the food vibrate at a high speed and in turn knock into protein and fat molecules and transfer energy to them. This vibration of the water, protein and fat molecules produces heat, which cooks the food. Microwaves can penetrate food to a depth of 4–5 centimetres, unlike infrared radiation, which is only absorbed on the surface of the food.

The most suitable foods for cooking in a microwave oven are those that have a high moisture content and cook quickly. Small portions – less than 4 centimetres in thickness – cook more evenly.

There are some disadvantages to microwave cooking.

- Foods such as biscuits that have a low water content are not suitable for cooking in a microwave oven.
- Food is cooked very quickly, so it is easy to overcook some foods and they can become dry.
- Food does not brown because the surface of the food does not get sufficiently hot to trigger either the caramelisation, the Maillard reaction or dextrinisation.

Food that is cooked in a microwave oven should be left to stand for the same length of time as the cooking time stated in the recipe to allow the molecules to stop vibrating and finish the cooking process. Some foods will need to be stirred during cooking, as this will enable even distribution of heat – although the food may be bubbling around the edge, the heat may not have penetrated the centre, which could still be cold.

Glass, plastic and ceramic containers allow microwaves to pass through them, so they make excellent containers for cooking foods in a microwave oven. Metal surfaces reflect microwaves, and therefore metal bowls and aluminium foil containers are unsuitable.

INDUCTION COOKING

An induction cooktop heats very quickly and responds instantly when you want to change the temperature settings; for example, increasing the heat from simmer to boil. The other benefit is that the surface of the cooktop stays cool-to-touch while food is cooking in a saucepan and so it is easy to clean because spills do not cook onto the surface. Induction cooking is more environmentally friendly than gas because the heat zone is directly underneath the saucepan, not around the walls of the saucepan, so less energy is used.



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An induction cooktop

Practical Activity 13.1

Scientific experiment – cooking carrots using different heat transfer methods

Aim: To compare the appearance, flavour and texture of carrots cooked using different cooking methods.

Materials

8 medium, even-sized carrots, oil

Method

1. Preheat the oven to 200 °C
2. Wash and top and tail the carrots. Peel if desired.
3. Slice each carrot into ½-centimetre coins
4. Prepare the equipment for each cooking method.
5. Cook the carrots using each of the four methods listed in the table below (use two carrots for each method).

Analysis

Record your answers to the following in a table like the one below.

1. Which method of cooking produced the carrot with the best colour?
2. Which method of cooking produced the carrot with the best texture?
3. Which method of cooking produced the carrot with the best flavour?
4. Comment on which method of cooking would be considered to be the most healthy cooking method. Justify your answer.

Conclusion

Identify and explain which method of heat transfer achieved optimal sensory properties of the carrot.

HEAT TRANSFER METHOD	COLOUR	TEXTURE	FLAVOUR
Boil carrots for 5 minutes			
Steam carrots for 5 minutes			
Microwave carrots with 1 tablespoon water for 3–4 minutes			
Roast carrots in a small amount of oil at 200 °C for 20 minutes			

Understanding the Text

11 Explain the difference between boiling and simmering.

12 Describe the process of heat transfer that takes place when food is boiled.

13 What is meant by the term 'blanching' and why is this process often used in food preparation?

14 Explain the process used to poach food and list two advantages of poaching.

15 How is heat transferred to food during steaming?

16 Why is steaming often considered an excellent method of cooking tender portions of food?

17 List three advantages of stewing tough or less tender cuts of meat.

18 How does a microwave oven cook food?

19 Describe two disadvantages of cooking in a microwave oven.

20 Outline the reasons why an induction cooktop could be selected for a kitchen over a gas cooktop.

Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

Applying knowledge

Prepare a summary chart of both dry and moist methods of cooking using the following headings:

- Cooking method
- Definition
- Methods of heat transfer
- Foods suitable
- Equipment required.

Worksheet

Analysing information

Prepare a SWOT analysis of microwave cooking.

MICROWAVE COOKING	
Strengths	Weaknesses
Opportunities	Threats

Evaluating concepts

1 Select an ingredient; for example a fruit or vegetable.

2 Select three different cooking methods that can be used to prepare the ingredient.

Worksheet

3 Predict how each cooking method may change the sensory properties of the selected ingredients.

4 Which method of cooking would you recommend to enhance the properties of the ingredient? Justify your answer.

Eggs Florentine

The recipe for eggs Florentine demonstrates the coagulation of egg protein by changing the pH of the cooking liquid and applying heat. Poaching is a gentle wet method of cooking the egg. The preparation of a béchamel or cheese sauce uses the starch to gelatinise and thicken the sauce. The process of dextrinisation and the Maillard reaction are also evident in this product.

50 grams baby spinach leaves
15 grams butter
1 tablespoon plain flour
½ cup milk
1 tablespoon grated cheddar cheese
½ English muffin
1 egg
1 tablespoon vinegar
2 teaspoons grated parmesan cheese

METHOD

1. Preheat grill to high or oven grill to 200 °C.
2. Wash the spinach leaves thoroughly.
3. Microwave spinach in a covered bowl for 30 seconds until just wilted.
4. Melt the butter in a small saucepan.
5. Add the flour and stir over a low heat for 1 minute.
6. Remove from the heat and gradually stir in the milk. Return to the heat and stir constantly with a wooden spoon until the mixture boils and thickens.
7. Add the cheese and stir until melted. Remove from the heat.
8. Toast the muffin and set aside.
9. To poach an egg in the classic style, heat water to just below boiling point in a saucepan or frying pan and add the vinegar. Then stir the water briskly with a wooden spoon to create a whirlpool. Gently lower the egg from a small dish into the swirling water. The swirling water will ensure the egg forms a neat shape.
10. Reduce the heat and poach the egg until the yolk is set to suit your taste.
11. To serve, place half a muffin on a serving plate and top with the spinach.
12. Carefully lift the poached egg onto the spinach and spoon the cheese sauce over the top of the egg.
13. Sprinkle with parmesan cheese and flash under a grill until the cheese is melted. Serve immediately.

SERVES 1

EVALUATION

1 Describe the sensory properties of the eggs Florentine – appearance, aroma, flavour and texture – and comment on the overall appeal.
2 List all the methods of cooking used in this recipe. Explain how the heat is transferred to the food for each method of cooking.
3 Identify and describe the process that causes the sauce to thicken.
4 Identify and explain the processes that cause the muffin to brown when toasted.
5 Describe how the process of coagulation changes the form of the egg protein during poaching.



Mark Fergus Photography

Soba noodle salad

Many recipes described as contemporary Australian cuisine borrow heavily from Asian cultures, including Japanese. This recipe for soba noodle salad is based on traditional Japanese ingredients. Soba noodles are a Japanese noodle made from buckwheat and wheat flour, which gives them a brownish-grey colour. After cooking, they are rinsed to remove excess starch to keep the noodles separate and to allow them to absorb the flavours of the dressing. A number of cooking techniques – frying, blanching and boiling – are used in this recipe to maximise the sensory properties of all the ingredients.

2 teaspoons sesame seeds

½ chicken fillet

1 tablespoon soy sauce

½ teaspoon sesame oil

1 egg

3 teaspoons vegetable oil

4 snow peas

⅙ red capsicum

½ Lebanese cucumber

70 grams buckwheat soba noodles

¼ cup coriander leaves, washed

DRESSING

1 teaspoon pickled ginger

1 tablespoon mirin

1 tablespoon rice wine vinegar

½ teaspoon sesame oil

METHOD

1. Dry-fry the sesame seeds in a frying pan until pale golden. Set aside.
2. Pull the chicken tenderloin out to the side, then place the chicken fillet inside two sheets of baking paper and use a meat mallet or rolling pin to flatten slightly.
3. Prepare a marinade of soy sauce and sesame oil in a shallow bowl. Add the chicken to the marinade and allow to stand for 20 minutes.
4. Whisk the egg until the yolk and white are well combined. Heat 1 teaspoon of the vegetable oil in a small non-stick frying pan. Add the egg and cook over a low heat until the egg is set. Place the omelette on paper towel to remove any excess oil.
5. When cool, cut the omelette into fine strips and set aside to use as a garnish.
6. Blanch the snow peas in boiling water for 30 seconds. Drain and refresh. Cut into fine julienne shreds.
7. Cut the red capsicum into fine julienne shreds.
8. Cut the Lebanese cucumber in half lengthwise and use a teaspoon to scoop out the seeds.
9. Cut across into very fine slices.
10. Remove the chicken from the marinade and pat dry with a paper towel. Heat the remaining 2 teaspoons of oil in a small frying pan and cook the chicken for approximately 3 minutes on each side or until cooked through. Remove from heat and rest.
11. Bring a medium-sized saucepan of water to boil. When the water is boiling, add the soba noodles and cook for 4 minutes. Drain and rinse in warm water. Drain again.
12. To prepare the dressing, rinse the pickled ginger in cold water and then chop finely. Add the mirin, rice wine vinegar and sesame oil.
13. Slice the chicken thinly and combine with the snow peas, red capsicum and Lebanese cucumber in a bowl. Add the dressing.
14. Add the drained soba noodles and coriander leaves and toss gently to combine. Place in a serving bowl or on a plate.
15. Garnish with the omelette strips and toasted sesame seeds.

SERVES 1

EVALUATION

1 Describe the sensory properties of the soba noodle salad using descriptive language.

2 Identify the cooking techniques used in the recipe to develop the colour of specific ingredients:
- sesame seeds
- chicken
- snow peas
- soba noodles.

3 Why is the omelette cooked and cooled before it is used in the soba noodle salad?

4 Describe the physical changes to the chicken that occurred during the cooking process – consider changes in colour, texture and size.

5 Discuss your success with the preparation of this recipe. Focus on:
- your cutting skills
- cooking ingredients to the right degree of doneness
- final presentation of the salad.

Suggest areas for improvement in future productions.



Mark Fergus Photography

Lemon and ricotta steamed puddings

Steam doesn't conduct heat as quickly as water, so it is a cooking method suited to delicate ingredients such as ricotta cheese. This mixture will hold at room temperature for several hours, so this recipe can be prepared ahead of time and cooked just before serving. The ricotta in this recipe provides a good source of calcium; however, this recipe is also high in fat and sugar and so should only be eaten occasionally as a treat.

3 tablespoons apricot jam or marmalade
65 grams butter, softened
65 grams caster sugar
zest of 1 lemon, finely grated
50 grams ricotta
1 egg
75 grams flour
1 teaspoon baking powder
1 tablespoon lemon juice
2 teaspoons milk
1 tablespoon poppy seeds, optional
extra butter for greasing
pouring cream or ice-cream to serve

METHOD

1. Grease and line the base of 3 dariole moulds or ceramic ramekins, approximately ¾ cup capacity.
2. Place 1 tablespoon of apricot jam or marmalade in the base of each mould.
3. Beat the butter, sugar, zest and ricotta until smooth, then beat in the egg.
4. Sift the flour and baking powder together and stir into the mixture. Add the lemon juice and milk and mix. Stir through the poppy seeds if using.
5. Divide the pudding mixture between the 3 moulds – each should be ¾ full.
6. Cover each mould with buttered foil and secure with kitchen string.
7. Bring the water to the boil in the base of a steamer. Place the puddings in a steamer basket and cover the steamer with the lid. Cook for 25 minutes.
8. Invert the puddings onto a plate and serve with pouring cream or ice-cream.

Alternative cooking methods if a steamer is not available:

- Baking – preheat oven to 100 °C and bake for 25 minutes or until a skewer comes out clean.
- Microwaving – use plastic or ceramic moulds or buttered teacups and cover with cling wrap. Microwave for 1–2 minutes then leave to sit for 4 minutes before serving.

MAKES 3 PUDDINGS

EVALUATION

1 Describe the sensory properties of the lemon and ricotta steamed puddings.
2 Explain how heat is transferred when using the steaming method.
3 Identify the three processes used to aerate the puddings and explain how each method of aeration contributes to the light airy texture of the finished product.
4 Why do the puddings need to be covered individually before cooking?
5 Explain why, if the puddings are baked, a low oven temperature is recommended.



Mark Fergus Photography

STARCH

Flour
Cornflour
Rice
Potato flour
Rice flour
Pasta



REACTIONS: MAILLARD REACTION
DEXTRINISATION
GELATINISATION

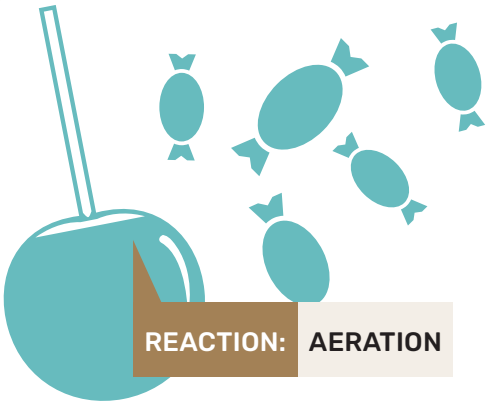
SUGAR

Granular
Caster
Raw
Brown
Golden syrup



REACTION: MAILLARD REACTION

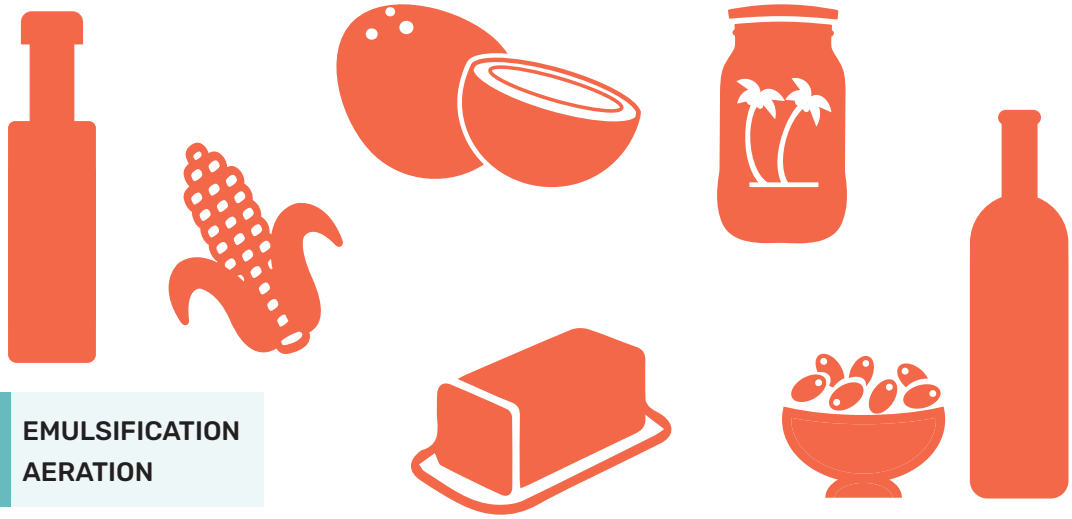
REACTION: CARAMELISATION



REACTION: AERATION

FATS AND OILS

Butter
Canola oil
Lard
Olive oil
Rice bran oil
Coconut oil



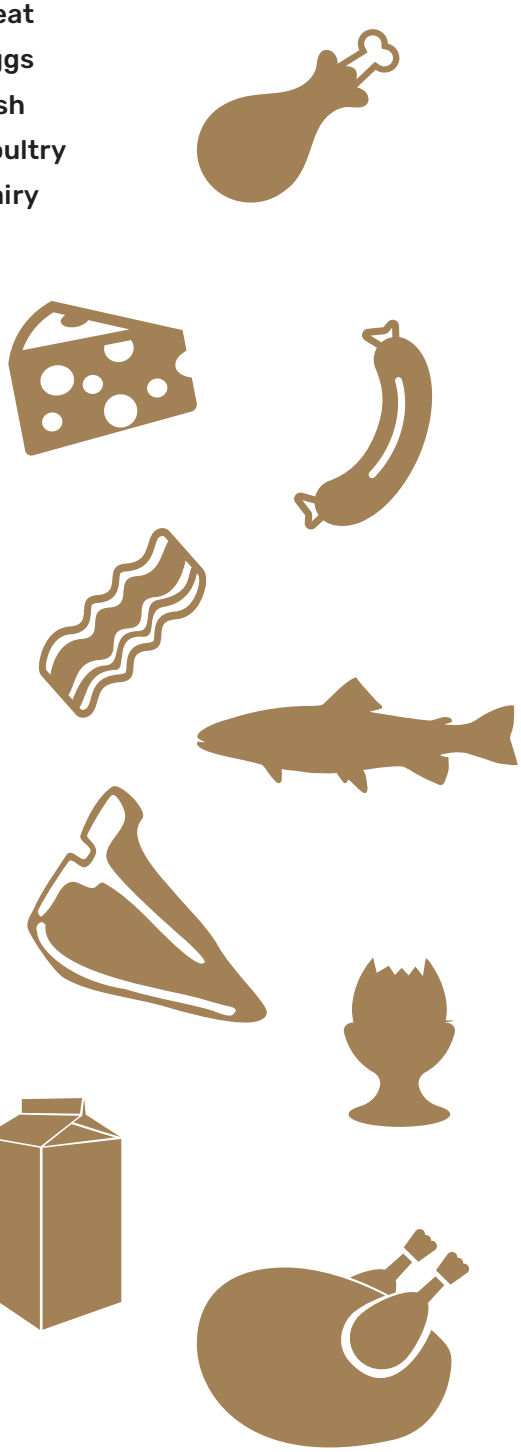
REACTIONS: EMULSIFICATION
AERATION

14

THE SCIENCE OF FOOD

PROTEIN

Meat
Eggs
Fish
Poultry
Dairy



REACTIONS:
DENATURATION
COAGULATION
EMULSIFICATION
AERATION
MAILLARD REACTION

KEY TERMS

aeration the process of incorporating air into food products to increase the volume and create a light, airy texture

caramelisation the process that sugars undergo when heated to high temperatures to develop a golden-brown colour

coagulation a form of denaturation that occurs when there is a permanent change in the protein from a liquid into a thick mass as a result of heat or the addition of acids

denaturation the permanent structural change of the protein molecules in food

dextrinisation the process that occurs when a starch is exposed to dry heat; the starch is broken down to dextrin, resulting in a change in colour to golden brown

emulsification mixing two liquids that don't normally combine evenly; for example, water and oil

enzymes chemical substances that act as biological catalysts in plants, animals and micro-organisms; they bring about and speed up chemical reactions in foods without becoming involved in the reactions

gelatinisation the process that occurs when starch granules absorb liquid in the presence of heat and thicken the liquid, forming a gel

Maillard reaction when a protein and sugar or starch are present in the same mixture and dry heat is applied during baking, creating a golden-brown crust and a wide range of aromas

Resources
Study Design links
Infographics
Flashcards

Chemical and physical changes to the properties of food

Understanding the functional properties of food – that is, the physical and chemical properties of food ingredients and the way they react during preparation, cooking and processing – is essential to producing successful products that have a delicious flavour, aroma, texture or visual appeal to consumers.

TABLE 14.1

REACTION	DESCRIPTION OF REACTION	FOOD EXAMPLES
Aeration	**Aeration** is the process of incorporating air into food products to increase their volume and create a light, airy texture. Food can be aerated by: • biological ingredients – yeast • chemical ingredients – baking powder, bicarbonate of soda • mechanical actions – sifting, creaming, whisking, beating, folding in ingredients, rubbing in ingredients.	Bread Cakes Pavlova Soufflé
Caramelisation	**Caramelisation** is when sugar (sucrose) begins to decompose when exposed to high temperatures (190 °C) of dry heat. Hundreds of compounds are generated as the sugar decomposes, resulting in browning and enjoyable aromas, such as when baking goods or roasting coffee.	Gingersnaps Caramel sauce Toffee
Coagulation	**Coagulation** is a form of denaturation that occurs when there is a permanent change in the protein from a liquid into a thick mass as a result of heat or the addition of acids. The denatured proteins form a new structure which retains water – a semi-liquid becomes firm and maintains its shape.	Grilled meat Quiche Boiled egg
Denaturation	**Denaturation** describes the permanent structural change of the protein molecules in food. This can occur by application of heat, mechanical action or the addition of acids.	Beaten egg whites Poached egg Marinaded meat
Dextrinisation	**Dextrinisation** is the process that occurs when a starch is exposed to dry heat; the starch is broken down to dextrin, resulting in a change in colour to golden brown.	Bread Scones
Emulsification	**Emulsification** is mixing two liquids that don't usually combine; for example, water and oil. Some proteins act as emulsifying agents and hold the immiscible liquids in suspension.	Mayonnaise Vinaigrette dressing
Gelatinisation	**Gelatinisation** is the process that occurs when starch granules absorb liquid in the presence of heat and thicken the liquid, forming a gel.	Cheese sauce on cauliflower White sauce in lasagne Filling of lemon meringue pie
Maillard reaction	The **Maillard reaction** turns food brown and creates pleasant volatile aromatic compounds. It is a reaction between amino acids in protein and sugars and/or starch. It begins at about 154 °C, so can be seen when sautéing on the cooktop or baking in the oven.	Cakes Roast meat Biscuits Muffins



Videos
Demonstrations of each reaction

The pH scale

The pH scale is used by food scientists when analysing an ingredient or food product to determine if it is an acid or alkali.

Acids occur naturally in some foods, such as lemons and limes and have a pH between 1 and 6. Most foods fall into the acidic to neutral section of the pH scale, rather than being alkaline. Neutral ingredients, such as water and chocolate, are neither acidic nor alkaline, so they have a pH of 7 and do not react with or cause chemical changes when combined with other ingredients in a recipe.

Alkaline ingredients, such as bicarbonate of soda and egg white, have a pH of between 7 and 14.

Blue and red litmus papers are used to determine whether a food is an acid or an alkali, and universal indicator paper indicates the pH rating.

ACIDS

Acids are any chemicals that release hydrogen ions when dissolved in water and turn litmus paper red. Edible acids, such as citric in citrus fruit, usually taste sour and can be described as having an acidic flavour. Some other acids present in foods are lactic acid in milk, acetic acid in vinegar and tartaric acid in grapes.

ALKALIS

Alkalis are the opposite of acids and are sometimes known as 'bases'. They have a low concentration of hydrogen ions when dissolved in water. Their pH values are above 7 and they turn red litmus paper blue. Alkalis have a bitter taste and a slimy mouthfeel. The most common alkali used in food preparation is bicarbonate of soda. It is a white powder and the simplest form of a chemical raising agent.



Mark Fergus Photography

Bicarbonate of soda

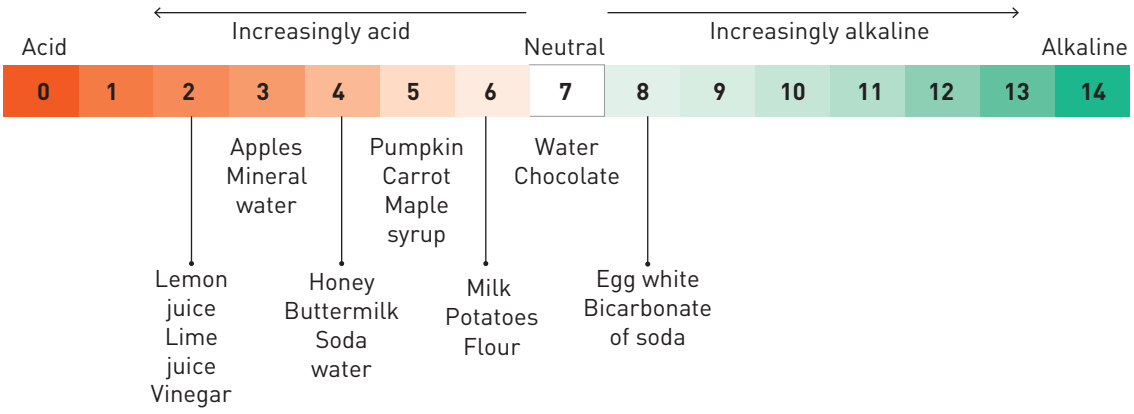


FIGURE 14.1 pH scale

Activity 14.1

Determining the pH levels of foods

Aim: To determine the pH levels of a variety of foods.

Equipment

- 8 clear plastic glasses
- blue litmus paper
- red litmus paper
- universal indicator paper
- teaspoon measuring spoons
- 1 teaspoon each of: vinegar, milk, tomato juice, tap water, bicarbonate of soda, orange juice, lemon juice, egg white

Method

1. Draw up a table like the one in the next column to record your results.
2. Add 1 teaspoon of bicarbonate of soda to a glass and dissolve in 1 teaspoon of water.
3. Place each of the other ingredients in individual glasses, each with 1 teaspoon of water. Remember to label each glass.
4. Test each sample with the blue litmus paper – if it turns red, this indicates the sample is an acid.
5. Test each sample with the red litmus paper – if it turns blue, this indicates the sample is an alkali.
6. Record the results from the litmus paper tests.
7. Using the universal indicator paper, test each sample for a pH rating to determine the degree of acidity or alkalinity.

Results

FOOD SAMPLE	LITMUS PAPER TEST	pH RATING
Vinegar		
Milk		
Tomato juice		
Tap water		
Bicarbonate of soda		
Orange juice		
Lemon juice		
Egg white		

Analysis

1. Which foods could be used to sour milk?
2. Which alkali substance would be suitable to use as a raising agent?
3. What is likely to happen when milk is added to hot tomato soup? Why is this reaction likely to occur?
4. Which foods would be suitable to add to a marinade for meat? Why would this product be suitable?

Conclusion

- The acidic ingredients were …
- The alkaline ingredients were …
- The neutral ingredients were …

Enzymes

Enzymes are chemical substances that act as biological catalysts in plants, animals and micro-organisms. They bring about and speed up chemical reactions in foods without becoming involved in the reactions, and are valuable when preparing some food.

Enzymes found in fruits and vegetables

When fruits or vegetables are peeled or cut, enzymes contained in the plant tissue are released. In the presence of oxygen from the air, these enzymes catalyse to form brown pigments called 'melanins'. This process is called 'enzymatic browning'. Citric acid from lemon juice is often used to prevent browning and to slow down the action of the enzymes in cut fruits, such as apples and bananas in a fruit salad.

Enzymes are also responsible for the ripening of fruit as they convert the starch to sugar, which gives fruit better sensory properties and makes it more palatable, such as in the ripening of a green banana.

Some fresh fruits, such as fresh pineapple or papaya, contain the enzyme protase, which has the ability to break down proteins. This enzymatic action can be used to tenderise tough cuts of meat by breaking down or denaturing the proteins in the muscle fibres and connective tissue.



iStock.com/Nungning20

Fresh papaya contains the enzyme protase.

Aeration

Aeration is the process of incorporating air into food products to increase the volume and create a light, airy texture. Food can be aerated by:

- biological ingredients such as yeast
- chemical ingredients such as baking powder, bicarbonate of soda
- mechanical actions such as sifting, creaming, whisking, beating, folding in ingredients and rubbing in ingredients.

BIOLOGICAL RAISING AGENT – YEAST

Yeast is like an enzyme machine, breaking down sugars into smaller and simpler molecules. Yeast contains three enzymes:

- maltase – which changes maltose to glucose
- sucrase – also called 'invertase', which changes sucrose to invert sugar, a mixture of glucose and fructose
- zymase – which splits up both glucose and invert sugar into carbon dioxide and alcohol.

These simple sugars are a very important part of the process of fermentation and the production of carbon dioxide, which enables the yeast dough to rise.

Aerating food with yeast

Yeast is a single-celled micro-organism. It reproduces by budding, and during this process, yeast converts the carbohydrates, starch and sugar in the yeast dough to a gas, carbon dioxide (CO_2), plus alcohol and water. This process is known as 'fermentation'. Yeast needs food, moisture and warmth in order to ferment and leaven (raise) the bread dough. In bread making, the food for the yeast is from the flour and a little sugar; the water in the dough provides the moisture. While the yeast dough is being 'proved' – that is, while fermentation is occurring – the dough must be kept warm at a temperature of between 25 °C and 27 °C to allow the yeast to reproduce and increase the volume of the dough. A flour with a high gluten content allows the dough to stretch and capture the bubbles of carbon dioxide without collapsing.

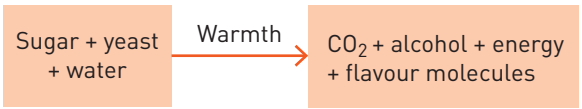


FIGURE 14.2 The fermentation process of yeast

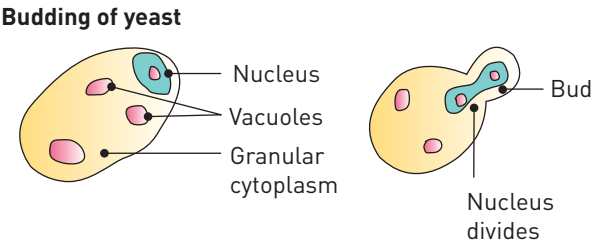


FIGURE 14.3 Reproduction of yeast cells

CHEMICAL RAISING AGENTS

Alkali as a raising agent

Bicarbonate of soda, when combined with moisture and heated, produces sodium carbonate, steam and carbon dioxide. The carbon dioxide gas is released and leavens the mixture by causing it to froth and expand up and out. The remaining residue is soda, an alkaline substance that gives a sharp, bitter taste and a dark yellow colour. Ingredients that have strong flavours such as brown sugar, ginger or golden syrup are needed to mask these unpleasant residue flavours. When bicarbonate of soda is used as an ingredient in biscuit making, it causes the biscuits to spread more, crisp faster and develop a rich, dark colour.

Acids as raising agents

Raising agents are used in baked products such as cakes, biscuits and muffins to increase the volume of a mixture and to create a light, porous texture in the final item. The acid ingredients dissolve when they are moistened, then react with the bicarbonate of soda to produce carbon dioxide gas, which in turn leavens a mixture. Examples of acidic ingredients used in baked products to help them rise can be seen in the diagram on the following page.

Self-raising flour is a convenient all-purpose flour with baking powder and salt already added. It is used in a wide range of baked products such as cakes, muffins, biscuits and scones, which are leavened when baked.



FIGURE 14.4 Acidic ingredients used in baked products

AERATION CAUSED BY MECHANICAL ACTION

Sifting, creaming together butter and sugar, whisking, beating, folding-in and rubbing-in are all processes that mechanically trap bubbles of air within a batter in order to create a light, airy texture in the finished product.

- **Sifting** involves passing dry ingredients such as flour through a fine-mesh sieve to incorporate air to make ingredients lighter.
- **Creaming** is beating butter and sugar together until they resemble lightly whipped cream. As the mixture is creamed, air is incorporated, the volume increases and the mixture becomes lighter in colour.
- **Whisking** is the process of using a whisk vigorously to incorporate air into a mixture.
- **Beating** is stirring rapidly in a circular motion with a tool such as a wooden spoon or electric mix-master to incorporate air.
- **Folding-in** is the process of gently combining a light, airy mixture into a heavier mixture. A metal spoon or spatula is used in short strokes to prevent loss of air.
- **Rubbing-in** is a method of mixing butter through dry ingredients with fingertips until it resembles fresh breadcrumbs. The fingertips are held above the bowl so that air is captured as the mixture is lifted and dropped into the bowl.

Understanding the Text

1 What is the pH scale? If an ingredient has a pH of 7, what does that mean when it is included in a recipe?

2 Describe the characteristic properties of an acid. List five ingredients that are classified as acids.

3 Describe the characteristic properties of an alkali and identify the most common alkali used in food preparation.

4 Describe the process of enzymatic browning in cut fruit and vegetables and explain how its effect can be minimised.

5 Explain the role enzymes play in developing the sensory properties of fruit and in tenderising meat.

6 Yeast is a biological raising agent. Identify and outline the process it uses to aerate food products. List three conditions yeast requires to grow.

7 Describe how bicarbonate of soda acts as a raising agent. Explain why ingredients such as brown sugar, ginger and golden syrup are used in recipes that are leavened with bicarbonate of soda.

8 Why are acids such as cream of tartar and vinegar sometimes used when making meringue?

9 How do acidic ingredients work with bicarbonate of soda to increase the volume of cake, biscuits and muffins?

10 Select four mechanical methods that can be used to aerate food products. Describe how each method incorporates air to leaven a food product.

Answers Understanding the Text

Protein

Proteins are found in both animal and plant foods, such as meat, poultry, fish, eggs, dairy foods, wheat flour and legumes. They are large molecules made up of smaller units called 'amino acids' and contain the elements of carbon, oxygen, hydrogen and nitrogen. The number and type of amino acids in the different types of protein chains vary considerably. The pattern of amino acids that form in the protein molecule determines the shape of that molecule and consequently its physical properties and the type of protein food. Each amino acid has its own chemical name and there are at least 22 different types.

PROPERTIES OF PROTEINS

When preparing and cooking protein foods, such as meat, poultry, fish, dairy products, eggs and legumes, the protein molecules undergo a permanent structural change known as **denaturation**. It can occur by the application of heat, mechanical actions, a change in pH or exposure to enzymes. As a result of exposure to all or any of these, the protein becomes less elastic and less soluble.

Coagulation is a form of denaturation and occurs when there is a permanent change in the protein from a liquid into a thick mass as a result of heat or the addition of acids.

Here are two examples of the denaturation of protein utilised in food products:

- During the beating of egg whites for meringue, air bubbles are captured so the liquid becomes light and foamy.
- Including an acid such as vinegar in the water assists in coagulation when poaching an egg.

EGGS

Eggs are a valuable ingredient in food preparation because of their versatility and the various functions they perform when combined with other foods. Popular methods of preparing eggs by themselves are boiling, frying, scrambling, poaching and beating in an omelette.

In each protein food, including eggs, all the molecules are identical in shape in their raw form. It is possible to denature egg protein in a variety of ways by heating, applying mechanical actions, or adding sugar or an acid.

Coagulation of eggs

During cooking, heat is applied to eggs or egg mixtures, causing considerable changes in their physical properties. In its raw state, egg white is a clear liquid with a slimy texture and egg yolk is a dense yellow colour and is slightly more viscous than the white. When the egg is exposed to heat, the liquid white gradually sets to form a white rubbery mass and the yolk becomes firm.

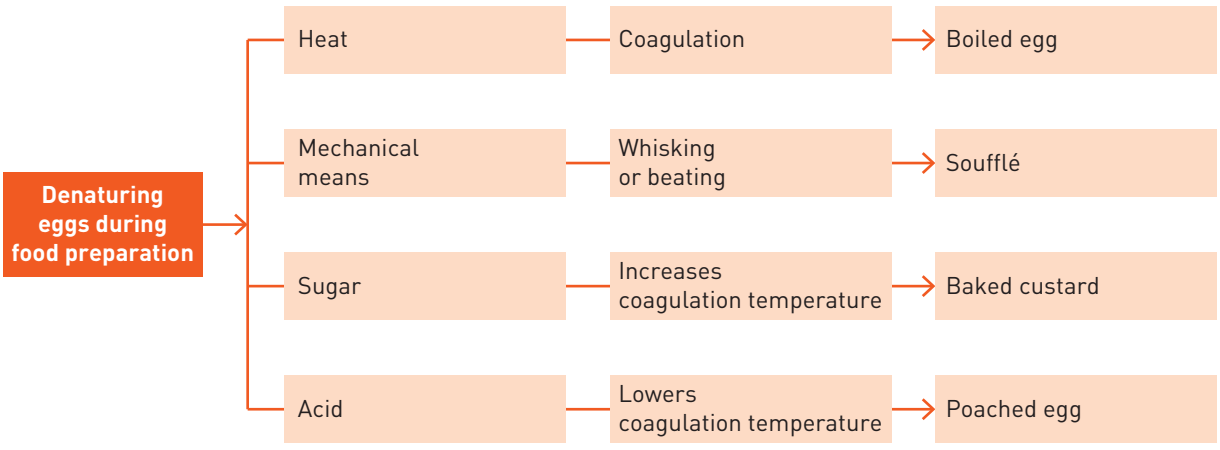


FIGURE 14.5 Denaturing eggs during food preparation

Cooking eggs using dry heat

The effect of baking on eggs

When baked products are cooked in the dry heat of an oven the protein in eggs is an important structure builder. During the baking of a cake mixture, the heat coagulates or sets the egg protein, contributing to the fixed shape and firm structure of the finished product. Products that utilise the structural function of eggs are cakes, muffins, biscuits and puddings.

In the final step before baking, pastries and scones are often brushed with an egg glaze. There is a very small amount of glucose in eggs; during baking it combines with the egg proteins, and complex reactions such as the **Maillard reaction** occur, resulting in brown colouration and intense flavour development.

Baked custards are very delicate mixtures and must be cooked with a gentle heat to ensure a smooth, even texture and so are cooked in a water bath within the oven.

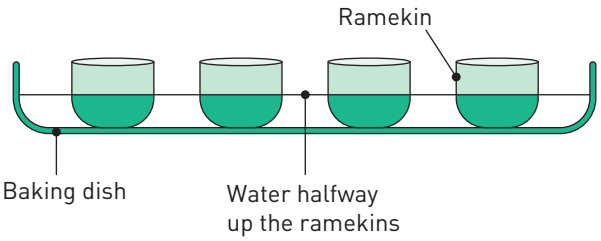
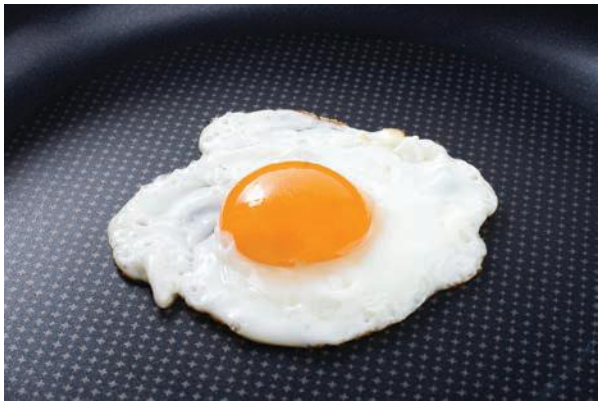


FIGURE 14.6 A water bath for cooking egg-based dishes

The effect of frying on eggs

Frying is another dry cooking method regularly used to cook eggs. The heat is transferred through the frying pan to heat the fat or oil and as soon as the raw egg is added, its physical and chemical properties begin to change. The semi-liquid egg sets into a firm shape as the protein denatures and coagulates, and the base of the egg begins to brown as the Maillard reaction becomes evident around the edge of the egg white.



Shutterstock.com/Vankad

Coagulation and the Maillard reaction occur when eggs are fried.

Cooking eggs using moist heat

Boiling involves cooking food in a liquid at 100 °C. When an egg is boiled, the texture changes from a semi-liquid to a firm, solid mass. The egg white changes from transparent to white and the oval shape is set within the shell as the process of coagulation takes place.

Steaming is used to cook delicate mixtures such as egg custard sauces that are used for the base of ice-cream. Using a double boiler and the gentle heat of steam prevents the egg custard from over-coagulating to produce a smooth, even-textured product.

The effect of acid on eggs

When eggs are poached in hot water, a small amount of acid in the form of vinegar can be added to assist in the denaturation process. The acid decreases the pH of the cooking soluation so the proteins in the egg become less stable and more likely to denature. By combining heat and an acid to denature the egg protein during poaching, it coagulates and holds its shape at a lower temperature, making the end product more appealing.

When beating egg whites to make meringue, a small amount of cream of tartar, which is an acid, can be added. This addition of acid in the early stages of beating stabilises the egg whites.

Emulsification using eggs

Egg yolks include lecithin and this makes them an effective **emulsifying** ingredient. The yolk has the ability to prevent fat and water from separating. If eggs are too cold or are added too quickly to a creamed mixture of butter and sugar, the emulsion breaks and is said to have 'split' or 'curdled'. Egg yolk is also used in mayonnaise as the emulsifying agent – see Fats and Oils on page 335.



Shutterstock.com/Robyn Mackenzie

Lecithin in egg yolk stabilises homemade mayonnaise.

Using mechanical action to aerate eggs

Eggs, either whole, yolks or whites, trap air as they are beaten to create a foam made from millions of bubbles that will increase the volume and create a light texture in a mixture.

When mechanical action is applied to egg whites – that is, they are whisked or beaten – the protein, ovalbumin, is denatured, creating a foam that will aerate a mixture. As the egg white is beaten, the protein is stretched, forming a thin, elastic membrane that traps air bubbles. This mesh-like structure stabilises the air bubbles in the foam and this trapped air expands when heated in the oven. The expanding bubbles lift the soufflé or cake until the temperature of the mixture is hot enough to set the egg protein.

Overbeating egg whites overstretches the protein molecules and the foam will collapse. Adding sugar to a beaten egg foam will stabilise the mixture and maximise its volume when baked. Egg whites can aerate products such as meringues, soufflés and sponge cakes.



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Egg whites are denatured during beating.

To maximise the foaming properties of egg whites when preparing them in the kitchen, it is important to:

- ensure the whites are at room temperature
- ensure the whites contain no trace of egg yolk and therefore no fat
- make sure all utensils are clean and dry
- avoid using plastic utensils because they tend to retain fatty substances and inhibit the foam development.

Note: If egg whites must be measured, 1 egg white is equivalent to 30 millilitres or 1½ tablespoons.

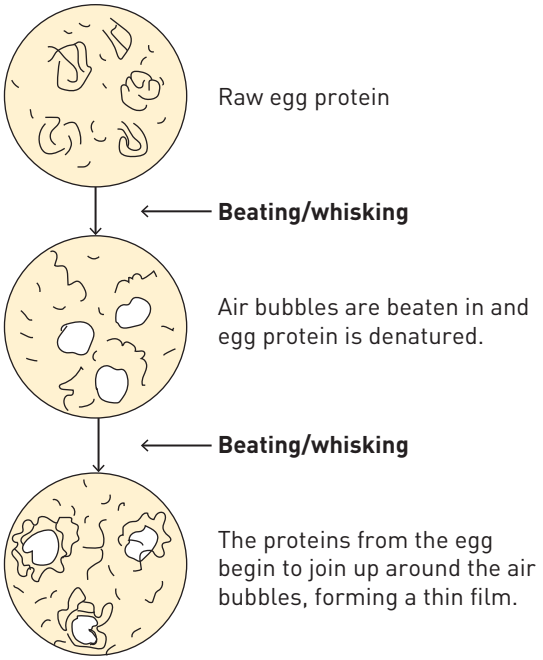


FIGURE 14.7 Stages in beating an egg white foam



Shutterstock.com/Elena Demyanko

Beaten egg white gives this sponge its light and airy texture.

MEAT

Meat is the flesh of animals that is eaten by humans. It is a rich source of nutrients and in particular, an excellent source of protein. Three of the main proteins in meat are:

- collagen in the connective tissue
- myosin in the muscle tissue
- elastin in the muscle fibre.

Structure of meat

Lean meat is composed of bundles of long muscle fibres. Each fibre has a wall of elastin and is filled with water carrying dissolved protein, minerals and extractives. These fibres create the grain of the meat. The bundles of fibres are held together with collagen, which dissolves into gelatin when cooked by moist methods.

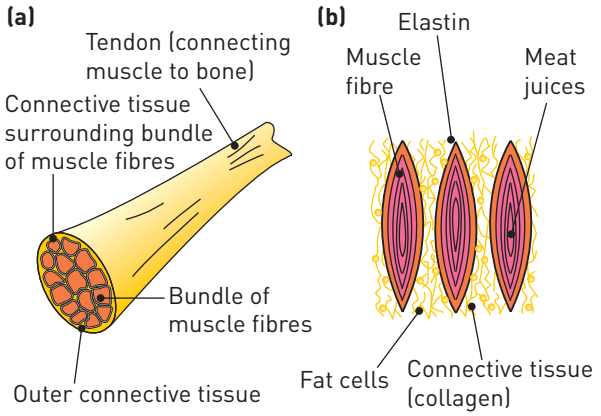


FIGURE 14.8 Structure of meat

Fat is present between the protein fibres in the form of invisible fat or marbling on the outer surface as adipose tissue. The older the animal, the greater the amount of fat.

What makes meat tender?

The tenderness of a cut of meat depends on the age of the animal and the part of the body from which it comes. The meat from young animals has short, fine fibres, whereas meat from older animals has longer, thicker fibres and more connective tissue. The level of activity of an animal is directly related to the tenderness of its meat. The tenderness of meat is also influenced by the methods of preparation and cooking used, as well as the cut selected.

Cooking meat

The cooking process changes each main structural component of the meat:

- **Muscle fibre** – During heating, the proteins in the muscle fibre begin to change shape; that is, they denature and coagulate. As the proteins change, there is contraction in the direction of the muscle fibre, resulting in the piece of meat shrinking and becoming firm as some of the water is expelled. The longer the meat is heated, the tougher it becomes, as more protein is denaturated. If meat is overcooked, the toughened protein becomes less digestible.
- **Connective tissue** – The protein collagen, which makes up connective tissue, is tough in its raw state and must be cooked sufficiently to convert it to water-soluble gelatin so that it becomes tender enough to bite through.
- **Fat** – Before heat is applied, the fat in meat is solid, either on the edge of a cut of meat or marbled through the muscle fibre. During cooking, the fat melts and acts as a lubricant so that the muscle fibre appears less tough. Fat also contributes to the flavour and aroma of cooked meat.

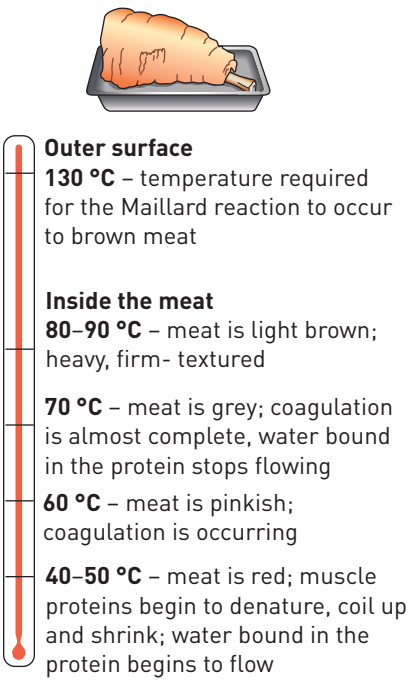


FIGURE 14.9 Stages in cooking meat

- **Water** – This is the largest component of meat and has a major influence on the flavour and texture of the cooked meat. When the meat is heated – for example, when frying – a little water will flow out of the meat as the proteins begin to denature. However, most of the water remains locked within the proteins, and if the meat is cooked at the correct temperature and for the correct time, it should be juicy and moist to eat. Meat that has been cooked too long will become dry because much of the water has been lost.

Tenderising meat

- A meat mallet can be used to pound some meat cuts to break down the tough fibres. This tenderises the meat or makes it thinner so it will cook more quickly.
- Acidic ingredients, such as wine, vinegar or lemon juice are often combined with flavourings to make a marinade for meat and poultry before cooking. The acidic ingredient in the marinade acts as a tenderising agent. by breaking down bonds between the proteins in the connective tissue and converting the collagen to gelatin.
- The enzyme papain, an extract from papaya, is often an ingredient in commercial meat tenderisers – it breaks down the bonds between some of the protein molecules in tough meat fibres.

POULTRY

The term 'poultry' includes duck, turkey, chicken, pigeon and goose. Chicken is the most popular type of poultry because it has an appealing flavour, can be prepared and cooked in many different styles and is economical.

Structure of poultry

Poultry can be cooked as a whole bird, or cut into portions such as thigh fillets, drumsticks, wings, tenderloins, chops and breast fillets. The thigh and leg meat of poultry is from the active muscles of the bird, so these are tougher cuts. They are darker in colour because they require more oxygen to move about, and are higher in fat. Domestic chickens do not fly, so their breast meat is white and tender because there is less connective tissue.

Cooking poultry

The tender cuts such as tenderloins and breast fillets are best prepared using quick, dry methods of cooking such as stir-frying or pan-frying to prevent dryness and toughness. As with red meat, the heat of the cooking process denatures and coagulates the proteins. In their raw state, cuts of poultry have a pinkish colour, are shiny on the surface and soft in texture. As heat is applied, the flesh becomes whiter and the poultry is firm to touch. Browning on the outside when dry methods of cooking are used is a result of the Maillard reaction. Tougher cuts, such as drumsticks and thighs, have more connective tissue and are best baked or cooked using a wet method, such as simmering for a curry or casserole.



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The colour of a roast chicken is a result of the Maillard reaction.

FISH

Fish are aquatic vertebrates; that is, they have a spinal column and are found in fresh water or salt water. Fish are one of the most popular animal foods eaten throughout the world.

Structure of fish

Fish is different from meat and poultry in that the muscles are arranged in layers of short fibres, unlike the long fibres that make up the muscle fibres of meat and poultry. These bundles of short fibres are surrounded by very thin sheets of delicate connective tissue. Fish contains very little connective tissue – it makes up about 3 per cent of a fish's body weight. This is significantly less than meat, of which approximately 15 per cent is connective tissue. The little connective tissue that is present in fish is very fragile and easily converted to gelatin.

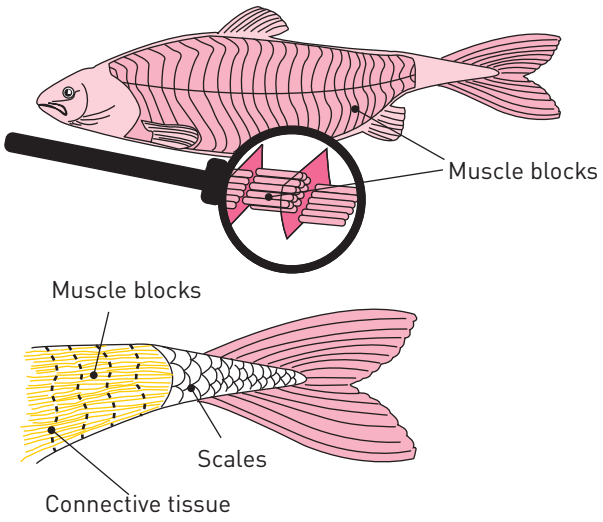


FIGURE 14.10 Muscle fibres in fish

Fish can have differing sensory properties depending on the amount of oil in their flesh.

- **Oily fish** – The oil is dispersed throughout a darker-coloured flesh and they have a strong flavour. Examples of oily fish are salmon, tuna, trout, sardines, mackerel and gem fish.
- **Fish in the white classification** – These fish have white flesh and a delicate flavour, and the oil is contained in a small sac near the liver. Whiting, flathead, flake, garfish and bream are in this group.

Cooking fish

In its raw state, fish is translucent, firm to touch and the juices are clear and watery. Fish is fully cooked when the proteins have denatured and coagulated, the flesh becomes opaque and the flakes just begin to separate and the juices are milky white. Fish cooks quickly and, when cooked, it is very tender and tends to fall apart.

The effect of acids on fish

Fish has only a small amount of connective tissue so is tenderised or softened very quickly when exposed to an acid such as lemon or lime juice. In fact, if fish is marinated in an acidic ingredient for longer than 5 to 10 minutes the raw flesh turns white and the texture becomes firm – in much the same way as the sensory properties of fish are changed during cooking.

Understanding the Text

11 Define 'denaturation' and describe how it can change the properties of protein foods.

12 Explain 'coagulation'. Create a flow chart to illustrate the physical changes in egg protein as it begins to coagulate.

13 Describe the structural role of eggs in a baked product such as a cake.

14 Why is vinegar added to the water when poaching an egg?

15 Explain how beating egg whites denatures the proteins and aerates a mixture.

16 Why are dry methods of cooking suitable for some cuts of meat and moist methods for other cuts of meat?

17 Prepare a summary of the changes that occur during cooking to the main components of meat – muscle fibre, connective tissue, fat and water. Explain how the changes influence the final sensory properties of cooked meat.

18 Describe the changes that occur in poultry when it is cooked.

19 Describe the difference in structure between fish and meat, and explain how this impacts on the cooking time of fish.

20 How does the exposure to ingredients such as lemon juice change the properties of raw fish?

Answers
Understanding the Text

MILK

Milk consists mainly of water and a range of nutrients, including various proteins, calcium, milk fat, sugar, vitamins and mineral salts that are suspended in the liquid. There are two types of protein in milk: those present in the whey – principally lactoglobulin – and lactalbumin – and that present in the curds – casein. This classification of the proteins in milk is important, particularly in cheese making.

Cooking with milk

Boiling milk

When milk is heated in a saucepan, several changes occur. Some of the water in the milk evaporates as steam and the tiny globules of fat begin to rise to the surface, giving a creamier appearance. When the temperature of the milk reaches boiling point (100 °C), the proteins present on the surface of the milk combine with the fat to form a skin. If the heating continues, the milk may boil over as a result of the pressure of steam forcing its way through the skin.

If milk is warmed over a direct heat, a coating forms on the base and sides of the saucepan. This occurs as the heavy protein particles in the milk fall to the bottom of the saucepan, where they stick and can scorch or burn.

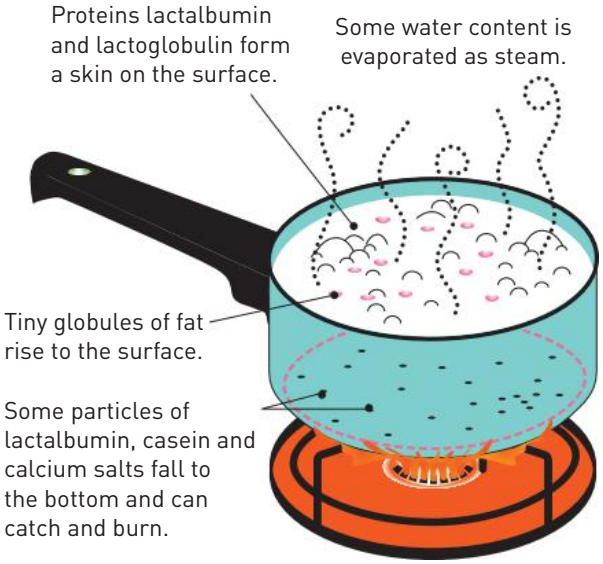


FIGURE 14.11 Heating milk

Combining eggs with milk

Custard is a mixture of milk, or milk and cream, with eggs or egg yolks and sugar. There are two basic kinds of custard: one is stirred on top of the stove and the other is baked in the oven.

The consistency of custard depends on the proportion of eggs to milk – the higher the ratio of eggs to milk, the thicker the end product due to more egg protein being available to coagulate. The smooth texture of custard relies on gentle even heat, ensuring the eggs coagulate or set evenly within the milk at a temperature between 65 °C and 70 °C. Preparing a stirred custard in a double boiler, or cooking the set custard in a water bath, helps to prevent the delicate mixture from curdling or separating. If the custard is overheated, the proteins from the egg and milk begin to over-coagulate to form small lumps and separate from the whey, and the smooth, rich texture is lost.

The effect of acid with milk

Ingredients containing citric acid – for example, lemon juice – cause significant change in the sensory properties of milk when they are mixed together. When foods with a low pH, such as lemon or tomato, are combined with milk or cream in a recipe, over-coagulation or curdling – the separation of the protein, casein and liquid occurs – and tiny lumps or clots form.

Using milk to develop colour

Milk is often brushed onto the surface of scones and pastries as a glaze just prior to baking. The formation of a golden-brown colour is an example of the Maillard reaction; that is, the breakdown of the protein and milk sugar (lactose) during baking.

PROTEIN IN PLANT FOODS

Gluten

Gluten is the protein component of many cereals and is found in high amounts in wheat flour. It can only be formed when flour is mixed with water. Under a microscope, it is possible to observe the two proteins of wheat flour, glutenin and gliadin, which join together when they are mixed with water to form gluten.

Mechanical actions – kneading a dough

When gluten is developed in a flour mixture, it creates a strong network that can be stretched like an elastic band and will then spring back. The more the gluten is developed – that is, using the mechanical actions of kneading or mixing – the more it is capable of stretching into a thin film without tearing or breaking. With continued mixing and kneading, batters and doughs become smoother and stronger. They can then trap solid particles, liquids and gases as they expand. This property is important in the production of yeast doughs and pasta, which rely on a strong structural framework to enable them to hold their shape once cooked.

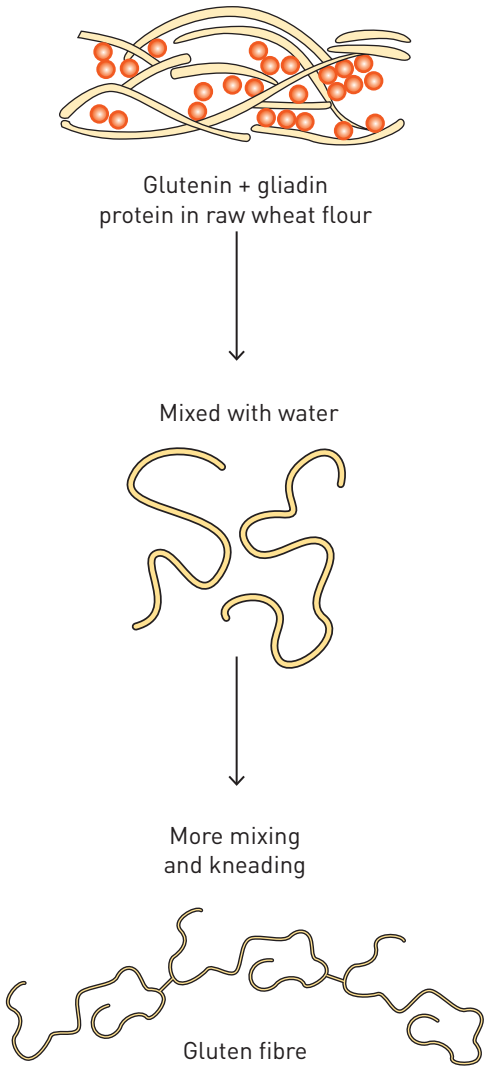


FIGURE 14.12 Stages in the formation of gluten



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Kneading develops gluten and helps a bread dough hold its shape when baked.

Mechanical actions – beating legume protein

The brine drained from canned chickpeas and cannellini beans is rich in a range of plant proteins which, when beaten, can be stretched and stabilised with sugar. The mechanical action of beating changes the shape of the proteins and they behave similarly to egg whites in a recipe for meringues. This property of the chickpea brine allows vegans and people allergic to egg to enjoy many sweet baked products.

Sugar

TYPES OF SUGARS

Sugars are carbohydrates; they contain the elements of carbon, hydrogen and oxygen. Sugars dissolve in water and have a sweet taste. Sugars are divided into two major groups according to the number of saccharide units they contain.

- Glucose and fructose are monosaccharides. Onions, unripe potatoes and sweet fruit are sources of glucose; and fructose, or fruit sugar, is found in fruit and honey.
- Sucrose is a disaccharide and is present in fruit, vegetables and sugar cane. Lactose is the disaccharide in milk.

FUNCTIONS OF SUGAR

Sugar comes in a crystalline form such as A1, caster, icing and brown sugar, or in a syrup form such as golden syrup, maple syrup and honey.

Sugars and syrups are used to sweeten foods such as drinks, biscuits, desserts, cakes and pastries. Sugar is also used as an ingredient in a variety of non-sweet foods, such as tomato sauce, relish, chutneys and salad dressings.

Ice-creams are made with a high proportion of sugar and many seem over-sweet when taste-tested at room temperature. However, after the mixture has been frozen, the sweet flavour is difficult to distinguish, as the cold temperature tends to numb the taste buds.

Sugar can serve a range of functions (see Table 14.2); for example:

- *Sugar as an activator* – Sugar provides food for yeast during fermentation. Yeast breads require a little sugar initially to speed up the yeast in producing carbon dioxide for leavening the dough.

- *Sugar as a tenderiser* – Sugar has a tenderising effect on baked products such as cakes and muffins. The sugar in the mixture helps to produce a fine crumb texture and good volume during mixing and baking. During mixing, sugar tenderises cakes by absorbing the liquid and preventing the uptake of water by the flour. This retards gluten development and so prevents the products developing a tough, dry texture.
- *Sugar assists in moisture retention* – Sugar helps to retain moisture as it has a hydroscopic property; that is, it has water-attracting capabilities. This increases the softness in freshly baked products and also extends the shelf life by keeping baked goods from drying out.
- *Sugar reduces curdling* – The addition of sugar to custard mixtures raises the coagulation temperature of an egg custard, allowing the eggs to coagulate or set slowly. This produces a smooth, stable consistency and prevents curdling.

TABLE 14.2

FUNCTION	EXAMPLES
Activating	Yeast dough
Tenderising	Cakes and muffins
Retaining moisture	Softness in cakes
Reducing curdling	Egg custards
Creating a crisp crust	Outside of cakes and biscuits
Sweetening	Flavour for many foods
Preserving	Jam
Aerating	Cakes made by the creaming method
Adding colour	Maillard reaction and caramelisation

COOKING WITH SUGAR USING DRY HEAT

The Maillard reaction occurs when sugar or starch, and proteins from egg or milk, are present in the same mixture and dry heat is applied during baking. This reaction produces a golden crust on the baked food and a desirable flavour often likened to roasted coffee or cocoa.

CARAMELISATION OF SUGAR

Caramelisation is the process that sugars undergo when they are heated to high temperatures and their molecules begin to break apart. When making caramel, the sugar is usually dissolved in a little water – this enables the sugar to be heated over high heat immediately and reduces the danger of burning as it allows the process of caramelisation to take place over a longer time.

A sugar thermometer helps take the guesswork out of making caramel, so this is a very useful tool when making different types of confectionery.

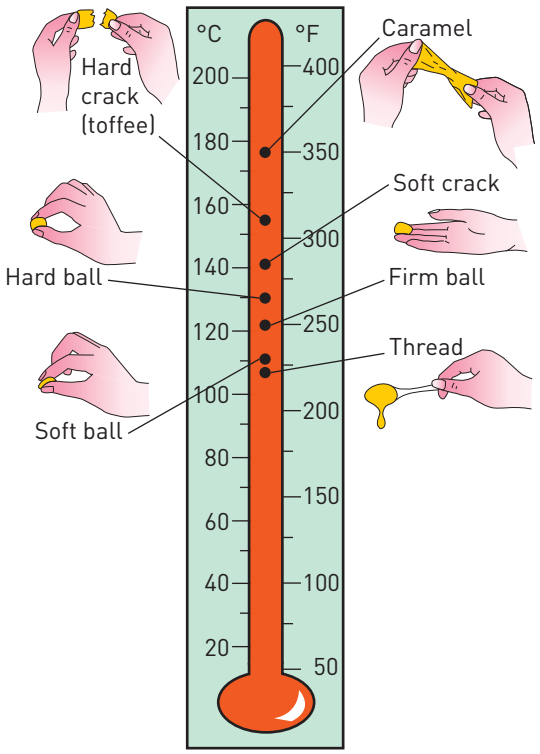


FIGURE 14.13 Stages in caramelisation

EFFECT OF SUGAR ON AERATION

Many cakes, biscuits and puddings are made using the 'creaming' method. When beating the sugar and butter together, the sharp edges of the sugar crystals help form small pockets of air in the fat or butter. The mixture becomes lighter in colour and fluffier in texture, hence the description that creamed butter and sugar should look like lightly whipped cream. During the cooking process, the tiny air pockets expand and contribute to the aerated texture and the increased volume of the end product.

EFFECT OF ACIDS ON SUGAR

Crystallisation occurs when a supersaturated sugar solution, using A1 or table sugar, is boiled and large crystals form. When the sucrose solution is heated with acid it is 'inverted' or broken down into monosaccharides – glucose and fructose. These substances are very soluble; therefore they hold and retain moisture, which prevents crystal formation. When making confectionery such as toffee, this crystallisation process in sugar mixtures can be slowed down or prevented by the addition of an acid such as vinegar.

The setting of jam depends on the right proportion of acid, sugar and pectin from the fruit to form a gel. In jam making, the inversion or breaking down of sucrose occurs when sugar is added to fruit. It is the acid from the fruit that contributes to the smooth texture of the jam and helps prevent crystallisation during storage.

Starch

Starches are carbohydrates that are made up of polysaccharides, which are in turn composed of many monosaccharide or glucose units joined together. Starch granules are the small gritty granules found in the endosperm of cereal grains from which flour is made and also in the tubers and roots of certain plants.

THE FUNCTIONAL PROPERTIES OF STARCH

Starch contributes to structure

Flour, which is mostly starch with a little protein, is one of the most important ingredients in baked products such as cakes and breads because it provides structure. Gluten and starch are responsible for the structure-building properties of flour. The structure allows products to hold a new, larger size and shape as gases produced by raising agents or the fermentation of yeast expand and leaven. The cooked starch prevents products collapsing once they have been removed from the oven and cooled.

Starch can thicken

There is a large range of starches available for use as thickening agents, and they are a significant structural ingredient that form the soft shape of many foods.

Starch absorbs moisture

Flours can absorb moisture such as water, milk and oil. This is a very important function and helps to bind ingredients together during cake and bread making. Flour absorbs fat when making a roux for the base of a

TABLE 14.3 Thickening properties of starches

STARCH	PHYSICAL AND CHEMICAL PROPERTIES	USES IN FOOD PRODUCTS
Flour – from wheat	Cloudy, heavy gel Dull flavour	Bread, cakes, biscuits, pastries
Cornflour – from wheat or maize	Cloudy, good sheen Syneresis occurs over time Not stable in high-acid mix	Stews, casseroles, cream pastries
Arrowroot – from the arrowroot tuber	Clear, shiny, soft, stretchy gel Stable in high-acid mix Clean flavour	Glazes on fruit tarts
Pectin – from fruit and vegetables	Clear, shiny gel Clean flavour Requires a high-acid/high-sugar mixture to gel	Fruit jams, fruit jellies, glazes
Rice flour	Gluten-free Slightly coarse white powder Faint nutty flavour when baked	Gluten-free foods Some biscuits, puddings and shortbreads Asian-style sauces
Potato starch – from cooked, dried and ground potatoes	Gluten-free Retains moisture in baked products	Indian-style breads, gluten-free products

sauce, either a white sauce for a gratin or brown sauce for gravy. Cornflour is often added to dry products such as icing sugar and baking powder to absorb moisture.

THE EFFECT OF DRY HEAT ON STARCH

Dextrinisation is the process that occurs when a starch is exposed to dry heat; the starch is broken down to dextrin, resulting in a change in colour to golden brown.

The formation of dextrin alters the sensory properties of food. It changes the colour of starch from white to brown and develops a slightly sweet, nutty flavour. A desirable 'cooked' aroma is produced and the texture of the food is altered to create a crisp mouthfeel.

Examples of dextrinisation during cooking are:

- toasting a slice of bread, which turns brown
- baking a loaf of bread – the crust or outside edge turns brown
- browning a roux for gravy
- baking starchy vegetables such as potatoes to develop a brown outer layer.

THE EFFECT OF MOIST HEAT ON STARCH

Gelatinisation is the process that occurs when starch granules absorb liquid in the presence of heat and thicken the liquid, forming a gel.

Starch is not soluble in water. When starch is blended with water and allowed to stand, it will settle to the bottom of a bowl. If the starch solution is heated, the starch granules absorb the water and begin to swell. The swollen granules then take up more space and the solution becomes more viscous and thickens to form a gel. During the heating, the mixture must be stirred to keep the starch evenly dispersed so the end product is smooth and lump-free. This process of gelatinisation is irreversible.

Syneresis

After a gelatinised mixture is allowed to cool and stand for a long period, it will go through the process of syneresis. As the starch cools, the molecules pull closer together, tightening the 'gel' structure and squeezing out liquid. The 'weeping' effect can often be seen in the filling of a lemon meringue pie that is allowed to stand for several days, or in the over-coagulation or curdling of a custard.

Cooking starchy vegetables, rice and pasta

Cooking starchy vegetables such as potatoes causes the starch to gelatinise; that is, to swell up and become thicker. Rice and pasta are cooked by exposing these starchy foods to moisture and heat at the same time, just enough to soften and gelatinise the starch. When pasta is cooked in a large amount of boiling water, the starch granules absorb water and expand and the protein network of gluten sets or coagulates so the pasta holds its shape.

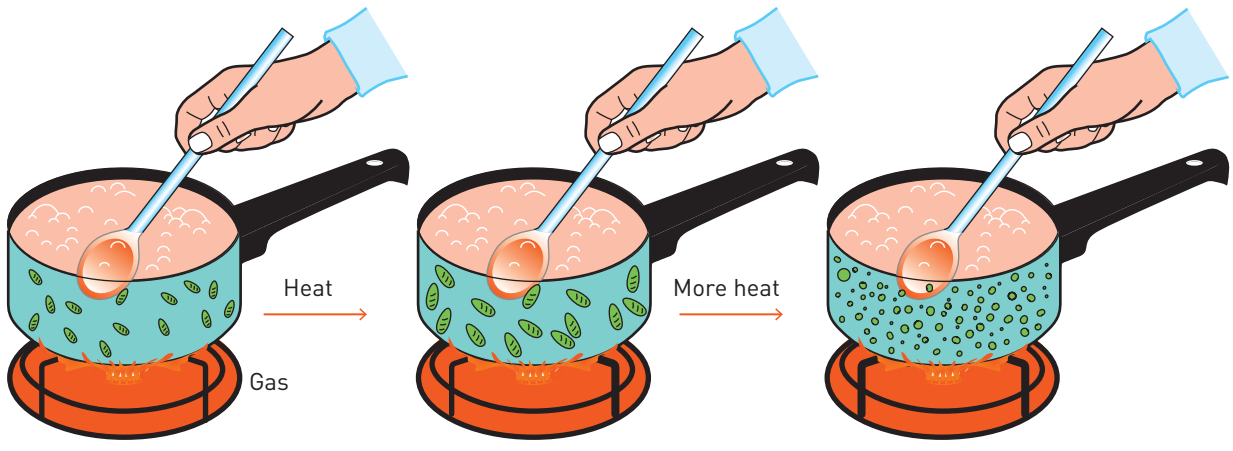


FIGURE 14.14 Process of gelatinisation

CHANGING THE pH – ADDING AN ACID TO STARCH

Acids decrease the ability of starches to thicken liquids, particularly when they are heated together. The process of gelatinisation is disrupted when an acid such as lemon juice, tomato, vinegar or pineapple juice is added to a mixture thickened with a starch such as wheat flour, cornflour or arrowroot. The starch granules gelatinise or thicken more quickly and easily but do not form a firm gel.

Activity 14.2

Gelatinisation of starches

Aim: To investigate the effects of the gelatinisation process on a variety of starches.

Equipment

- 1 tablespoon of each of the following starches: wheat flour, cornflour, arrowroot and rice flour
- ½ cup water for each starch
- small bowls for blending starches
- a wooden spoon
- 4 small, wetted moulds
- 4 copies of the measuring scale drawn on baking paper (see Figure 14.15)

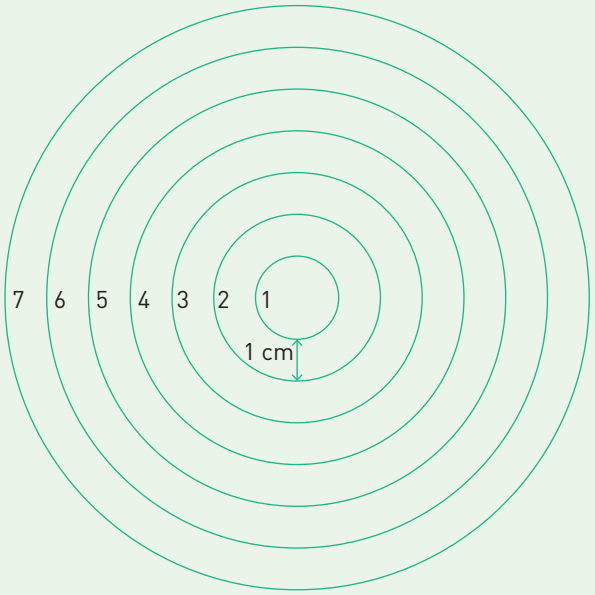


FIGURE 14.15 Measurement scale for assessing the effects of gelatinisation process

Method

1. Wet the moulds by rinsing with water and draining quickly.
2. Place the wheat flour in a small saucepan and slowly add the water, mixing well so there are no lumps.
3. Place the saucepan over heat; stir continuously until the mixture comes to the boil.
4. Continue stirring and cook for 1 minute.
5. Pour the thickened mixture into the wetted mould. Label and allow to cool and set.
6. Repeat with the other three starches.
7. Loosen the edges of each mould and turn it onto a measuring scale. Record the results in a table like the one below.
8. When analysing your results consider the relationship between spread and viscosity. The spread refers to the distance the moulded starch moves from its original shape after unmoulding. Viscosity describes the resistance of semi-solid foods to flow. Rate a very viscous mixture at 1 and a less viscous mixture at a higher number.

Results

STARCH	SPREAD	APPEARANCE	TEXTURE	FLAVOUR	VISCOSITY
	Degree of spread in centimetres	White, cloudy, cream, beige, translucent, opaque, transparent, shiny	Smooth, uneven, lumpy, firm, holey, tough, tacky, soft	Floury, starchy, dull, clear, sharp, bland	Degree of viscosity (most viscous or firm to least viscous or firm)
Wheat flour					
Cornflour					
Arrowroot					
Rice flour					

Analysis

1 Which starch was easiest to blend? Which starch took the longest time to remove the lumps?

2 Did any of the starches settle to the bottom of the bowl after blending? If yes, which ones?

3 Which starch spread the least and held its shape on unmoulding?

4 Did any of the starches show signs of syneresis?

5 Which starch would you use to prepare a clear glaze for a fruit tart?

6 Which starch would be most suitable for the roux of a cheese sauce to pour over cauliflower?

7 Which starch would be most suitable for a moulded fruit-flavoured dessert?

8 Suggest the most suitable starch to slightly thicken a stir-fry or meat casserole.

Conclusion

Rank the starches tested from most viscous to least viscous after gelatinisation is completed.

Understanding the Text

21 Draw a flow chart to explain the effect of heating on milk.

22 Describe the changes to the sensory properties of milk when lemon juice is added.

23 What is gluten? Describe how the mechanical action of kneading a dough changes the physical properties of gluten.

24 Explain why the brine from canned legumes such as chickpeas can be used as a substitute for eggs in meringues.

25 How does sugar contribute to the golden-brown colour of cakes?

26 What is 'caramelisation'? How does sugar aerate and tenderise cakes and muffins?

27 Explain how starch contributes to the structure of baked products.

28 Dextrinisation is a process that occurs to starch when it is exposed to dry heat. Describe the process and list examples of dextrinisation.

29 Draw an annotated flow chart of the process of gelatinisation of starch.

30 Describe the effect of adding an acidic ingredient to a starch mixture.

Answers
Understanding the Text

Fats and oils

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

TABLE 14.4 Physical properties of fats and oils

FATS	OILS
White, cream or yellow in colour	Pale golden colour
Opaque	Translucent
Solid at room temperature	Liquid at room temperature
Insoluble, less dense than water	Insoluble, less dense than water
Greasy mouthfeel	Oily mouthfeel



Mark Fergus Photography

Fats and oils used in food preparation

Products containing large quantities of fat and oil, particularly baked products, have a moist, often oily texture and smooth mouthfeel, and enhance the flavour of foods. Butter adds a rich flavour to baked products, and flavoured oils such as macadamia and sesame give a distinctive flavour to dressings and sauces.

USING DRY HEAT TO COOK WITH FATS AND OILS

Fats and oils are good conductors of heat, as they can be heated to high temperatures; so during the cooking process heat is readily transferred from its source, such as a gas flame or electric hotplate. Frying is a dry, fast method of cooking. Food that is deep or shallow-fried in fat or oil not only cooks fast, but also absorbs some of the fat or oil, giving it a distinctive flavour and a brown crisp texture as a result of the Maillard reaction and dextrinisation.



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The Maillard reaction causes the golden-brown colour of potato chips to develop when they are cooked in the dry heat created by frying. It occurs because potato contains starch and a small amount of protein and sugar.

Roasting involves cooking food such as meat, poultry and vegetables uncovered in the oven. This method usually produces food that is well browned on the outside and moist inside. The Maillard reaction and caramelisation contribute to the colour development of the food.

THE EFFECTS OF FAT ON AERATION

Fats assist in the aeration of baked products, especially cakes that are made from the creaming process; that is, when the butter and sugar are beaten together to form a light, fluffy mixture before egg and other ingredients are added. Fats trap tiny air cells during the beating or creaming process. During baking, the trapped air bubbles in the cake batter expand and leaven the product to create a light, airy texture in baked products.

EMULSIFICATION

Emulsions can only be made from two immiscible liquids; that is, they don't dissolve in each other and they keep their distinct properties when mixed together. An oil-in-water emulsion has oil or fat droplets dispersed through water, as in liquid milk. A water-in-oil emulsion example is butter. Two oil-in-water emulsions often used in food preparation are French dressing and mayonnaise.

Temporary emulsion

When making a French dressing, oil, (usually olive oil) is combined with vinegar or the water component of the emulsion. Shaking the ingredients in a closed jar or whisking vigorously breaks the surface tension between the liquids and they appear to be evenly blended for a short time.

Collaborative Activity



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French dressing – the ingredients are beginning to separate.

Permanent emulsion

To make mayonnaise, emulsifying is done slowly by adding oil drop by drop to beaten egg yolks. This process disperses and suspends minute droplets of oil within the yolks, and vinegar or lemon juice is added towards the end. Lecithin, the protein in the egg yolk, acts as an emulsifying agent and holds the oil and water molecules in suspension so the mayonnaise has a thick, satiny texture that does not separate on standing. It is a permanent emulsion.

Collaborative Activity

THE EFFECTS OF FAT ON THE TEXTURE AND FRESHNESS OF BAKED PRODUCTS

In baked products such as pastries and biscuits, fat provides tenderness to the cooked food. The fat, usually butter, coats the starch grains and separates the gluten strands, preventing strong cohesion and providing a crisp shortening effect that is described as 'short'.

After baking, the starch molecules from the flour in cakes and biscuits begin to bond and solidify, causing the products to stale or have a dry, crumbly texture. Fats such as butter or margarine delay this process of staling and increase the keeping qualities of these products. Cakes such as rich fruit cakes and shortbread biscuits have high proportions of butter and therefore remain fresher than scones, which have a small quantity of butter and become stale within hours of baking.

Understanding the Text

31 Identify sources of fats and oils used in food production.

32 Why are fats and oils used to cook many foods?

33 List the similarities and differences between the properties of fats and oils.

34 Explain why frying creates food that is very appealing to many people.

35 Why are fats or oils used in the process of roasting?

36 What is the role of fat in the aeration of cakes made by the creaming method?

37 What is an emulsion?

38 Describe the difference between a temporary and a permanent emulsion.

39 How does butter 'shorten' pastry and biscuits?

40 Explain how the inclusion of butter in a cake improves its keeping quality.

Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

Applying knowledge

Prepare individual knowledge maps for each of the following natural food components. Identify the properties that make them useful in food preparation.

- acids
- alkalis
- enzymes
- protein
- sugar
- starch
- fats and oils

Analysing information

Describe the changes in the physical properties of meat when it is cooked. Use a simple diagram to support your analysis.

Evaluating concepts

There are many processes used to aerate food products. Evaluate the benefits of using each of the following during the preparation of food products:

- biological
- chemical
- mechanical.

Teriyaki pork cutlets and spicy slaw

Pork cutlets are a lean cut of pork; retaining the rib bone assists in flavour development and keeps the meat moist during cooking. Mirin is a Japanese vinegar. It is made by fermenting rice wine and has a pH value of 3.8, so it is classified as an acidic ingredient. The denaturation process tenderises the pork and flavours the marinade. The dressing for the spicy slaw is a temporary emulsion. The pork cutlet used in this recipe is a good source of protein; however, it is also high in saturated fat. The marinade includes soy sauce, which is high in salt and sugar. The spicy slaw contains many nutritious vegetables as well as apple, providing dietary fibre and a wide range of vitamins and minerals.

TERIYAKI PORK CUTLETS

¼ cup soy sauce

1 tablespoon mirin

2 teaspoons caster sugar

2 teaspoons fresh ginger, grated

1 clove garlic, crushed

2 thick pork cutlets

olive oil cooking spray

2 portions udon noodles, cooked according to manufacturer's instructions

SPICY SLAW

1½ cups white cabbage, shredded

1½ cups red cabbage, shredded

½ small carrot, finely shredded or thickly grated

½ red onion, finely sliced

½ cup mint, chopped

½ cup coriander, chopped

½ Granny Smith apple, peeled and cut into strips

½ long red chilli, seeds removed and chopped finely

DRESSING

2 tablespoons rice vinegar

2 teaspoons caster sugar

1 tablespoon soy sauce

1 tablespoon lime juice

1 tablespoon fish sauce

METHOD

Teriyaki pork cutlets

1 To make the marinade – combine the soy sauce, mirin, caster sugar, grated ginger and crushed garlic. Add the pork cutlets, coat with the marinade, cover and refrigerate for 30 minutes.
2 Remove the pork cutlets from the marinade. Retain the marinade.
3 Spray a large frying pan with oil. Heat over medium heat. Cook cutlets for 5 minutes each side. Transfer to a plate and cover loosely with foil.
4 Add reserved marinade to frying pan. Bring to the boil. Reduce heat to low. Simmer for 3–5 minutes, scraping base of frying pan to prevent the mixture from sticking.
5 Place noodles on serving plates and top with cutlets. Drizzle with marinade.
6 Serve with spicy slaw.

Spicy slaw

1 In a large bowl, combine the cabbage, carrot, onion, mint, coriander, apple and chilli.
2 In a jar, combine the rice wine vinegar, sugar, soy sauce, lime juice and fish sauce.
3 Place the lid on the jar and shake to combine.
4 Toss the slaw with the dressing until well coated.

SERVES 2

EVALUATION

1 Describe the sensory properties of the three elements of the meal: pork cutlets, noodles and slaw.

2 Identify the acidic ingredients used in the recipes and explain their functional roles in a table like the one below.

ACIDIC INGREDIENTS	FUNCTIONAL ROLES OF THE ACIDIC INGREDIENTS

3 Identify and describe the changes that occur to the chemical and physical properties of the pork cutlet when it is pan-fried.

4 Why is it essential to cook the marinade before serving it as a sauce on the pork cutlet?

5 Explain why the dressing for the spicy slaw is described as a temporary emulsion.



Mark Fergus Photography

Savoury soufflé with vibrant vegetable salad

The preparation of a hot soufflé is a great example of the way in which beaten egg whites are able to incorporate a large volume of air and enable aeration to occur. A hot soufflé also demonstrates the changes that take place in the physical and sensory properties of eggs when they are denatured by both mechanical means and by heat. The savoury soufflé and the vibrant vegetable salad incorporate a wide range of sensory properties to create a tasty light meal.

SAVOURY SOUFFLÉ

20 grams butter

1 tablespoon plain flour

¾ cup milk

⅓ cup grated Swiss cheese

salt, pepper

2 tablespoons grated parmesan cheese

1 tablespoon chives, chopped

2 eggs, separated

VIBRANT VEGETABLE SALAD

1 tablespoon pine nuts

¼ red capsicum

¼ green capsicum

1 stick celery

½ small carrot

¼ cup bean shoots

SALAD DRESSING

¼ cup olive oil

2 tablespoons lemon juice

1 tablespoon clear honey

METHOD

Savoury soufflé

1. Melt the butter in a saucepan, and then stir in the flour with a wooden spoon and cook for 1 minute.
2. Remove from the heat and gradually stir in the milk.
3. Return to the heat and stir continuously until the sauce thickens.
4. Add the grated Swiss cheese and stir over the heat until it melts. Season with salt and pepper.
5. Transfer to a clean bowl and put to one side. Allow to cool, beating occasionally to prevent a skin forming.
6. Preheat oven to 180 °C and grease two soufflé dishes approximately 1½ cups in volume. Allow to set and grease again.
7. Add the parmesan cheese and chopped chives to the cheese sauce and mix well.
8. Add the egg yolks to the cheese mixture one at a time and beat in well.
9. Beat the egg whites in a clean, dry bowl until they form stiff peaks.
10. Fold 2 tablespoons of beaten egg whites into the cheese mixture and stir until the mixture loosens up.
11. Fold the remaining beaten egg whites into the cheese mixture.
12. Pile the mixture into the middle of the prepared soufflé dishes. Fill to the top, then level off with a metal spatula.
13. Place on a baking tray and bake for 20–25 minutes until well risen and firm in the centre when pressed with the fingertips.
14. Serve immediately.

Note: Prior to baking, run your finger round the inside edge of the soufflé dish. This will help the soufflés rise up straight with a neat edge.

Vibrant vegetable salad and salad dressing

1. Place the olive oil, lemon juice and honey in a screw-top jar and shake vigorously to combine the ingredients.
2. Toss the pine nuts in a frying pan over medium heat until they are a golden brown. Cool and reserve.
3. Deseed the capsicum and cut into julienne strips about 5 centimetres long.
4. Remove any strings from the celery and cut into julienne strips about 5 centimetres long.

5 Peel the carrot and cut into julienne strips about 5 centimetres long.
6 Place the prepared vegetables in a bowl and toss through the bean shoots.
7 Toss lightly with the shaken dressing just before serving and sprinkle with the toasted pine nuts.

SERVES 2

EVALUATION

1 Describe the sensory properties of the savoury soufflé and vibrant vegetable salad – appearance, aroma, flavour and texture – using descriptive language.
2 What is the term for the mixture of butter and flour used for thickening the sauce used as the base of the soufflé?
3 Describe strategies to optimise the aeration properties of egg whites when beating.
4 Identify and describe the chemical reactions that cause the soufflé to brown when cooked.
5 Explain why the savoury soufflé with vibrant vegetable salad would be considered to be a healthy meal.



Mark Fergus Photography

Gingernut biscuits

Gingernut biscuits are popular, old-fashioned biscuits that use the alkali, bicarbonate of soda. This ingredient contributes to the aeration of the mixture, the spread of the biscuit and flavour and colour development. The butter, sugar and golden syrup in these biscuits mean that they are high in fat and sugar, so should only be eaten occasionally and in small amounts.

60 grams butter
½ cup caster sugar
2 teaspoons golden syrup
½ teaspoon bicarbonate of soda, dissolved in 2 teaspoons water
1 small egg (size 55 grams), beaten
1 cup self-raising flour
1¼ teaspoons cinnamon
1 teaspoon ground ginger
2 tablespoons caster sugar, extra

METHOD

1. Preheat oven to 180 °C.
2. Lightly grease an oven tray or cover the tray with baking paper.
3. Melt butter, sugar and golden syrup together in a medium saucepan. Remove from heat.
4. Add the dissolved bicarbonate of soda, mix well and allow to froth and then cool.
5. Pour the cooled butter mixture into a bowl and add the beaten egg. Mix well with a wooden spoon.
6. Sift the flour, cinnamon and ginger, and add to the butter mixture to form a soft dough.
7. Spread mixture onto a plate and allow to cool further in the refrigerator or until it becomes firm to the touch.
8. Roll into small balls and then roll the balls in the extra caster sugar.
9. Place the sugared balls on the baking tray, spacing them well, then flatten with a fork.
10. Bake for 10–15 minutes until golden brown and biscuits have changed from a puffed shape to a slightly flattened one.
11. Allow the biscuits to cool on the tray, remove carefully and store in an airtight container when completely cold.

MAKES 24 BISCUITS

EVALUATION

1 Describe the sensory properties of the gingernut biscuits.
2 Describe the chemical reaction you observed when bicarbonate of soda was added to the hot butter and sugar mixture. How does this contribute to the aeration of the biscuits?
3 Which ingredients mask the unpleasant flavours left after the reaction of the bicarbonate of soda in this recipe?
4 Explain the effects of the bicarbonate of soda on the properties of the cooked biscuits.
5 Which ingredients and processes contribute to the browning of the biscuits?



Mark Fergus Photography

Coffee meringue roulade

This recipe for a coffee meringue roulade is a contemporary take on one of Australia's classic desserts – the pavlova. A roulade is a soufflé-type mixture that is baked until it is firm but still moist, then spread with a filling and rolled up like a Swiss roll. It can be filled with flavoured whipped cream, or a mixture of mascarpone cheese or Greek yoghurt and cream. Berries, chocolate, lemon curd, honey and banana can be added to the filling. Substituting coffee with wattleseed is a delicious way of including indigenous ingredients into sweet products.

COFFEE MERINGUE

melted butter for greasing

2 tablespoons cornflour for coating the tray

4 egg whites

¾ cup caster sugar

2 teaspoons cornflour

1 teaspoon vanilla

1 teaspoon vinegar

2 tablespoons ground roasted hazelnuts

2 tablespoons caster sugar, extra

FILLING

2 teaspoons instant coffee powder, dissolved in 1 teaspoon water

¾ cup thickened cream

1 teaspoon vanilla

METHOD

1. Lightly grease a Swiss roll tin (25 × 38 centimetres).
2. Line the tin with baking paper, allowing a 2-centimetre overhang at both long ends.
3. Grease the baking paper lightly with a little melted butter and dust with cornflour. Shake the tin to remove the excess cornflour.
4. Preheat oven to 180 °C.
5. In a large bowl, beat the egg whites with an electric hand-held beater until soft peaks form. Gradually add the sugar, 1 tablespoon at a time, beating after each addition until the sugar is dissolved.
6. Sift the cornflour over the egg whites, add the vanilla and vinegar, and fold through gently using a metal spoon.
7. Spread the mixture evenly in the prepared tin.
8. Sprinkle the meringue with the combined hazelnuts and extra sugar.
9. Bake for 10 minutes or until the meringue is firm to touch and a pale-golden colour.
10. While the meringue is baking, prepare the filling by dissolving the instant coffee in 1 teaspoon of hot water.
11. Beat the cream until soft peaks form and fold through the coffee and vanilla. Cover and refrigerate until required.
12. Remove the meringue from the oven and turn onto a clean sheet of baking paper. Carefully remove the baking paper from the bottom of the meringue. The mixture is very delicate at this stage.
13. Cool flat to room temperature.
14. Spread the filling over the meringue, leaving a 1-centimetre border on all sides. Roll over the meringue, using the baking paper as a guide, along the long slide. Wrap the paper firmly around the roll to secure.
15. Place the seam side down and chill in the refrigerator. Remove the paper and slice the roll to serve.

Note: The roulade may crack when rolled but will still hold its shape.

SERVES 4–6

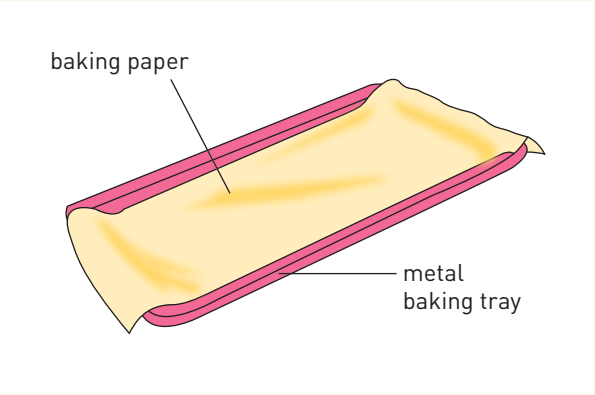


FIGURE 14.16 Lining a baking tray

EVALUATION

1 Describe the sensory properties of the coffee meringue roulade using descriptive language.
2 Why is lining the baking tray in a particular way important in the production of this recipe?
3 Describe the steps you took to prepare the egg whites so that they could be beaten to maximum volume.
4 Describe the appearance of egg white beaten to the soft-peak stage.
5 Explain the difference between the processes of beating and folding-in.



Mark Fergus Photography

CONSIDERATIONS WHEN COMPARING HOMEMADE AND COMMERCIAL MEALS

SENSORY

The appearance, aroma, flavour and texture of food



PHYSIOLOGICAL

The ability of the food to provide all the nutrients necessary for the body to function normally



ECONOMIC

Comparing the cost of purchasing the ingredients to make a meal in comparison with buying a ready-made meal



SOCIAL

Social – celebrating with friends at home or at a café or restaurant



HEALTH

Health – the nutritional benefits of eating home-cooked meals rather than commercially prepared meals



15

FOOD IN THE HOME

KEY TERMS

carbon footprint measures all of the carbon dioxide produced to get food from paddock to plate, including growing, processing, manufacturing, packaging and selling the food

food gatekeepers the members of the household who make decisions about the food that is purchased and consumed

food miles the term used to estimate the distance food travels from its point of production through to consumption; that is, from paddock to plate

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

meal solutions ingredients or preprepared products that can be combined and cooked quickly to form a meal

organic farming an environmentally sustainable food production system, as it uses farming practices that produce crops and animals without the use of artificial chemicals, instead using natural systems

physiological considerations the ability of food to provide all the nutrients necessary for the body to function normally

resources factors that affect meal planning and preparation; they include the ability to manage time efficiently and skills in managing the family food budget

Resources
Study Design links
Infographics
Flashcards

FACTORS THAT INFLUENCE FOOD CHOICES AND MEAL-PLANNING DECISIONS



- Managing time
- Managing the household food budget

VALUING HEATH

- Food gatekeepers - members of the household who make decisions about the food that is purchased and consumed
- Preparing healthy, nutrient-dense meals at home



VALUING SUSTAINABILITY

- Purchasing organic food
- Reducing the consumption of meat and dairy products
- Reducing the consumption of processed food
- Shopping locally
- Purchasing food with minimal packaging
- Reducing food waste



Comparing homemade and commercial meals and dishes

Preprepared and ready-to-eat meals are a major growth sector in the world of food manufacturing. Preparing and cooking meals from scratch is the ideal for many people, but it may not always be possible. Many consumers have very busy lives, which means they do not have time to cook a complex meal, so they look to the time-saving convenience of preprepared food that often only requires heating. For those with limited cooking skills, the wide range of meals in the supermarket offers the consumer many choices. The industry is extremely versatile, and with the sophisticated technology that has been developed for use in processing and packaging, it can respond to trends quickly and is constantly introducing new products.

Currently, 'freshness' is on-trend and this has resulted in a huge increase in food products and meals from the supermarket chill cabinet. For example, salads, curries, sushi, savoury tarts, soups, pasta and rice dishes are now freshly made for customers to purchase. Consumers have become more adventurous and are keen to try new, exotic flavours. Products such as arancini balls filled with a spicy filling, which might take hours to prepare at home from scratch, are now available in the supermarket deli.

SENSORY, PHYSIOLOGICAL, ECONOMIC, SOCIAL AND HEALTH CONSIDERATIONS IN MEAL AVAILABILITY

Trying to compare a preprepared meal purchased from a supermarket, such as a risotto, with one you have made yourself at home from scratch, can be challenging. A number of factors must be taken into consideration, such as making a judgment about which one has the more appealing sensory properties or which one is more likely to meet your health needs of being low in fat, for example. Other considerations – such as the cost of purchasing the preprepared risotto in comparison with making it at home – will be important for many people.

Sensory considerations

The first impression we gain about a particular food and whether we think we will enjoy it is based on its sensory appeal. Sensory considerations are the appearance, aroma, flavour and texture of the food. Appreciating food uses all of our senses – sight, hearing and touch are all involved in the sensory appreciation of food, as well as taste and smell.

The appearance of food is composed of a range of components including its colour, shape, size and surface texture. The aroma of food is another important sensory consideration and it has a major impact on our enjoyment of food. While we can detect only four main flavours, we can differentiate between the smell of thousands of different types of food.

Even though many people may make an initial decision about a food based on its appearance, what they will usually remember is its flavour. The flavour of food is the total impression we form about food and is made up of not only the basic tastes of sweet, sour, bitter and salty, but also the smell or aroma of food, as well as the appearance and even the sound of food as it is eaten.

Preparing meals at home enables you to develop an appreciation of the sensory properties of the meal as you cook. The aroma of a chicken roasting in the oven, or the flavour of Asian ingredients used to make a stir-fry have wonderful sensory appeal and make you look forward to sitting down to enjoy the meal.

Food manufacturers go to great lengths to make sure their products have appealing sensory properties. As appearance is the first feature we notice about a food product, commercial food products must have strong visual appeal or they won't sell. Equally important is that consumers find their flavour and texture appealing, or they won't be repeat purchasers of the product.



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The flavour and aroma of Asian ingredients used to make a stir-fry have great sensory appeal.

Physiological considerations

Physiological considerations refer to the ability of the food to provide all the nutrients necessary for the body to function normally. Eating a nutritionally well-balanced meal that includes foods from the five food groups is likely to be in line with the recommendations of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating. These foods will provide a wide range of important nutrients such as the protein, carbohydrates, vitamins and minerals essential for growth and development, and the repair of all body tissue. They will also contribute to maintaining a healthy weight and protect against the development of lifestyle diseases.

By contrast, a commercially preprepared meal purchased from a supermarket or a takeaway meal from a large multinational chain may be higher in saturated fat, salt and sugar. Consuming these foods on a regular basis can lead to weight gain and lifestyle diseases such as type 2 diabetes and cardiovascular disease.

Another important physiological function of food it to satisfy our hunger and provide a sense of satiety or fullness after eating the meal. Food that has a low **glycaemic index** – a measure of how fast and how much a food raises blood glucose levels – and that is digested slowly is more likely to provide a sense of satiety than food with a high glycaemic index. Preparing meals at home using ingredients with a low glycaemic index such as wholegrain pasta, long-grain rice or pulses such as lentils and chickpeas will help you to feel full for far longer. Foods high in protein such as meat, poultry, fish and dairy products also provide high levels of satiety. However, eating foods that are high in fat, such as potato chips and pastries, have a low level of satiety, so it isn't long before you feel hungry again. This is often evident if you eat a burger from a fast-food chain, as the burger bun contains a significant amount of sugar that is quickly digested.

Economic considerations

When preparing meals for the family, economic considerations might guide decisions about what to cook and serve. The price and quality of ingredients is a major consideration for most households. Some families might consider it more economical to purchase the individual ingredients to make a meal rather than to buy a ready-made meal; others may think that a fast-food meal is cheaper, and it may fit their food budget.

Comparing the cost of preparing a home-cooked meal such as a pizza or a pasta dish with a similar commercially produced food item can be difficult. Preparing a meal using some staple ingredients from the pantry may be cheaper than purchasing takeaway food on a regular basis. However, other factors such as the time taken to prepare the meal may be considerations that outweigh the economic cost of purchasing preprepared meals.

Social considerations

Sharing a meal with family and friends improves our connectedness with others. Studies have shown that eating with others in a social situation improves our level of happiness and enjoyment of life and overall mental wellbeing. Sharing a birthday celebration with friends over brunch at a café or a casual dinner at a local restaurant, makes these important events in our life seem even more special. Celebrating with friends at home over a delicious home-cooked meal allows us to demonstrate the importance we place on the friendship. Inviting friends over for a casual barbecue or a more elaborate dinner, allows us to relax in a very familiar environment and is a great way of bringing people closer together. Depending on the venue, eating out can feel more formal and sometimes not as relaxing as socialising at home over a simple meal we have cooked ourselves.



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Sharing a meal with others in a social situation improves our mental wellbeing.

Health considerations

There is no definitive list of the healthiest foods; however, using food models such as the Australian Guide to Healthy Eating helps families to make good choices about the food they eat. Consuming whole foods such as grains, vegetables, fruit, moderate amounts of fish, meat and dairy foods, and restricting foods high in fat, sugar and salt helps to build a healthy diet. Following the guidelines of a food selection model means that families are likely to consume all of the nutrients required for good health and to maintain a healthy weight.

However, when commercial meals are purchased for the family, it is more difficult to ensure these meals meet the Australian Dietary Guidelines as

they are often much higher in fat, salt and sugar than similar meals that are prepared at home from scratch. There is also evidence to suggest that when a family eats meals prepared at home, the children are likely to consume more fruit and vegetables and less fast food than families who eat out more often.

An equally important health consideration is for people who have a food intolerance or an allergy; for example, to nuts, eggs or shellfish. Eating out can be difficult for these people as the meals may accidentally be contaminated with the food to which they are allergic. For example, a knife used to chop nuts might not be washed thoroughly before being used to slice vegetables for a stir-fry. For these people, eating at home may be a far safer and more enjoyable experience than worrying about what they can or can't eat if they go to a restaurant.

Our psychological health and wellbeing are also enhanced when we eat a meal with friends. Eating with others in a relaxing environment reduces stress and feelings of anxiety.



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For people with a shellfish or nut allergy, eating out can be a health hazard.

Practical Activity 15.1

Comparison of homemade and commercial minestrone

Aim: To compare the physical, chemical and sensory properties of homemade and a chilled commercial minestrone soup.

Materials

- One quantity of homemade minestrone soup (see page 364)
- One single-serve packet of minestrone soup from the chilled section of the supermarket



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Worksheet

Method

1. Complete a quantitative test to evaluate the physical properties of size, weight and number of serves of each product.
2. Use the information on the label of the commercial product to provide details about its chemical properties – ingredients and nutrients.
3. Use a nutrient analysis software program to calculate the nutritional value of the homemade minestrone soup. A good example is the Food Standards Australia New Zealand Nutrition Panel Calculator, available online.
4. Record your results in a table like the first one on the following page.
5. Heat the homemade minestrone soup so that it is ready to serve.
6. Heat the commercial minestrone soup according to the manufacturer's instructions.
7. Carry out a qualitative test, describing the sensory properties of both soups in a table like the second one on the following page. Then perform two preference tests by rating the dishes on a nine-point scale and drawing an appropriate facial hedonic descriptor. Remember, everyone has different perceptions of the sensory properties of food so there are no wrong answers. Try not to influence others in your class with comments or even facial expressions.

QUANTITATIVE RESULTS		
	Homemade	Commercial
Name of product		
Serving size		
Key ingredients		
Nutrients per 100 grams		

QUALITATIVE RESULTS USING A PREFERENCE TEST		
	Homemade	Commercial
Sensory descriptors		
Appearance		
Aroma		
Flavour		
Texture		
Ratings		
Nine-point scale 1 = dislikes very much 5 = neutral 9 = likes very much		
Facial hedonic descriptor		

Analysis

1 Was there any difference in the serving size of the two minestrone soup products? If yes, why do you think this is the case?

2 Why was it important to use the figures for the nutrient content per 100 grams and not per serve?

3 After calculating and evaluating the nutrient content of both types of soup, which was the most nutritious? Justify your answer.

4 Discuss the similarities in the sensory properties of the homemade and commercial minestrone soup.

Conclusion

1 Which minestrone did you prefer overall? Justify your decision based on the physical, chemical and sensory properties of each soup.

2 What recommendations would you make to other consumers when deciding between a serving of homemade soup or commercial soup?

Understanding the Text

1 Outline two factors that may influence individuals or families to purchase preprepared and ready-to-eat meals. Give two examples of products that would meet these consumer needs.

2 Describe the factors that enable us to determine the flavour of food.

3 Why do food manufacturers make sure their products have good sensory appeal?

4 Explain the meaning of the term 'physiological considerations'.

5 Describe one strategy individuals can use to ensure their physiological needs are met.

6 What is the glycaemic index and how can knowledge of the glycaemic index help in meal planning?

7 Outline two factors a family might take into consideration when deciding whether to make a meal from scratch or to purchase a takeaway meal.

Answers
Understanding the Text

8 Draw a mind map to identify some of the considerations families might take into account when inviting friends over for a social occasion.

9 Make a list of the health benefits for a family of preparing home-cooked meals rather than purchasing preprepared meals.

10 Why is eating at home sometimes a safer option from a health perspective than eating at a café or restaurant?

Factors that influence our food choices and meal-planning decisions

The secret to eating well for good health lies in understanding what influences our food choices. Having resources at our disposal when planning and preparing everyday food can make a task relatively easy to complete. If resources are limited, some tasks can be very challenging. Meal planning is easier if the person who is preparing the food has access to **resources** such as skills in managing time efficiently and an understanding of how to manage the family food budget.

MANAGING TIME

It seems as though our lives are busier now than ever before. Every member of the family seems to have a range of commitments – part-time or full-time work, study, music lessons, sporting commitments and so on. Trying to juggle the individual commitments of each member of the household often means there is little time left for meal preparation.

Most supermarkets provide an online food ordering and delivery service for people who are time-poor or, as occurred during the COVID-19 pandemic, people who simply want to avoid shopping in-store. Once they become familiar with the online ordering system, customers can save time, which may provide a little more opportunity to prepare meals at home.

According to research complied by the Australian Food and Grocery Council, one of the most important considerations when planning meals to be eaten at home during the week is convenience. The amount of time the majority of the population is willing to spend preparing the evening meal is about 20–30 minutes.



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Supermarkets offer online ordering and delivery services for people who are time-poor.

Food manufacturers have attempted to assist consumers by producing a range of **meal solutions**; that is, ingredients or preprepared products that can be combined and cooked quickly to form a meal. Supermarkets and some cookbook writers also recognise the needs of busy people and have developed a range of strategies to help consumers make decisions about the food they purchase. They frequently produce online recipes and in-store recipe cards for meals that are quick to prepare, require basic kitchen equipment and are nutritious.



Mark Fergus Photography

Preprepared meals save households time in meal preparation.

Activity 15.2

Evaluation of an e-commerce site

Visit the website of an e-commerce food supplier such as Victorian Farmers Direct, Rod's Fruit and Veg, Real Food Grocer, Ceres Fair Food, YourGrocer or another website of an Australian e-commerce food supplier of your choice.

Explore the website and answer the following questions.

1. What range of food products does this site offer for delivery?
2. Does the website offer products other than food?
3. Can you utilise this website to have food delivered to where you live?
4. How soon after an order is placed can you expect to receive the delivery?
5. What reasons might lead a consumer to shop for food online?
6. What factors may have influenced a consumer to select this site to shop online?
7. Explain why a consumer may choose this type of online shop compared to using the major supermarket online services.
8. Are there any other features on the website that can assist consumers with food choices and planning their meals?
9. If you were the main purchaser of food in your household, would you order from this website? Explain your response.
10. Identify two other sites you would be most likely to order food from and explain why.



Practical Activity 15.3

Design brief – a meal in a moment

A large food manufacturing company wants to update the recipes on its website to include more of its new meal solution products. As a chef, you have been asked to design a recipe that can be prepared in 20 minutes. The recipe must incorporate at least one time-saving product from the supermarket, as well as some fresh ingredients, so that it is nutritionally balanced. The meal should be visually appealing and offer a variety of flavours and textures.

Use the design process to design, produce and evaluate a meal to meet the specifications outlined in the design brief.

1. Criteria to evaluate the success of the meal – questions could be developed about:
   - the time taken to complete the meal
   - quality of the time-saving product
   - sensory properties – appearance, aroma, flavour and texture
   - the skill required to complete the meal
   - the nutritional value of the meal
   - the overall success of the meal.
2. Research – collect and present information about time-saving products available in the supermarket. Also include some research about fresh ingredients that can be served with the processed products.
3. Prepare a food order for the meal.
4. Produce the meal and share it with a friend.
5. Evaluate the success of the meal using the previously established criteria.

MANAGING THE HOUSEHOLD FOOD BUDGET

Most households don't have an unlimited budget to spend on food. The amount of money available for meals will impact on meal planning and preparation and will affect the type of ingredients the household is able to purchase and use.

In recent years there has been a significant increase in the variety and number of private label products on the supermarket shelves. These products have become popular with consumers as they are often a fraction of the price of premium products. The quality of many of these private label products has also improved as supermarkets try to convert shoppers to their own brands. In August 2020, Choice food editor,

Rachel Clemons, stated: 'House brand products have really improved in quality recently, and often score well in our testing.' She went on to say: 'They're a good option if you're looking to save a bit of money on your grocery bill, as they're usually a fraction of the price of more premium products.'

The cost of purchasing fresh vegetables, fruit, meat and fish can also influence a householder's planning and decision-making about the ingredients they can purchase. Research into inflation data by the Australian Bureau of Statistics, showed a significant increase in the cost of food during 2021 and 2022. Economics correspondent for the Australian Financial Review, Ronald Mizen, noted that the 'cost of vegetables increased by 5.5 per cent in the June quarter while fruit rose 4.7 per cent … [and] beef went up by 3.6 per cent'.

This has had a major impact on the ability of many households to purchase fresh produce, affecting food availability, food access and food sovereignty. Consequently, many weekday meals may be based on cheaper ingredients, such as pasta, rice or minced meat.

Hints to stretch the food budget

- Making several meals with similar special ingredients can reduce food costs; for example, if one recipe only uses half a bunch or packet of spinach, look for another recipe with spinach as an ingredient so you can use the rest of it, rather than throw it out.
- Buy fruit and vegetables when they are in season as this is when they will be at their lowest price. For example, purchase stone fruit in summer when they are in season rather than buying more expensive imported stone fruit in June or July.
- Find interesting and appealing recipes that use cheaper cuts of meat, such as minced steak or chicken wings.
- Plan on preparing one or two meat-free meals each week as vegetables and pulses are generally cheaper to purchase than meat, poultry or fish.
- Cook from scratch most nights rather than using preprepared products, which are frequently more expensive.
- Make sure you calculate the amount of food needed for each meal to reduce food costs and food waste.
- Check the ingredients in your pantry before shopping so that you don't buy extra ingredients.
- Compare the price per 100 grams of each product before you buy – what seems to be cheap when it is 'on special' may still be more expensive than other similar items.
- Buy fresh produce, such as meat, poultry, fish, fruit and vegetables, from a wholesale market if there is one in your area, rather than shopping at a supermarket.
- Check the 'use-by' or 'best-before' date so that you don't mistakenly buy something that only has a short shelf life.
- Plant some fresh herbs, such as parsley, thyme and mint, so that they are always available, and you do not have to throw away half a bunch.
- Buy non-perishable items such as tinned tomatoes, pasta and oil in bulk and when they are on special.
- Making your own soups, biscuits and cakes is much cheaper than buying similar commercial products.
- Make lunch to take to school or work rather than buying lunch.
- Write a shopping list before you go shopping – it helps to avoid buying unnecessary food items.



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Checking the food in the pantry and preparing a shopping list means that you don't buy food you already have.

Activity 15.4

What's in season?

It is always best to buy fruit and vegetables when they are in season as this is when they are cheapest and at their peak for flavour and colour.

1. Select two types of fruit or vegetables that are currently in season.
2. For each of the fruits or vegetables selected, write a brief summary under the headings:
   - How to select the best
   - Storing for later use
   - Preparation tips
   - Goes well with …
3. Research five recipes suitable for using each of the fresh fruits or vegetables. The Taste website and supermarket sites are a good starting point for this activity.

Valuing health and its impact on meal planning and preparation

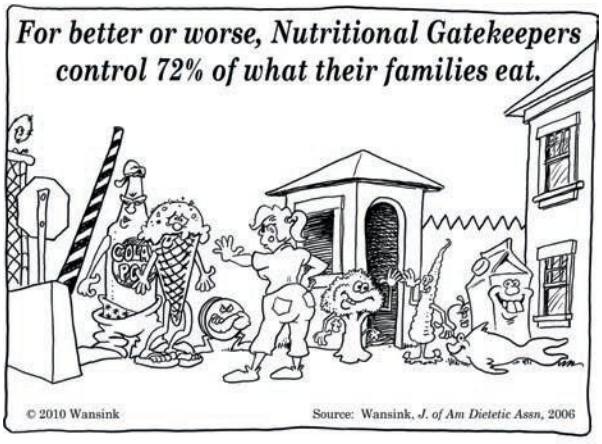
Most people value good health and many of us exercise regularly and try to make healthy food choices most of the time. For many individuals and households, the value of good health is the key to their meal planning and food preparation. If the **food gatekeepers** of the household – that is, the members of the household who make decisions about the food that is purchased and consumed – value good health, this will influence the types of food everyone in the household consumes. The food gatekeepers help shape the attitudes and preferences of all family members as they are the people who plan the meals and usually shop for food.

People who value good health will generally have knowledge about the types of food that make up a healthy diet. They will understand the difference between healthy and unhealthy food choices and the impact this has on the overall health and wellbeing of themselves and their family members. This means that they are more likely to follow the recommendations of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating. With this knowledge, they will have a better understanding of the types of affordable, nutrient dense, whole foods to look for when shopping, and include foods from the five food groups on their regular shopping list.

Valuing good health also means that the food gatekeepers will choose whole foods rather than processed foods that are much higher in fat, salt and sugar, and that are therefore more energy-dense and likely to lead to weight gain. They may also carefully scrutinise food labels so that they can compare food products when shopping and make healthier food choices.

Preparing delicious, healthy, nutrient-dense meals at home is something people who value good health are also more likely to do. They are also less likely to rely on purchasing energy-dense, preprepared or takeaway foods. They will be familiar with appropriate portion sizes so that they can control the amount of food served and consumed at a meal. Preparing their own meals at home also means that they know and understand the type and quantity of ingredients that have used, and are not misled and confused by unknown ingredients on a product label, or by the marketing hype of food manufacturers.

Parents and caregivers who value good health are also likely to teach their children about healthy food choices and to model healthy food behaviours so that children can develop life-long healthy eating habits. They will also offer their children nutrient-dense fresh fruit and vegetables as a snack rather than a biscuit or crisps.



© Brian Wansink



Source: National Health and Medical Research Council

The Australian Guide to Healthy Eating helps families select foods that promote health and wellbeing.

Valuing sustainability and its impact on meal planning and preparation

Most people in the community are aware that as a society we need to become more environmentally conscious and ensure our food supply is sustainable for future generations. The goal in producing and consuming food sustainably is to minimise the impact food production and consumption has on the planet and the contribution it makes to climate change.

At present, most of us take small steps towards environmental sustainability – we remember to separate the rubbish and put out the recycling bin, and some of us compost our food scraps and remember to take the green bags when we go shopping. However, individuals and households that value environmental sustainability can be far more proactive and make informed decisions when planning and purchasing food for the family.



FIGURE 15.1 Strategies consumers who value sustainability can implement when planning and purchasing food

PURCHASING ORGANICALLY PRODUCED FOOD

Many householders who are concerned about environmental sustainability choose to purchase food that has been grown organically or using conservation farming methods. **Organic farming** is an environmentally sustainable food production system as it uses farming practices that produce crops and animals without the use of artificial chemicals, instead using natural systems. These natural systems can include the use of organic fertilisers, composting, crop rotation and biological pest control. The use of these natural systems minimises any environmental damage and helps to ensure the future productivity of the land.

For many people, purchasing food produced using organic systems is an ethical decision based on their desire to combat climate change. It is well recognised that agriculture plays a significant role in climate change and it has been calculated that it is responsible for approximately 30 per cent of all CO_2 emissions worldwide. However, research has shown that converting to organic food production removes the use of nitrogen fertilisers from the system, lowering the amount of nitrous oxide emitted into the atmosphere.

One of the greatest barriers to purchasing organic food for many people is the increased cost to the household budget. The main reason for the higher cost of organic food is the cost of production – it is generally a far more labour-intensive form of farming and yields are lower than those obtained using traditional farming methods.



iStock.com/deyangeorgiev

Food produced using organic systems is more environmentally sustainable.

REDUCING THE AMOUNT OF MEAT AND DAIRY PRODUCTS CONSUMED

Another strategy used by people who value environmental sustainability is to plan and prepare meals with the goal of including more plant-based food in the diet and reducing the amount of meat and dairy products consumed.

Research shows that there is a strong link between the consumption of meat and dairy products and environmental sustainability including issues such as climate change, greenhouse gas emissions and water pollution. Data released in January 2021 by the Australian Federal Department of Primary Industries and Regional Development, shows that livestock are directly responsible for 70 per cent of all greenhouse gas emission within the Australian agricultural sector and 11 per cent of total national greenhouse emissions.

People who value environmental sustainability might plan and prepare meat-free meals two or three days a week rather than completely eliminating meat from their diet. They might also join environmental campaigns such as 'meat-free Mondays' that encourage individuals and families to help slow climate change by reducing their consumption of meat.



iStock.com/KucherAV

Meat-free meals such as curried cauliflower and rice are becoming popular with people who value environmental sustainability.

The move to consuming a diet that contains less animal protein has been aided by the increasing variety of plant-based options available at the supermarket. They can use a plant-based mince instead of beef or lamb when making a Bolognese sauce for pasta or to prepare homemade burgers. They might purchase plant-based sausages instead of pork or chicken sausages for a family barbecue. They might choose to purchase meat-free chicken tenders instead of chicken to serve with a salad as a weekday family meal. Plant-based milk, yoghurt and cheese have also become very popular options with people who value environmental sustainability.



Shutterstock.com/Salena Stinchcombe

Plant-based products are popular with consumers who value environmental sustainability.

REDUCING THE CONSUMPTION OF PROCESSED FOOD

When food is processed, manufactured, packaged, transported, marketed and sold, it has an environmental impact. The production of any food item, regardless of whether it is a packet of sweet biscuits, a frozen meat pie or a chocolate cake, uses energy and water and adds to its **carbon footprint**. The carbon footprint measures all of the carbon dioxide produced to get food from paddock to plate, including growing, processing, manufacturing, packaging and selling the food. Individuals who value environmental sustainability may make their own biscuits and cakes at home rather than purchasing a commercially available product, as they think this will use fewer natural resources and be less detrimental to the environment. They may also make their own preserves such as jams and pickles rather than buying a similar product from the supermarket. Others may decide to install a beehive in the garden so that they can harvest fresh honey rather than purchasing honey that has a higher carbon footprint. Building a hen house to keep chickens so that fresh eggs are always on hand rather than having to purchase them from the supermarket is another strategy people who value environmental sustainability may use.



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People who value sustainability may keep chickens so that fresh eggs are always available.

SHOPPING LOCALLY

Shopping locally is another important consideration for people who value environmental sustainability. Purchasing food that has been grown and produced within a close geographical location rather than imported food, will reduce the 'food miles' the produce has travelled. The concept of **food miles** is one that is often used to estimate the distance food travels from its point of production through to consumption; that is, from 'paddock to plate'. Calculating the distance food travels is an indicator of how environmentally friendly the food is – the fewer kilometres (or miles) a food has to travel, the lower the carbon footprint of the food, meaning that less carbon dioxide is produced and emitted into the atmosphere.

People who value environmental sustainability are therefore more likely to purchase their fruit and vegetables at a local farmer's market. In addition to being produced locally, these foods have most likely been grown using organic food production systems. Being a member of a community garden is another way in which people who value environmental sustainability can have access to locally grown vegetables and fruit. Here they can join with other members to grow, trade and share fresh produce that has a minimal impact on the environment. For others, growing tomatoes or herbs in the backyard or in a pot on the balcony means that they have their own fresh produce on hand rather than having to purchase something that might have travelled from further away.

PURCHASING FOOD WITH MINIMAL PACKAGING

Food packaging is an essential component of today's food system. In is often used to protect the product and to make transporting food easier for the food producer, the logistics company, the retailer and the purchaser. However, food packaging creates a range of environmental problems. Much of today's packaging is made from non-renewable resources, including petroleum in the production of plastics, and timber to manufacture paper and paperboard. It uses significant amounts of non-renewable resources, including water, coal and natural gas. Another issue associated with environmental sustainability is that much of the food packaging produced in Australia ends up in landfill. As it degrades, plastic packaging produces greenhouse gases, particularly methane, damaging the environment further. Food packaging is also responsible for much of the litter that pollutes the environment.

To minimise their impact on the environment, people who value environmental sustainability will endeavour to purchase products with minimal packaging whenever possible. They might purchase their meat and poultry from the local butcher's shop rather than the supermarket as it is does not come on a polystyrene tray or shrink-wrapped in plastic. They might recycle their fresh produce bags and take them with them when shopping for fruit and vegetables. Others might purchase their dry goods such as flour, sugar, rice, nuts, lentils and pasta from a bulk food store. Many of these stores aim to produce zero packaging waste and encourage their customers to bring their own refillable containers with them when they shop.



Shutterstock.com/Newman Studio

Minimising packaging waste is important for people who value environmental sustainability.

REDUCING FOOD WASTE

Wasting food is something most of us have been guilty of at one time or another. Food waste is recognised as having both economic and environmental sustainability implications for the community. According to the Federal Department of Agriculture, Fisheries and Forestry, every year Australians waste approximately 7.6 million tonnes of food across the food supply chain. This is the equivalent of one in five bags of groceries, costing Australian households more than $2000 annually.

Most of the food wasted by Australian households is fruit and vegetables, but leftovers from family meals are another major contributor to food waste. Other food waste occurs when we buy food from takeaway outlets and don't eat it all.

Of equal concern is the impact food waste has on the environment. Food waste that is sent to landfill produces methane, a very damaging greenhouse gas, and adds approximately 3 per cent to Australia's annual greenhouse gas emissions. However, greenhouse gases are not only released when organic material such as food breaks down. When food is grown, processed, refrigerated, stored and transported, energy is used. This energy releases greenhouse gases that are damaging to the environment and so when we throw food away, the energy used to produce the food is simply wasted. Food production also uses water and so this valuable resource is also wasted when food is thrown away, with implications for the environment.

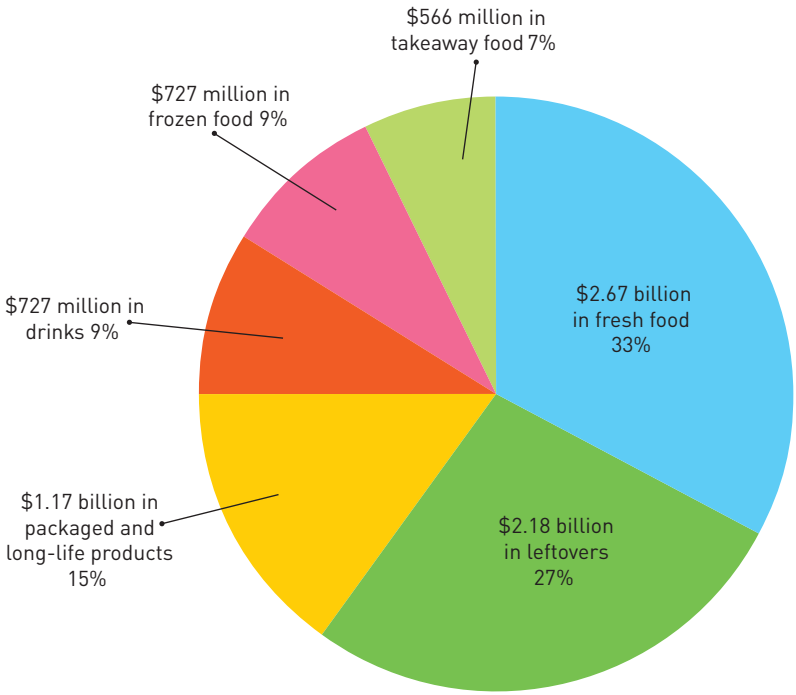


FIGURE 15.2 The annual cost of food wasted in Australia



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Leftovers from family meals contribute to food waste.

HINTS TO MINIMISE FOOD WASTE IN THE HOUSEHOLD

- Plan the meals for the week and prepare a shopping list so you don't buy food that you won't be able to use.
- Check the refrigerator and pantry before going shopping so that you know what ingredients you have on hand to use during the week.
- Find recipes that use leftover ingredients; for example, use leftover chicken in a fried rice.
- Check the 'use-by' and 'best-before' dates on all products before buying them to make sure you can maximise their shelf life.
- Buy fruit and vegetables two or three times a week if possible so that they stay fresh and don't deteriorate.
- Use the 'first in, first out' system in both the refrigerator and pantry.
- Label and date all food in the pantry so that you know when it must be used by.
- Make sure all food is stored carefully in airtight containers to avoid deterioration.
- Make minestrone soup in winter from the carrots, cabbage, beans and tomatoes that weren't used during the week.
- Use leftovers for lunch or after-school snacks.

Activity 15.5

Fighting food waste

Read the article that follows, then answer these questions.

1. Evaluate the validity of this article. Consider the reliability of the sources of information used in the article, the context and presentation of evidence.
2. Discuss the impact of food waste on environmental sustainability.
3. Outline the benefits of using the OzHarvest Use It Up tape for families.
4. Why is Ronni Kahn building a sense of urgency around climate change and food waste?
5. Explain why OzHarvest has enlisted television personality Jessica Rowe to promote the tape.

AUSTRALIA, IT'S TIME TO CLEAN OUT THE FRIDGE



Newspix/John Feder

Ronni Kahn launches the OzHarvest Use It Up initiative.

How much food did you have to throw away on bin night last week? If you're anything like the average Aussie, it was far too much. 'People want to blame supermarkets and industry for waste, but actually the majority of waste comes from our households,' says Ronni Kahn, OzHarvest founder and CEO. 'Two and half million tonnes a year comes from our homes.' In fact, 900 million tonnes, or a third of all food produced in Australia, goes to waste. It's a major contributor to climate change, being responsible for 8–10 per cent of global greenhouse gases. That's more than extracting oil and producing plastic put together.

That means, if food waste were a country, it would be the third biggest emitter of greenhouse gases after China and the USA.

If those statistics make you shudder, they should. Assistant Minister for Waste Reduction, Trevor Evans says reducing food waste has significant sustainability benefits. 'No one likes wasting food, but the reality is that most of us do and 70 per cent of the food we waste is perfectly edible. The research shows the simple but effective act of using food up could save the average household enough for a holiday each year.'

This is exactly why OzHarvest has teamed up with Monash Sustainable Development Institute's Behaviour Works Australia to launch Use It Up, a range of tools, recipes and tips that will show people how simple changes in the kitchen can have a huge impact.

Mark Boulet, a research fellow at Behaviour Works Australia, also suggests having a shelf or an area in the fridge or pantry where food that needs to be used up lives. 'The food that needs to be used up is actually noticeable, and you're reminded to use it ...' he says. 'Getting your family onboard and a bit of planning will also relieve some of the mental effort that's involved.'

A key item in the Use It Up toolbox is a roll of recycled paper tape, printed with messages like 'pick me', 'use ' and 'eat me up', designed to remind households to keep eating their leftovers and excess veggies.

Boulet believes that Use It Up has the biggest potential to shift the dial on food waste at home. 'Families immediately notice that they save both food and money,' he explains.

Once you get into a rhythm, using up the food you've bought becomes second nature and you'll wonder why you used to let so much good food go to waste.

'I'm not proud of how much food I wasted from not knowing what was shoved at the back of the shelves,' says Use It Up Ambassador Jessica Rowe. 'What the tape has done is make us more mindful as a family about what we waste and what we need to use,' says Jessica Rowe. 'My youngest daughter is an eco-warrior and she has been urging all of us to use less and she is especially pleased about our new fridge set up!'

For Kahn, who has been fighting food waste for 17 years, it always comes back to building a sense of urgency around climate change. Australia's target of halving food waste by 2030 is looming fast and big changes need to happen to get us there.

'People are blown away when they learn the number one thing they can do to take climate action starts right now in their kitchen!' says Kahn. 'Reducing the amount of food we waste is something we are all able to do.'

'Australia, it's time to clean out the fridge, Bron Maxabella, SBS Food, 29 September 2021 (adapted). © SBS



Source: OzHarvest

The Use It Up tape lets you tag the food in your fridge or pantry that needs immediate attention.

Understanding the Text

11 Explain how food manufacturers and the supermarket sector have helped families who have little time for meal preparation.

12 Outline how private label products have helped many households to manage their food budget.

13 Draw up a knowledge map to identify the six most important ways for families to stretch their food budget.

14 What is a 'food gatekeeper' and how do they influence the health of family members?

15 Draw a mind map of some of the strategies people who value good health will use when planning and managing meals in the home.

16 Why might someone who values sustainability purchase organic food?

17 Copy and complete the table below to identify the environmental sustainability issues associated with the consumption of meat and dairy, and processed food.

Reducing the consumption of meat and dairy	Reducing the consumption of processed food

18 Explain why shopping locally is considered to improve environmental sustainability.

19 Copy the following table and fill it in to highlight:

- the environmental sustainability issues associated with food packaging
- strategies consumers who value environmental sustainability can take to reduce the amount of food packaging they use.

Sustainability issues with food packaging	Strategies to reduce food packaging

20 Explain why people who value environmental sustainability try to minimise their food waste.

Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

1 Compare a similar homemade and commercial product, such as a chicken schnitzel. Complete a profiling test on the products and present your findings in a star diagram to evaluate the specific components of the homemade chicken schnitzel and the commercial variety.

2 Once you have completed the star diagram, discuss how a food profiling test could assist a food manufacturer to develop a food product that will satisfy the needs of consumers.

Minestrone soup

Preparing this hearty minestrone soup provides an opportunity to practise your cutting skills. The vegetables are sautéed to develop their flavour and, as occurs when stir-frying, the hard vegetables are added to the hot oil first because they take a little longer to cook. The soup is boiled and simmered to tenderise the ingredients and blend their flavours. When making soup, the liquid often evaporates during cooking, so make sure you adjust the consistency prior to serving – extra stock or water can be added.

1 tablespoon oil
½ onion, diced
⅓ carrot, diced
⅓ stick celery, sliced
4 green beans, sliced into 1-centimetre lengths
½ potato, diced
1 clove garlic, crushed
1 cup chopped cabbage
1 cup vegetable or beef stock
1 cup water
200 grams canned diced tomatoes
1 tablespoon tomato paste
1 tablespoon small pasta
1 tablespoon canned cannellini beans, drained and rinsed
salt and pepper (optional)

TO SERVE

2 teaspoons parsley, finely chopped
2 teaspoons grated parmesan cheese

METHOD

1. Heat oil in a large saucepan and sauté the vegetables. Begin with the onion, then add the carrot, celery, green beans and potato. Allow 30 seconds between each addition to develop the flavours.
2. Add the garlic and cabbage; cook until the cabbage has wilted.
3. Add stock, water, canned tomatoes and tomato paste, and bring to the boil. Cover and reduce heat. Simmer for 20 minutes or until the vegetables are almost tender. Add more water or stock if too much liquid evaporates and the mixture becomes too thick.
4. Stir in pasta and cannellini beans and cook for a further 10 minutes.
5. Test the flavour and add salt and pepper if required.
6. Serve garnished with chopped parsley and grated parmesan cheese.

SERVES 2

EVALUATION

1 Describe the sensory properties of the minestrone soup – appearance, aroma, flavour and texture.
2 Explain why the vegetables are sautéed before liquid is added to the soup.
3 Boiling and simmering are both methods of cooking used in this recipe. Explain the difference between boiling and simmering.
4 Why it is important to add the pasta and cannellini beans only 10 minutes before the soup is cooked?
5 What factors would you take into account when considering whether to cook a minestrone soup from scratch or to purchase a commercially available minestrone soup? Explain your answer.



Mark Fergus Photography

Potato and bacon pancake stacks

Potatoes were one of the first crops grown and traded throughout the Americas. In this recipe, the steamed mashed potatoes are lightened with beaten egg white to produce a very airy, delicate pancake. The addition of egg and milk to the recipe provides a source of protein and some calcium. The pancakes could also be topped with sautéed mushrooms and capsicum or a poached egg.

2 small potatoes
¼ cup milk
2 eggs
¼ cup self-raising flour
salt and pepper
1 tablespoon butter
1 tablespoon oil
4 rashers bacon
4 tablespoons maple syrup

METHOD

1. Peel the potatoes and cut into quarters.
2. Steam the potatoes for approximately 12–15 minutes or until tender, or cook in the microwave.
3. Mash the potatoes well and add the milk. Use a spatula and stir until smooth.
4. Separate the yolks from the whites of the eggs. Sift the flour and salt and pepper.
5. Using a spatula, fold the egg yolks and sifted flour into the mashed potato.
6. Beat the egg whites with a hand-held whisk until soft peaks form.
7. Gently fold the beaten egg whites through the potato mixture with a spatula.
8. Melt about a teaspoon of butter and a teaspoon of oil in the microwave. Using a pastry brush, lightly brush a little of the melted butter and oil over the surface of a non-stick frying pan.
9. Add approximately ⅓ cup of batter to the pan and cook the potato pancakes for about 2 minutes. Turn carefully using an egg lifter. Cook for a further 2 minutes or until golden brown and slightly puffed.
10. Remove from the pan and keep warm. Add a further small amount of the butter and oil to the pan and cook the remaining pancakes.
11. Cut the bacon into strips and grill until crisp.
12. Stack two or three pancakes on top of each other and top with crispy bacon. Drizzle with a little maple syrup. Serve warm.

MAKES 2 × 3 STACKS

EVALUATION

1 Describe the sensory properties of the finished potato and bacon pancake stacks – appearance, aroma, flavour and texture – using descriptive language.
2 Describe two conditions necessary to produce maximum volume when beating egg whites.
3 Why is it important to fold the egg whites into the potato mixture gently?
4 Explain why it is necessary to use a mixture of butter and oil to cook the potato and bacon stacks.
5 Describe an alternative topping to use on the pancakes for someone who is following a vegetarian diet.



Mark Fergus Photography

Thai green chicken curry

This recipe includes some of the herbs and spices and coconut milk that gives Thai food its distinctive flavour. The spicy, sweet curry is quick to make because it uses small, bite-sized pieces of chicken. The vegetables should retain their shape and texture, so are added in the last few minutes of cooking. In Thailand, tiny green eggplants would be used because they retain their colour when cooked and add texture, so are a more traditional vegetable than the zucchini.

4 chicken thigh fillets, skin removed

1 tablespoon vegetable oil

1 tablespoon green curry paste

½ long green chilli, finely sliced

2 fresh kaffir lime leaves, sliced (dried Kaffir lime leaves can be pre-soaked for 10 minutes)

400 millilitres coconut milk

1 teaspoon palm sugar

1 tablespoon fish sauce

100 grams canned sliced bamboo shoots, drained

1 small zucchini, sliced

⅓ cup frozen peas

1 tablespoon fresh Thai basil, basil or mint leaves

TO SERVE

steamed jasmine rice

METHOD

1. Cut the chicken into bite-sized pieces.
2. In a medium saucepan, heat the oil over moderate heat then quickly stir-fry the curry paste, chilli and lime leaves until they are aromatic; approximately 30 seconds–1 minute.
3. Add the coconut milk, sugar and fish sauce.
4. When the coconut milk begins to boil, add the chicken and bamboo shoots then simmer for 10–15 minutes until the chicken is just tender. If the sauce becomes too thick, add a little water.
5. Add the zucchini slices and cook for approximately 1 minute. The zucchini slices should retain their firmness, so adjust the cooking time to the size and thickness of the zucchini.
6. Stir through the frozen peas and cook until they are defrosted and tender.
7. Remove the saucepan from the heat and stir through half the Thai basil, basil or mint leaves.
8. Place the curry in a serving bowl and top with remaining leaves. Serve the curry with a bowl of steamed jasmine rice.

SERVES 2–3 AS PART OF A SHARED TABLE

EVALUATION

1 Describe the sensory properties of the Thai green chicken curry – appearance, aroma, flavour and texture – using descriptive language.
2 Classify the ingredients for the Thai green chicken curry on a diagram of the Australian Guide to Healthy Eating.
3 Using your data from question 2, explain how well this meal meets the recommendations of this food selection model.
4 Green vegetables are some of the main foods that are often wasted and end up in the rubbish bin. Suggest two green vegetables that could be used in this recipe instead of zucchini to minimise food waste.
5 Research Thai cuisine and suggest two other dishes that could be served with the green curry as part of a shared, Thai-style main meal.



Mark Fergus Photography

Cheesy schnitzels with pressed parmesan potatoes

Schnitzels are a popular way of serving meat for a main course. The addition of parmesan cheese to the crumbs gives a delicious cheesy flavour to the crust. Frying is a dry method of cooking that adds an appealing flavour and texture to food. This dish makes a hearty family meal when served with pressed parmesan potatoes and a green salad or coleslaw. Using thick slices of eggplant instead of yearling beef would make this recipe suitable for someone following a plant-based diet.

CHEESY SCHNITZELS

2 thin slices yearling beef

1 egg

2 tablespoons milk

pinch of salt

⅓ cup finely grated parmesan cheese

1 cup dried breadcrumbs

2 tablespoons flour

3 tablespoons oil

40 grams butter

Variation: substitute the yearling beef with eggplant cut into 2-centimetre slices.

Note: If using eggplant, omit steps 1 and 2 in the recipe.

PRESSED PARMESAN POTATOES

2 potatoes

spray oil

2 tablespoons parmesan cheese

1 spring onion, chopped

TO SERVE

green salad or coleslaw

METHOD

Cheesy schnitzels

1 Flatten the beef with a meat mallet until it is approximately ½ centimetre thick.
2 Trim off any sinew from around the edge if necessary.
3 Beat the egg, milk and salt together lightly.
4 Mix the parmesan cheese and breadcrumbs together on a plate.
5 Dust the meat with the flour and shake off any excess.
6 Dip the floured meat into the egg mixture.
7 Finally, coat the meat with the breadcrumb and parmesan mixture.
8 Place the crumbed schnitzel on a tray and refrigerate for 20–30 minutes.
9 Heat the oil in a frying pan; when hot, add the butter.
10 When the butter is foaming, fry the crumbed schnitzels until golden brown. Turn and cook the other side.
11 Drain on paper towel. Serve with pressed parmesan potatoes and a green salad or coleslaw.

Pressed parmesan potatoes

1 Preheat oven to 200 °C.
2 Place the potatoes on a microwave-safe dish and microwave on high for 5 minutes.
3 Transfer the potatoes to an oven tray and bake for approximately 20 minutes until cooked through.
4 Using a potato masher, press each potato firmly until slightly crushed.
5 Spray each one with oil and sprinkle with parmesan cheese and chopped spring onion. Return to the oven and bake for a further 10 minutes.

SERVES 2

EVALUATION

1 Describe the sensory properties of the cheesy schnitzels with pressed parmesan potatoes – appearance, aroma, flavour and texture – using descriptive language.
2 Classify the ingredients for the cheesy schnitzels with pressed parmesan potatoes and a green salad on a diagram of the Australian Guide to Healthy Eating.
3 Using your data from question 2, explain how well this meal meets the recommendations of this food selection model.
4 What would happen to the crumbed coating if the schnitzel were not chilled before cooking?
5 Outline two strategies that someone who values environmental sustainability could implement when shopping for the ingredients for this meal.

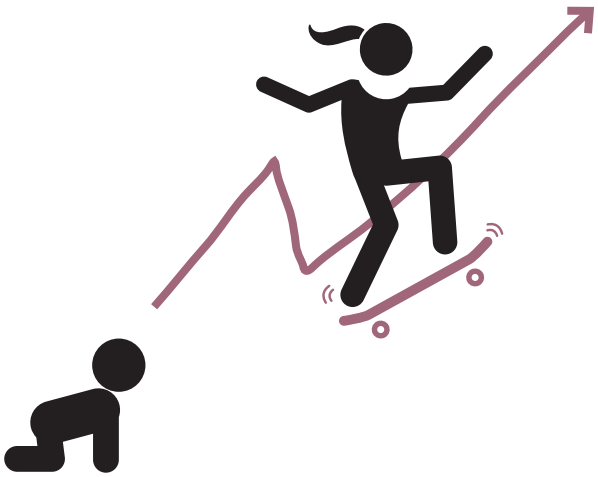


Mark Fergus Photography

MANAGING FOOD CHOICES TO MEET SPECIFIC DIETARY NEEDS

LIFE SPAN STAGE

- Babies and adolescents need nutrient-dense diets to allow for rapid growth and development.



ACTIVITY LEVELS

- People who are very active need to eat more than those who do little exercise.



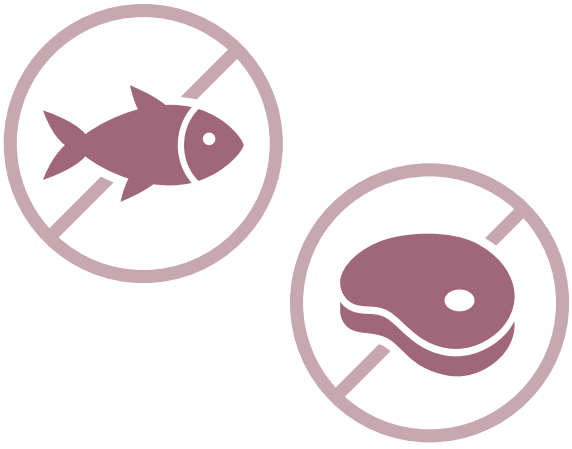
MEDICAL

- Food allergies – dairy, eggs, seafood, nuts and soy
- Food intolerances – gluten intolerance and lactose intolerance



CULTURAL RESTRICTIONS

- Food, for many people, is very closely linked to their religious or spiritual beliefs. Two of the foods that may be restricted are shellfish and pork.



16

DESIGNING AND ADAPTING RECIPES

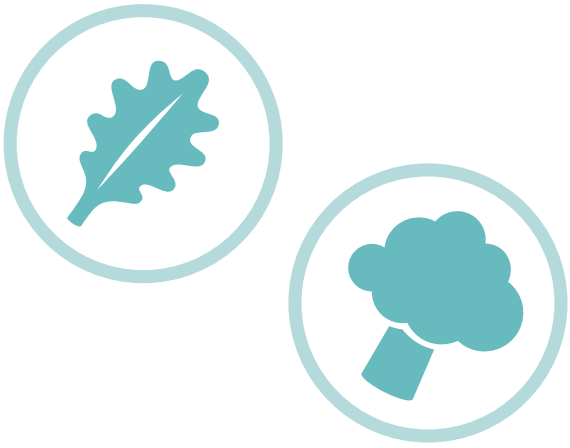
PERSONAL TASTES & PREFERENCES

- Create meals that include ingredients from the five food groups, and balance the likes and dislikes of family members.



ETHICAL RESTRICTIONS

- People concerned about the environment or animal welfare may follow a vegetarian or vegan diet.



KEY TERMS

culture the language, religion, styles of art, music and drama, foods and social behaviour of a particular people or society

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

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

vegans people who do not eat or use animal products

vegetarian diet consists of grains, pulses, nuts, seeds, vegetables and fruit; the diet does not include any meat, poultry, game, fish, shellfish or by-products of slaughter

Resources
Study Design links
Infographics
Flashcards

Managing food choices to meet specific dietary needs

Preparing family meals and endeavouring to meet the specific dietary needs or personal food tastes of family members can sometimes be very challenging. Individuals have differing dietary needs at every stage of the life span. Some family members may be very active, and require a diet that provides a higher energy intake than others who may be less active. It might be that some people are concerned about improving their health and wish to reduce their intake of refined white flour and therefore want to replace it with flour from whole foods such as almonds, spelt, oats or coconut when baking. Some people might love the crunch of a fresh green salad, while others will only eat cooked vegetables.

The challenge is to take all of the differing dietary needs and food choices of the household into account when planning meals, and then adapt recipes so that everyone enjoys the food they eat. Whenever possible, it is preferable to prepare a meal that includes a variety of ingredients and encourages everyone to try each dish, rather than preparing separate dishes to accommodate the food preferences of individual members of the family.

LIFE SPAN STAGE

Developing healthy eating patterns begins early in life. A nutrient-rich diet is important at every stage of life but is particularly important for babies and toddlers who are going through a rapid period of growth. While children in this age group will only consume small portions of food at any one time, their diet should contain a wide variety of foods based on the five food groups. Toddlers are very adaptable eaters, so regular family recipes can simply be modified to meet the needs of younger members of the household. It is easy, for example, to add some grated zucchini or carrot to a hamburger or cake mix, to increase the fibre and nutrient content of the recipe.

It is important to encourage toddlers and preschool children to eat plenty of fresh fruit and vegetables. One strategy to use is to model healthy eating by, for example, snacking on a bunch of grapes for morning tea rather than a sweet biscuit, or serving carrot and celery sticks with a dip instead of salty cracker biscuits.



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Toddlers should be encouraged to enjoy fresh fruit and vegetables.

Primary school-age children and adolescents often lead very active lifestyles and need to consume a balanced diet based on the recommendations of the Australian Dietary Guidelines and the Australian Guide to Healthy Eating to meet their energy and growth and development needs. As they grow, they should be encouraged to prepare their own lunch to take to school, and to help plan and prepare the family meals. Healthy lunch boxes should contain some carbohydrate foods, preferably wholegrain; some protein foods, either meat, fish, eggs or legumes; a dairy item such as cheese, yoghurt or a plain milk drink; and salad or vegetables and/or fruit. To ensure students are well hydrated throughout the day they should have easy access to fresh water and be encouraged to refill their water bottles during breaks. Healthy lunch boxes should *not* contain foods high in fat, salt or sugar. Those preparing lunch boxes should avoid the processed foods that are packaged in small portions and marketed specifically for lunch boxes as they often have a high fat, salt or sugar content.



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A healthy lunch box includes all the food groups.

Adults of all ages too, should base their diet on eating a wide variety of foods from the five food groups. However, energy needs of adults decrease as they age so their diet needs to be based on nutrient-dense, rather than energy-dense foods. This is particularly important for people in late adulthood whose energy needs decrease by approximately 15–20 per cent.

ACTIVITY LEVELS

Being physically active every day is one important aspect of achieving and maintaining a healthy body weight. It builds muscle and bone strength and helps to keep the brain alert and active. Children and adolescents should be involved in moderate-to-vigorous exercise for at least 60 minutes every day.

The activity level of individual members of the household may vary greatly. Children and adolescents may be involved in competitive sports – such as basketball, netball, football, soccer, swimming or tennis – that are physically demanding. Adults might enjoy going for a run, going to the gym or playing a competitive sport. All of these activities are energy-intensive and so the amount and quality of food individuals consume may need to be increased to account for the energy expended. If you are very active, you will probably need to eat more than someone who does little exercise. Using food models such as the Australian Guide to Healthy Eating helps guide your food choices and support your energy needs to maintain a healthy weight.



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Individuals involved in sport will need to eat more than those who do little exercise.

PERSONAL TASTES AND PREFERENCES

Designing meals to suit individuals within households can be quite a challenge for the food gatekeeper of the household responsible for preparing and cooking family meals. Often it can be a question of balancing the likes and dislikes of family members with the desire to create a meal that has a wide variety of foods from all the food groups. In fact, when it comes to adapting meals, the cook in the family can be compared with the big fast-food chains in North America – once they know and understand the palate of a particular country (or individual), they adjust products for the local market. For example, in Japan, McDonald's offers a Teriyaki McBurger with edamame and corn. Customising the food served is a crucial strategy to ensure good sales in the global fast-food business, and this is very similar to the home cook who adapts meals to ensure the family is well fed. It can be as simple as making a green salad and serving it in two bowls – one that has a vinaigrette dressing and one served without a dressing. Maybe not everyone enjoys hot chilli, so curries can be prepared using a mild curry sauce, and extra chilli sauce or sliced fresh chilli can be served as an accompaniment for those who want to add more



Shutterstock.com/Nina Firsova

A mild curry, rice and roti will suit most food tastes and can be served with extra chilli for those who like a spicier dish.

heat to the dish. Raw vegetables such as carrots and broccoli can be a favourite with some people, and for those who prefer them cooked, a quick zap in the microwave does the trick.

MEDICAL – FOOD INTOLERANCES AND ALLERGIES



Collaborative Activity

A **food allergy** is 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. A food allergy is caused when a foreign substance enters the bloodstream and an antibody is produced to fight it. Each time the foreign substance enters the body, more antibodies are produced. Therefore, some food allergies can become more severe with more frequent exposure. Common food allergies include dairy, egg, seafood, nuts and soy.

Food intolerance is a chemical reaction in the body to particular foods; it is not an immune response and so is not a true allergy. This reaction occurs in some people after eating or drinking certain foods. Food intolerances are much more common than food allergies. The reactions are similar to a food allergy but they are generally not life-threatening in the short term. Common food intolerances include gluten and lactose intolerance.

Substituting ingredients to suit the needs of individuals with food intolerances and allergies

When preparing foods for people with food intolerances and allergies it is essential to discuss the specific requirements with the person concerned. In some cases, it is possible to substitute ingredients, so a product is safe for them to eat and still has pleasing sensory properties. In other cases, where ingredients cannot be eaten – for example, prawns – a completely different recipe should be prepared and served.

The following lists contain common food intolerances and allergies and possible substitutes you could use when designing and adapting recipes.

GLUTEN INTOLERANCE

Foods usually containing gluten

Gluten is found in a range of commonly eaten foods, such as breads, pasta, pizza, cereals, cakes, biscuits and pies. It is also a common thickener in processed foods.

Ingredients to avoid

All products that are made from wheat, rye, oats, triticale and barley, including wheat flour, brewer's yeast, malt extract, soups, sauces, gravies and traditional soy sauce

Substitutes for flour containing gluten

A wide range of gluten-free ingredients is now available, including gluten-free plain flour and self-raising flour, arrowroot flour, buckwheat flour, potato starch, quinoa flour, soy flour, white rice flour and tapioca flour.

LACTOSE INTOLERANCE

Foods usually containing lactose

Milk, milkshakes and other milk-based beverages, whipping cream, ice-cream, cheese, butter, puddings, custards, cream soups, cream sauces

Ingredients to avoid

Whey, curds, milk solids, malted milk, casein, whey protein concentrate, margarine, buttermilk, caseinate, lactalbumin

Substitutes for milk containing lactose

A wide range of lactose-free ingredients is now available, including fresh and UHT soy milks, yoghurts and ice-creams. Other milk varieties, including rice, coconut and almond milk, are also widely available, as well as low-lactose milk products that may be suitable.

DAIRY ALLERGIES

Foods usually containing dairy

Milks, cheeses, yoghurt, cream, ice-cream, chocolate, baked products such as cakes, biscuits and pastry, butter and some margarines

Ingredients to avoid

Casein, whey, whey solids, buttermilk solids, curds, milk solids, lactalbumin, caseinate, sodium caseinate

Substitutes for dairy

For milk: soy, rice, almond, oat or coconut milk

For butter: dairy-free margarine (note that most light margarines are not suitable for baking)

For yoghurt: soy or coconut milk yoghurt

EGG ALLERGIES

Foods usually containing egg

Baked foods such as cakes, biscuits, muffins, breads, dry biscuits; desserts such as custards, puddings, ice-creams, meringues; battered and crumbed food, meatballs, pasta, sauces and dressings

Ingredients to avoid

Albumin, globulin, lysozyme, livetin, silici albuminate, Simplesse, vitellin, meringues, products including the words 'egg' or 'egg white, and ingredients that begin with 'ovo'

Substitutes for eggs

Eggs have several functional roles in baked products where they can act as a leavening agent, and provide structure and liquid to combine ingredients.

Commercial egg replacer: this is whisked into water until fluffy, then added to the baked product mixture

Baking powder, water and oil: whisk together 1½ tablespoons oil, 1½ tablespoons warm water or milk and 1 teaspoon baking powder to assist in leavening a mixture

Fruit purée: ¼ cup of mashed banana or thick stewed apple can provide moisture to combine ingredients

SEAFOOD ALLERGIES

Foods usually containing fish or shellfish

Anything with fish or seafood, including imitation crab, Caesar salad and dressing, Worcestershire sauce, fish sauce, some pizzas, some gelatine, marshmallows, some sauces, some antipasto items

Ingredients to avoid

All products that include a type of fish or seafood such as prawns, mussels or shrimp in the ingredient list

There are NO substitutes for seafood

Select alternative recipes and food products.

NUT ALLERGIES
Foods usually containing nuts
Baked products, chocolate (may contain traces of nuts), some confectionery, snacks, nut spreads, breakfast cereal, Asian-style food (stir-fry sauces), vegetarian burgers and meat substitutes, marzipan
Ingredients to avoid
Spreads that contain nuts such as Nutella and peanut butter, marzipan, confectionery and chocolate with nuts, vegetarian substitutes for meat such as nut meat, many breakfast cereals, Asian foods (that often have nuts as ingredients and in the sauces), baked goods and cake mixes
Substitutes for nuts
It is safest to exclude all types of nuts as there is often cross-contamination during the processing of different varieties of nuts. For a similar crunch to nuts in a salad, sunflower or pumpkin seeds could be used.

SOY ALLERGIES
Foods usually containing soy
Baked products such as cakes, biscuits, muffins and bread, cake mixes, breakfast cereals, frozen meals, margarines, snack foods, vegetable oils
Ingredients to avoid
Hydrolysed soy protein, miso, soy sauce, soy protein concentrates, soybean, soybean curd, tempeh, textured vegetable protein (TVP), tofu
There are NO substitutes for soy
Different recipes need to be selected. It is important to read the labels of commercial products as soy is used widely in items you might not expect, such as some pasta sauces and bread.

CULTURAL RESTRICTIONS

Over time, society develops a pattern or a particular way of doing things. This can include a language, religion, styles of art, music and drama, foods, mode of dress, and social behaviour of a particular society or group of people. All these factors combine to create what is often described as the **culture** of a society.

In times past, the culinary characteristics of a community were determined by the physical setting or the geography of the country in which people lived. Some of the geographical factors that influence the eating habits of a regional group or country are climate, landform (mountainous or flat land) and the types of vegetation. For example, the very rocky and mountainous land of Greece is suitable for growing olive trees and so olive oil plays a major role in Greek cooking. The Pacific Islands have extensive coastlines and very little open land for grazing cattle, so fish and seafood are a major part of the diet. Rice is the staple crop of many countries, particularly in Asia where an abundance of water is available to irrigate this crop.

The food habits of the people who settle in a country can have a major influence on the types of food eaten, how they are cooked and how they are served. South America was colonised by the Spanish and Portuguese, who introduced rice to these regions. In return, tomatoes, chillies, beans and potatoes were shipped across the seas to appear in dishes we would describe as traditionally Spanish.

Australian food was very similar to the British diet for more than 200 years. Our food habits have only expanded since the early 1950s as a result of the increased migration of people from countries other than Britain after World War II.

Australia's cultural diversity means that we no longer follow the traditional eating habits of the early European settlers. Instead, we have embraced an exciting range of taste sensations brought by the many migrants to our shores. Chinese, Italian, Greek, Vietnamese, Indian and, more recently, North African and Sri Lankan foods are now widely enjoyed in the community. It is not unusual in many Australian homes to have a meal that originated from a different part of the world every night of the week. The term 'fusion cooking' is commonplace in Australian kitchens, where creative cooks combine ingredients and use cooking methods from various cultures in a different way to make a new recipe.



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Vietnamese rice paper rolls are enjoyed by many Australians.

RELIGIOUS RESTRICTIONS

Collaborative Activity

For many people, the food they eat is very closely linked to their religious or spiritual beliefs. Many faiths, including Christianity, Judaism, Islam, Hinduism and Buddhism, have strict rules and customs associated with food. Some foods can never be eaten, while others cannot be eaten on particular days or times of the year. Some religions have very specific rules about the preparation of food and to whom the food can be served. Common foods that may be restricted include shellfish and pork.

Many Catholic and Orthodox Christians, for example, avoid eating meat on Fridays during Lent. Members of the Jewish community may follow the Jewish food law of only eating kosher food – the meat from animals must be slaughtered according to their customs. In Islamic communities food must be halal (permitted) according to their religion, and foods such as pork and brewer's yeast-based products are not permitted. Within the Hindu and Buddhist religions, some followers will not eat meat as it involves taking the life of an animal or causing it pain. Most Hindus avoid eating beef because the cow is considered a sacred animal. Therefore, when designing or adapting recipes and meals, these religious food restrictions must be taken into consideration.

ETHICAL RESTRICTIONS

A vegetarian is a person who does not eat meat or other animal products. A **vegetarian diet** consists of grains, pulses, nuts, seeds, vegetables and fruit. The diet does not include any meat, poultry, game, fish, shellfish or by-products of slaughter.

There is a wide range of reasons for following a vegetarian diet. The diet may be based on religious beliefs, as practised in Hindu and Buddhist sects, or it may be based on a person's ethical principles to avoid cruelty to animals or the view that there are more environmentally sustainable ways to produce food.

The health benefits of excluding animal products from the diet are well documented and show that there is a reduced consumption of saturated fats and cholesterol, which benefits heart health. From an economic point of view, non-meat products are often less expensive.

Vegans have a more limited diet – they do not eat any animal-derived products, including butter, cheese, milk and eggs, and they do not use any products, such as leather, that come from animals.



Australian Vegetarian Society (NSW)

Many vegetarians are concerned about animal welfare.

Practical Activity 16.1

Meringue comparison – plant-based and traditional

Aim: To compare the physical and sensory properties of meringues made from plant and animal protein.

Eggs are usually a key ingredient in meringues, but the traditional recipe is not suitable for people who have an allergy to eggs. The protein in chickpea brine behaves similarly to egg whites when it is beaten – it stretches and captures bubbles of air. Sugar is used to sweeten and stabilise the foam.

Worksheet

Work in small teams to complete a comparison test of plant-based meringues and traditional meringues. For the traditional meringues, substitute two egg whites for the chickpea brine in the recipe on the next page.

Method

1. Produce one quantity of plant-based meringues and one quantity of traditional meringues using the recipe below. For the traditional meringues, substitute the chickpea brine with two egg whites.
2. During the production of each type of meringue, record the time taken to beat into a foam and then to form a stiff-peak meringue in a table like the one on the following page.
3. Record the cooking time and the drying-out time.

Analysis

1. Was there a time difference in beating the chickpea brine and egg whites into a foam? Explain your answer.
2. Was there a time difference in the formation of a stiff-peak meringue between the plant and animal protein? Explain your results.
3. Did it take the same time to cook and dry out each type of meringue? Discuss your results.
4. Discuss the similarities and differences in the sensory properties of the two types of meringue.
5. Explain why people who have an allergy to eggs or who follow a vegan diet would be pleased with the chickpea variation of traditional meringues.

Conclusion

If you were allergic to eggs or followed a vegan diet, would you be satisfied with the chickpea meringues as a sweet treat? If so, explain why. If not, explain why not.

PLANT-BASED MERINGUES

80 millilitres liquid brine from canned chickpeas, at room temperature
¼ teaspoon cream of tartar
½ cup caster sugar
pinch of salt
½ teaspoon pure vanilla essence

METHOD

1. Preheat oven to 110 °C and line a baking tray with baking paper.
2. Combine the chickpea brine and the cream of tartar in a medium bowl. Use a hand-held beater and beat on high speed until the mixture begins to foam. This will take 1–2 minutes.
3. Continue beating and add the caster sugar, 1 tablespoon at a time – ensure it is completely dissolved before the next addition.
4. Add the salt and vanilla essence.
5. Continue beating until the mixture is glossy and stiff peaks form. This step will take about 7 minutes.
6. Place the meringue in a piping bag with a star nozzle and pipe onto the lined tray. The meringues should be 3–4 centimetres high.
7. Bake the meringues for 40–50 minutes, then turn off the oven and let cool and continue to dry out for 30–40 minutes.
8. Store in an airtight container.



An egg-free meringue made with chickpea brine is suitable for people with an egg allergy or for vegans.

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Results

	MERINGUE – CHICKPEA BRINE	MERINGUE – EGG WHITE
Time taken to beat into a foam		
Time taken to beat in sugar to form a stiff-peak meringue		
Cooking time		
Drying-out time		
Sensory properties • Appearance • Aroma • Flavour • Texture		

Activity 16.2

Adapting a recipe to suit individual food needs

When planning to cook a recipe, it often becomes necessary to adapt it by changing or substituting specific ingredients. Usually, these adaptations are necessary to reduce, eliminate or add ingredients, to make the recipe suitable for people who have specific dietary or food needs.

Using the recipe for sweet corn and bacon quiche on page 94, identify the adaptations that you could use to make this recipe suitable for the dietary needs of the following individual consumers

1. A person wanting to increase their fibre intake
2. A person who is coeliac and requires a gluten-free diet
3. A person who is lactose-intolerant
4. A person wanting a diet low in saturated fat
5. A person following a plant-based diet

Copy and complete the table below to identify your adaptations to the original recipe and describe how each adaptation will meet the needs of the specific dietary or food need identified.

	ORIGINAL INGREDIENT/S	NEW INGREDIENT/S	REASON FOR AND OUTCOME OF THE ADAPTATION
A person wanting to increase their fibre intake			
A person who is coeliac and requires a gluten-free diet			
A person who is lactose-intolerant			
A person wanting a diet low in saturated fat			
A person following a plant-based diet			

Understanding the Text

1 Explain a strategy that can be used to ensure that the family meal suits the food preferences of most family members.

2 Outline some of the factors a family with a baby and a toddler would need to take into consideration when planning family meals.

3 Describe the types of foods that should be included in a healthy school lunch box. Explain why prepackaged processed snacks should not be included in school lunch boxes.

4 Explain why it is important to consider the activity levels of family members when planning family meals.

5 Identify two strategies a family could use to meet the personal tastes and preferences of individuals when planning and preparing family meals.

6 Explain the difference between a food allergy and a food intolerance.

7 Select one food allergy and one food intolerance and, for each, identify one ingredient to avoid and a suitable substitute ingredient.

8 Explain how the food preferences of families are influenced by their cultural background.

9 Select one religion outlined in the text and describe how it restricts the types of food people who practise this religion can consume.

10 Explain how a vegetarian diet differs from a vegan diet.



Answers
Understanding the Text

Developing individual food skills

The individual food skills of the members of the household will have a big impact on the quality and type of meals they provide for others to share and enjoy. For those who have limited skills, it could mean they pick up takeaway food on the way home or order a meal delivery online rather than cooking.

THE BENEFITS OF DEVELOPING FOOD SKILLS

Being able to prepare healthy and enjoyable food is considered an essential life skill as it has economic benefits for family finances and promotes a person's social, emotional and physical health.

Economic benefits of developing individual food skills

Eating out occasionally is a real treat but it can be expensive, and usually costs significantly more than buying groceries to prepare a home-cooked meal. Depending on the type of food ordered, purchasing takeaway food or ordering in meals such as fish and chips or pizza can sometimes be cheaper, but these foods are not always healthy as they are generally energy-dense and high in fat, salt and sugar. Planning a menu carefully for the week, checking the pantry supplies and any leftovers in the fridge, and writing a shopping list are economically sound ways of saving money when preparing family meals. Developing individual food skills also means that entertaining friends at home is less expensive than buying prepared food or eating in a restaurant.

Social benefits of developing individual food skills

Learning to cook provides many valuable social opportunities. Sharing food that you have cooked with other people is a pleasurable experience and can make you feel happy and connected to others. You can invite others such as a partner, family or friends to enjoy the social activity of cooking together. Sharing the cooking tasks can help develop social interactions within the group and enable you to learn new skills, as well as strengthen family bonds and friendships. Cooking in groups can also foster good communication and provide quality time with others. As your food skills develop, so too will your confidence in your ability to prepare food, and then you will be able to move on to more creative and complex recipes.

Cooking meals and welcoming people to your home, or baking a gift for a friend, is a wonderful way of showing love and affection. Preparing food and sharing it with someone who lives alone, such as an elderly person, is very important. Seeing them enjoy, appreciate and value the food you have prepared helps to minimise their sense of loneliness and can also build your own feeling of self-worth.

During the COVID-19 pandemic and numerous lockdowns, some people prepared more home-cooked meals and looked forward to the social interaction experienced while shopping. This outing to the supermarket allowed people to see others and spend time selecting the ingredients for the night's dinner. Visiting a farmers' markets also provided social interaction with the farmers and producers as people discussed the produce they were buying. However, others found shopping during the pandemic made them feel anxious and ill at ease.



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Sharing a home-cooked meal can enhance social interactions.

Emotional benefits of developing individual food skills

Making a new recipe or preparing a meal is good for mental health because it requires patience and mindfulness and is an outlet for creative expression that helps to improve a person's self-esteem. Many people find that cooking helps them to relieve stress and to curb negative thinking as they focus their mind on following a recipe. Stirring the pasta sauce, checking on the cake baking in the oven or adjusting the seasoning in the soup provides an opportunity to do something physical, and breaks up the routine of the day.

Cooking food also stimulates the senses; for example, as we listen to the sound and rhythm of egg whites being whisked, or smell the aroma of fresh strawberries or a freshly baked cake. Preparing a delicious meal for the family can also improve self-confidence as others enjoy and comment on the success of the meal, and can encourage family members to try new ideas – not just in the kitchen, but in life.

Physical benefits of developing individual food skills

The ability to cook healthy meals is a valuable outcome of developing individual food skills. Cooking at home can be a positive influence on a healthy lifestyle for all the family. In an article by Paula Goodyer in GoodFood, 'Kitchen confidence: How we lost our food skills and how to get them back', Professor Clare Collins, a professor of nutrition and dietetics at the University of Newcastle, said: 'Research has found that people who regularly make their meals at home have better diets, and consume less salt, sugar, fat and kilojoules compared to people who rarely eat home-cooked meals – and this is more likely to result in a healthy weight.'

Home-prepared meals put the cook in control of the recipe, ingredient selection, cooking, serving methods and portion control, ensuring that the family has access to healthy, fresh meals. If family members have food allergies or sensitivities, or particular dietary constraints, the cook can use their food skills to accommodate these.



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Preparing a healthy meal for the family

FACTORS THAT ENABLE THE DEVELOPMENT OF FOOD SKILLS

The development of food skills varies greatly between individuals. Some people really enjoy cooking and have an innate talent for working with food, while cooking has far less appeal for others who may have little desire to improve their food preparation skills. A range of factors can enhance our ability to develop our food skills, including the influence of our culture and whether other family members who have a passion for cooking share their knowledge and talents with others. Access to technology and to Food Studies classes at school can also impact on our ability to develop food preparation skills.

The influence of family

Our family of 'orientation – that is, our immediate family – has perhaps the greatest influence on our ability to develop food skills. From a very early age children observe the preparation of food in the family kitchen. They will most likely accompany a parent to the supermarket and help with the selection of food, and with unpacking and storing the food when they return home. Many parents will encourage children to help with the family meal by allowing them to carry out simple food preparation tasks. These tasks may begin when children are small by, for example, getting ingredients from the refrigerator or tossing a salad. School-aged children may help in deciding the week's menu, choosing the fruit and vegetables to be eaten and preparing their own lunch box. They may then be able to prepare simple dishes such as cutting up the vegetables for soup, a pasta dish or a stir-fry meal.

As children get older, they will become more independent in the kitchen and can be encouraged to prepare some creative new recipes. They may begin by being responsible for the preparation of one of the family's midweek meals or learning about the food budget by preparing a meal using only ingredients available in the pantry. Encouraging participation in the preparation and cooking of family meals will create an interest in food and healthy, eating, and build valuable food skills they can use as they get older.



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Children can develop their love of food and skills in food preparation by helping to prepare the family meal.

Many of us enjoy, or have memories of, the delicious and special meals or dishes our grandmothers cooked. When you think of the 'best cooks', grandma often comes to mind. You may have watched her in the kitchen cook up special food for family birthdays, Christmas or other family celebrations. Quite probably your grandmother had many of these skills passed on from her family, or she exchanged recipes and hints with her friends and other family members. She made her food from scratch, often improvising if she was missing an ingredient, and cooked by experience and taste. Such skills often continue to be passed on by oral traditions. In addition, many younger people today, who are determined to learn from their grandparents, write down their much-loved recipes for future generations to cook and enjoy.



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Grandparents can pass on their food skills to their grandchildren.

The influence of culture

Food is often used as a means of transferring and retaining cultural identity and is one of the core components of a culture's customs, celebrations and restrictions. It is important that people of differing cultures develop food skills that help them to continue the important rituals around food. This enables them to maintain their cultural identity and sense of belonging, and pass these skills on to their children for future generations.

Often the older members of families of a particular culture are the ones to teach younger members of the family. Such skills and knowledge may involve learning about certain ingredients, methods of preparation, preservation techniques and types of foods eaten at certain celebrations or religious festivals, or particular times in the calendar of their church.

Larissa Dubecki, in an article from The Age Good Food – 'The mothers who made our great chefs' – discusses how chefs' mothers have passed on their love of food, trusted family recipes and food skills from their culture. One of these chefs, Guy Grossi, the Grossi Florentino Head Chef, said of his mother Marisa: 'Mum was always at the kitchen table, the stove was always on the go. As we got older and started going out there

was always something under lids on pots when we got home late.' Marisa commented: 'I love it when he uses my recipes or the skills he learned from me while he was growing up. He learned more technical skills from his dad later on, but he learned a lot of his cooking from me, in the family home.' Guy talks about his love for his mother's fettuccine with calamari ragu saying: 'It's the promise of this dish to come that subdues the groans in my stomach during mass on Good Friday. Having fasted all day, I can't wait for the bowl of this steaming hot pasta to be placed in front of me. This was one of Mum's specialities. I make this dish every year at Easter now and it is delicious but it will never be as good as Mum's.'

This cultural tradition will almost certainly live on in the Grossi family for generations to come.



Fairfax Syndication/Kristoffer Paulsen

Traditional recipes handed down by Guy Grossi's mother still evoke memories of his Italian culture.

Educational opportunities

As well as providing vegetable garden classes in primary schools, the Stephanie Alexander Kitchen Garden Foundation has regular kitchen classes where children make delicious dishes from the fresh vegetables, herbs and fruit they have grown. These classes begin a journey of understanding of where food comes from, how its grown, its seasonality and the fun involved in cooking. At the end of the cooking sessions students come together at the table to enjoy tasting the dishes they have made.

Individual food skills are developed further by classes in Home Economics, Food Technology or Food Studies in secondary schools. In these classes students develop the skills and knowledge they need to make informed decisions about their health, lifestyle and nutritional needs.



Fairfax Syndication/Melissa Adams

Students preparing food grown in the garden of the Stephanie Alexander Kitchen Garden Foundation



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Students learn valuable food skills in a Food Studies class.

Access to and availability of resources

Having access to a range of resources such as a reliable Internet connection or the ability to purchase or borrow recipe books can also enable individuals to develop their food skills. Online cooking classes are a remarkable resource that many people use. In an article published in July 2020 by The Age Good Food – 'Small screen sizzlers: Online cooking classes continue after lockdown – Eloise Basuki describes how online cooking classes, even after lockdown, have continued to be popular. During isolation many people were faced with preparing three meals a day and many learnt to cook for the first time. Eloise commented: 'Surprisingly, learning to cook in lockdown couldn't have been easier. Zoom and other online videoconferencing tools brought everyone together despite the government-mandated restrictions keeping us apart.' She went on to say: 'In June, the pinnacle of French culinary schools, Le Cordon Bleu, announced its Australian institute would release a set of 13 new cooking courses, all to be delivered entirely online.'

Angie Chong of the Humble Dumpling in Melbourne is one chef who ran online classes in dumpling making on Zoom.



Fairfax Syndication/Simon Schluter

Angie Chong making dumplings in an online cooking class

Activity 16.3

Worksheet

How to…

Making a new recipe for the first time or learning a new food preparation skill can sometimes make us a little anxious! Websites such as Taste offer 'how to' videos to help the inexperienced cook learn how to make a special recipe or perfect a challenging technique.

1. Access a website with recipes and select a recipe or skill you would like to know more about.
2. Watch the video and write up a brief evaluation to post on a blog.
   - Do you think there were sufficient steps explained in the video for an inexperienced cook to be able to prepare the dish successfully or master the skill?
   - Were the instructions clear and easy to follow? Give examples to support your answer.
   - What recommendations would you make to improve the video?
   - Suggest two recipes or skills that you think could be added to the video series, currently not available, that would be helpful for an inexperienced cook.

Recipe books

Recipe books are another resource that enable individuals to develop their food skills. While recipe books can be expensive to purchase, local libraries have a wide range of books that often focus on different cuisines or particular skills for members of the community to borrow. Books on baking, especially how to make sourdough bread, were some of the most highly sought-after books to borrow during lockdown. There are many recipe books written for people who are new to the kitchen and keen to begin the journey to develop their individual food skills. Most of these books provide clear and detailed explanations and photos of the recipe steps.

The recipes in Yotam Ottolenghi's book, *Simple*, are designed to be simple enough to prepare a delicious and easy recipe for a busy weeknight. Many of the recipes have fewer than 10 ingredients and can be made in less than 30 minutes. These recipes take a less complicated approach and are perfect for someone learning to develop their food skills.



Alamy Stock Photo/WENN Rights Ltd

Yotam Ottolenghi's recipe book, *Simple*, is suitable for people developing their food skills.

Opportunities and pathways for the home cook

There are many examples of Australians with a passion for good food and great cooking skills who have turned their hobby into a career. Some of our gourmet cheese producers started with a small herd of cows or goats and made enough produce for farm gate sales. They now supply other sectors of the food industry. Farmers' markets are where many home cooks sell their specialty products, such as preserves and baked goods. All the competition cooking shows on television, such as *MasterChef* and *The Great Australian Bake Off,* are opportunities for home cooks to make the big time in the food world. People such as Poh Ling Yeow, Adam Liaw, Julie Goodwin and Marion Gadsby were all *MasterChef* contestants who started or developed their food careers as a result of their television exposure. These shows opened doors for them: for a recipe book deal, an appearance as a guest on a food and travel show, the support to develop a product line or a regular opportunity to write as a food critic.

Following are two examples of passionate home cooks who demonstrate how they harnessed the food skills learnt at home and developed them into a career.

BISTRO MORGAN BAKEHOUSE

Morgan Hipworth, owner of Bistro Morgan Bakehouse, developed a passion for food and cooking from a very early age. His journey into baking began in 2009 through his love of the television program, *MasterChef*. As a nine-year-old, Morgan cooked meals for his family on the weekend and had them rate his dishes, as though he was a contestant on the much-loved program. In 2010 Morgan auditioned for *Junior MasterChef*, and although he was unsuccessful, he was more determined than ever to succeed in following his dream to become a chef.



Bistro Morgan

Morgan Hipworth developed his passion for baking into a successful business.

Morgan's journey began as a Year 9 student, when a Melbourne café asked him to supply them with some of his favourite cakes and slices. Each week the café would place an order and Morgan would come home from school every Friday afternoon and spend the weekend baking in the family kitchen.

The first doughnut Morgan made was a special request for Valentine's Day. Since then, his doughnuts have become his signature product. While still in Years 9 and 10, Morgan produced 15 new doughnut flavours and supplied many Melbourne cafés with between 500 and 800 doughnuts. In 2016 Morgan opened a pop-up store to test the market and determine the viability of opening up his own bakery. His pop-up store was only open for eight days but, with the help of his 100 000 Instagram followers and publicity received through morning breakfast television, he produced and sold an amazing 10 000 doughnuts!

Towards the end of 2016, while still in Year 10, Morgan secured a permanent lease on the site. The new business became Bistro Morgan Bakehouse and included a range of other baked goods. During the next 18 months Morgan ran the business and managed to successfully complete Years 11 and 12.

In 2020, Morgan was a guest judge on *Junior MasterChef* and also hosted a mini-series on the television channel Nick Jr. In 2021 he released a cookbook, *Made By Morgan*, sharing many of his famous recipes. Along his journey he has inspired many young people through his posts on Instagram and his quick cooking videos on TikTok, giving other young people the confidence to reach for their dreams and to enjoy food and cooking.



Elisa Watson

Morgan's doughnuts are a favourite with customers.

ZELDA BAKERY

Maaryasha Werdiger, the owner of Zelda Bakery in the Melbourne suburb of Ripponlea, began her professional life as a physiotherapist. However, in 2011 while living in Jerusalem, she fell in love with baking sourdough bread. When she returned to Melbourne, Maaryasha developed her love of sourdough bread into baking a variety of other delicious products, including babka, challah buns and rugelach.



Fairfax Syndication/Simon Schluter

Maaryasha Werdiger, the owner of Zelda Bakery

Maaryasha started baking her kosher sourdough breads and pastries in the kitchen and garage of her home. Friends, neighbours and members of the local Jewish community would find out when and where the next batch of delicious sourdough goodies would be available, either by word-of-mouth or Instagram. The demand for her kosher baked products became so great that in 2021 she had to move her sourdough micro-bakery from her home to new premises not far away in Ripponlea.

All of her sourdough products are kosher, which means that she only uses certified kosher ingredients and follows strict kosher traditions by keeping dairy and non-dairy ingredients separated at all times, and each batch is blessed, following a traditional blessing. Maaryasha bakes her bread using a natural sourdough starter, organic flours and a a stone oven. Recently she has teamed with Mount Zero Olives and includes their olives, salt and spices in many of her products.



Zelda Bakery

Zelda Bakery sells a wide variety of kosher breads and pastries.

Understanding the Text

11 Outline the economic benefits of developing individual food skills.
12 Create a mind map of the social benefits of developing food skills and applying these in the home.
13 How can preparing food at home improve the emotional wellbeing of individuals?
14 Outline two ways in which developing food skills and applying them at home can enhance physical health.
15 Write a short paragraph to explain the role of parents and grandparents in influencing the development of food skills.
16 Explain how a person's culture can influence the development of an individual's food skills.
17 Outline two ways in which access to educational opportunities can develop food skills.
18 How did access to online classes during the COVID-19 pandemic help many people develop their food skills?
19 Explain why local libraries are an excellent resource for people wanting to improve the meals they cook for their family and friends.
20 Select a home cook who has turned their passion for food into a career. Describe the pathway they took to reach their goal.



Answers
Understanding the Text

Chapter Test
Chapter review

THINKING SKILLS

1 Research shows that more than 30 per cent of people who dine out at a café or restaurant report having a dietary restriction or allergy.
   - Complete a quick survey of your class to determine the percentage of people who have a dietary restriction or food allergy.
   - Do the results from your class survey support the research above? Discuss reasons for any similarities or differences between your class survey and the research data.

2 Outline the evening meal you had last night, then discuss if it would be suitable for a vegan. If not, explain how it could be modified so that it has good sensory properties and is within vegan guidelines.
3 If you had a guest who had a gluten intolerance, consider how you would be able to modify the menu and the changes you would need to make.

Coconut fish fingers with Thai carrot and tomato salad

Fish fingers are a great favourite for a quick and easy family meal. Making your own at home is quite simple, and adding toasted coconut flakes to the breadcrumb coating gives them a delicious crunch. Fish is an excellent source of protein and omega-3 fatty acids, and baking the fish fingers in the oven rather than frying them is a healthier option. Serve the coconut fish fingers with Thai carrot and tomato salad for a delicious Asian-style meal.

COCONUT FISH FINGERS

200 grams firm white fish
2 tablespoons coconut cream
1 tablespoon lemon juice
pinch salt
½ cup moist coconut flakes
½ cup panko crumbs
½ teaspoon chilli flakes
1 egg
olive oil spray

THAI CARROT AND TOMATO SALAD

Cos lettuce leaves
1 medium carrot, grated
1 firm Roma tomato, deseeded and diced
1 tablespoon coriander
2 tablespoons peanuts
2 tablespoons dried shrimps

DRESSING

2 small cloves garlic, crushed
2 tablespoons lemon juice
1 tablespoon fish sauce
2 teaspoons brown sugar
½ green chilli, deseeded and finely diced
2 tablespoons peanuts, chopped

METHOD

Coconut fish fingers

1. Cut the fish into fingers approximately 3 x 10 centimetres in size.
2. Combine the coconut cream, lemon juice and a pinch of salt in a bowl and stir to combine.
3. Add the fish to the coconut cream mixture. Cover and place in the refrigerator to marinate for 20 minutes.
4. Preheat the oven to 180 °C. Line two oven trays with baking paper.
5. Spread the moist coconut flakes evenly on one oven tray and toast in the oven for 4 minutes until beginning to brown. Remove from the oven and stir lightly so that the coconut on the outside of the tray is brought to the centre. Return the coconut to the oven for a further 3 minutes. Watch carefully so that it doesn't get too brown.
6. Remove the coconut from the oven and allow to cool. Mix with the panko crumbs and chilli flakes, and place on a plate lined with a paper towel ready for crumbing.
7. Whisk the egg thoroughly.
8. Take the fish from the coconut cream marinade, removing as much marinade as possible.
9. Dip each fish finger into the beaten egg and then into the coconut flake and panko crumb mixture. Press the crumbs firmly onto the fish with a spatula. Place on a baking tray lined with baking paper. Refrigerate for 10 minutes.
10. Lightly spray the fish fingers with olive oil spray. Bake in the preheated oven for 8 minutes.
11. Remove from the oven and allow to stand for 2 minutes before serving with the Thai carrot and tomato salad.

Thai carrot and tomato salad and dressing

1. To make the dressing, combine the garlic, lemon, fish sauce, brown sugar and finely diced green chilli together in a small jar. Add the chopped peanuts. Set aside.
2. Wash and dry the cos lettuce and arrange on a serving plate.

3 Combine the grated carrot, chopped tomato and coriander in a bowl. Shake the jar containing the dressing vigorously, pour over the vegetables and stir through to combine.
4 Top with the peanuts and dried shrimp.
5 Serve as an accompaniment to the coconut fish fingers.

SERVES 2

EVALUATION

1 Describe the sensory properties of the coconut fish fingers and Thai carrot and tomato salad – appearance, aroma, flavour and texture – using descriptive language.
2 Classify the ingredients for the coconut fish fingers with Thai carrot and tomato salad on a diagram of the Australian Guide to Healthy Eating.
3 Using your data from question 2, explain how well this meal meets the recommendations of this food selection model.
4 Describe how the process of denaturation changes the properties of the fish protein during baking.
5 Identify the steps in the recipe that children could assist in preparing in order to develop their food skills.



Mark Fergus Photography

Feta, broccoli and carrot pie

Feta cheese (also often spelled 'fetta') and filo pastry are both traditional ingredients used in Greek cuisine. Greek migrants brought these and other traditional Greek ingredients to Australia following World War II. Feta cheese and filo pastry are key to many traditional Greek dishes including spanakopita – a spinach, feta and filo pie. Although meat is not used, this recipe for feta, broccoli and carrot pie uses a range of ingredients to provide an adequate source of protein. The feta cheese and eggs are both good sources of complete protein, while the filo pastry and pine nuts contain several incomplete proteins, which complement each other to produce an additional source of complete protein.

250 grams broccoli
½ carrot
2 spring onions
125 grams firm feta
2 tablespoons pine nuts
2 teaspoons olive oil
2 eggs, beaten
½ cup fresh breadcrumbs
black pepper
4 sheets filo pastry
1 tablespoon olive oil

METHOD

1. Preheat oven to 200 °C.
2. Cut the broccoli into small florets. Steam or microwave the broccoli for 2–3 minutes until just tender. Do not overcook.
3. Grate the carrot and finely chop the spring onions.
4. Grate the feta.
5. Sauté the pine nuts in the olive oil in a frying pan for 3–4 minutes until golden brown. Remove from the frying pan and drain on paper towel.
6. Add the spring onion to the frying pan and cook for 1 minute. Add the grated carrot and cook for a further 2–3 minutes until wilted. Cool slightly.
7. Combine the broccoli, spring onions, carrot, pine nuts, beaten eggs, breadcrumbs, grated feta and pepper in a bowl. Mix well.
8. Brush 1 sheet of filo with the olive oil. Place another sheet crossways on top. Brush with oil. Repeat the layering of the pastry with 2 more sheets of filo.
9. Lift the pastry into a 20-centimetre foil container or a 20-centimetre round or square cake tin. Spoon the feta and broccoli filling on top of the pastry. Fold the extra pastry in over the top to form a lid. Brush with oil.
10. Bake the pie at 200 °C for 10 minutes. Reduce the heat to 180 °C and continue to cook for a further 20–30 minutes or until the mixture has set and is cooked through.

SERVES 2–3

EVALUATION

1 Describe the sensory properties of the feta, broccoli and carrot pie – appearance, aroma, flavour and texture – using descriptive language.
2 Classify the ingredients for the feta, broccoli and carrot pie on a diagram of the Australian Guide to Healthy Eating.
3 Using your data from question 2, recommend other foods that could be served with the pie to create a healthy meal for children and meet the recommendations of this food selection model. Justify your recommendations.
4 Identify the function of the eggs in this recipe and describe how their properties change during baking.
5 Explain why filo pastry is considered to be a healthier option than the types of pastry used for meat pies and sausage rolls.



Mark Fergus Photography

Double chocolate cake

This recipe for double chocolate cake uses two products produced from the cocoa plant: dark chocolate and cocoa powder. Dark chocolate is made of cocoa solids, sugar and cocoa butter. The percentage of cocoa affects the flavour of the chocolate; the higher the percentage of cocoa, the more bitter the flavour of the chocolate will be. Cocoa powder is the dried solids of the bean after the cocoa butter has been removed. As this cake contains no dairy products or eggs, it is suitable for someone who is vegan or following a plant-based diet.

CHOCOLATE CAKE

300 millilitres water

1⅓ cups (200 grams) plain flour

1¼ teaspoons bicarbonate of soda

pinch of salt

1½ teaspoons instant coffee

65 grams cocoa

1⅓ cups (265 grams) soft brown sugar, firmly packed

80 millilitres sunflower oil

1 teaspoon cider vinegar or white wine vinegar

CHOCOLATE ICING

2 tablespoons shredded coconut

40 millilitres cold water

50 grams coconut oil

2½ tablespoons (35 grams) soft brown sugar

1 teaspoon instant coffee

1 tablespoon cocoa

50 grams dark chocolate (70 per cent cocoa solids), roughly chopped

METHOD

Chocolate cake

1. Preheat the oven to 160 °C.
2. Line the base of a 20-centimetre ring tin with baking paper then spray with vegetable oil spray. Dust with plain flour and tap out any excess. Set aside. Alternatively, this cake can be cooked in a kugelhopf tin.
3. Bring 300 millilitres of water to the boil in a small saucepan – keep the lid on to avoid any evaporation. Turn off the heat and set aside.
4. In a larger bowl, sift the flour, bicarbonate of soda, salt, instant coffee and cocoa. Stir well to combine.
5. In a separate small bowl, combine the sugar, boiled water, sunflower oil and vinegar. Stir until sugar is dissolved.
6. Pour the wet ingredients into the dry ingredients and stir to combine. Beat for 1–2 minutes with a hand whisk or hand-held electric beater to create a smooth batter.
7. Pour the batter into the prepared ring tin. Bake in the preheated oven for 25–30 minutes until firm to touch and a skewer comes out clean and dry.
8. Allow the cake to cool in the tin for 10 minutes, then turn onto a wire cooling rack.

Chocolate icing

1. Cover a baking tray with baking paper. Place the shredded coconut on the prepared tray and bake at 160 °C for 8 minutes. Remove from the oven and allow to cool.
2. Place the water, coconut oil, brown sugar, instant coffee powder and cocoa in a small saucepan and bring to the boil. Simmer for 1 minute or until the sugar has dissolved.
3. Turn off the heat and quickly add the chopped chocolate. Stir thoroughly until the icing is dark, smooth and glossy. Stir frequently while the mixture cools and thickens to prevent a crust forming on the surface.
4. Once the cake has cooled, pour the icing over the top of the cake, allowing it to drip down the sides a little. Sprinkle with some of the toasted coconut.

Note: It is best to leave the cake to stand for 30 minutes for the icing to set before slicing – if you can resist the temptation!

EVALUATION

1 Describe the sensory properties of the double chocolate cake – appearance, aroma, flavour and texture – using descriptive language.
2 Identify the acidic and alkaline ingredients in the cake batter that contribute to the chemical leaving of the cake.
3 Explain why it is important to prepare the baking tin by lining and coating it before processing the ingredients for the cake.
4 Discuss why pure cocoa and not a cocoa mix such as drinking chocolate is critical for the success of this recipe.
5 Discuss why people who consume a plant-based diet often miss out on eating a slice of cake for a treat.



Mark Fergus Photography

GLOSSARY

Aboriginal Victorians Indigenous peoples who inhabited Victoria prior to European settlement. Also referred to as First Nations peoples

aeration the process of incorporating air into food products to increase the volume and create a light, airy texture

agriculture the practice of cultivating land, growing crops and feeding, breeding and raising livestock

agriculture food systems the establishment of early permanent settlements close to reliable water supplies, to plant and harvest crops, and to domesticate or tame animals such as dogs, goats and sheep

agricultural sectors in Australia include grains, oilseeds, sugar, dairy, livestock and fisheries production

Australia New Zealand Food Standards Code a code developed by FSANZ covering locally grown and processed food that prescribes exactly what every food must contain or may contain; nothing else is permitted in that food

baking the cooking of food in an oven without the addition of fat or oil

BCE the abbreviation of Before Common Era; that is, before the year 0

blanching a method of partly cooking food by plunging it briefly into boiling water

boiling cooking food in water at 100 °C

caramelisation the process that sugars undergo when heated to high temperatures to develop a golden-brown colour

carbon footprint measures all of the carbon dioxide produced to get food from paddock to plate, including growing, processing, manufacturing, packaging and selling the food

cattle feedlot a managed system to produce beef of consistent quality within a specific time frame

CE the abbreviation of Common Era or Current Era, the calendar era that we use in Australia

chalau a simple dish of fluffy white rice that is a staple food in Afghanistan

chinampas the plant beds built by the Mayan farmers on floating plots of land

climate change a change in the pattern of weather, and related changes in oceans, land surfaces and ice sheets, occurring over time scales of decades or longer

coagulation a form of denaturation that occurs when there is a permanent change in the protein from a liquid into a thick mass as a result of heat or the addition of acids

conduction occurs when heat is transferred from one molecule to another by collision or movement

considerations more flexible than constraints and may not direct the outcome of the product in the same way as a constraint

constraints aspects over which the designer has little control, but which can restrict or create problems in the development of the product

contemporary food the present period of time; a term often used to describe current food practices in Australia

convection occurs when the molecules in liquids or gases move from a warmer area to a cooler one

cooking the application of heat to ingredients to cause physical and chemical changes

cuisine the style of food preparation and cooking that reflects the characteristics of a particular country or geographic region

cultivate to deliberately sow and tend a crop on nearby land

culture the shared or learnt patterns of behaviour or identity of a group of people

current food system a complex series of activities involving food's journey from the farm, its movement to food processors, then on to the food retailers and finally on to the consumer's plate at home or in a restaurant

denaturation the permanent structural change of the protein molecules in food

Department of Agriculture, Fisheries and Forestry operates at a national level and is responsible for the inspection of imported foods, food exports from Australia and border protection and quarantine

dextrinisation the process that occurs when a starch is exposed to dry heat; the starch is broken down to dextrin, resulting in a change in colour to golden-brown

domestication the process of using selective breeding to make wild plants and animals more useful to humans

electromagnetic radiation when electric currents cause electrons within food to move rapidly and generate heat that cooks the food, as occurs during microwaving and induction cooking

emulsification mixing two liquids that don't normally combine evenly; for example, water and oil

enzymes chemical substances that act as biological catalysts in plants, animals and micro-organisms; they bring about and speed up chemical reactions in foods without becoming involved in the reactions

Fertile Crescent a semi-circular or crescent shaped region of fertile land to the east of the Mediterranean Sea that forms a 'bridge' between Africa and Eurasia

fertilisers chemical compounds applied to soil to promote plant growth

filo pastry a pastry made by layering many sheets of paper-thin dough with butter; it is commonly used in Greek cuisine

fire-stick farming regularly burning vegetation to facilitate hunting and to change the plant and animal species in an area

First Nations peoples Aboriginal and Torres Strait Islander Australians. Also referred to as Indigenous peoples

flavour house a company that produces flavour compounds that can be used by a food-processing company to improve or enhance the natural flavours in food

food additives chemicals added to foods to keep them fresh or to enhance their colour, flavour, texture or processing properties

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

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

food gatekeepers the members of the household who make decisions about the food that is purchased and consumed

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

food manufacturers companies that process foods

food manufacturing turning primary processed foods into other food products usually by combining them with other ingredients

food miles the term used to estimate the distance food travels from its point of production through to consumption; that is, from paddock to plate

food processing the transformation of raw food or ingredients into new food products by physical or chemical means

food product recall an action taken to remove from distribution, sale and consumption, food that may pose a health and safety risk to consumers

food security ensures that the food supply is available, accessible, acceptable, adequate and stable for all people at all times

food service sector cafés, fast-food outlets and restaurants where consumers eat, as well as the catering institutions that provide food for schools, hospitals and nursing homes

food sovereignty aims to remove the control of the food system away from large corporations and back to the farmers and the individuals who produce and consume food, ensuring that food can be produced ethically and sustainably

Food Standards Australia New Zealand (FSANZ) a partnership between the Commonwealth (federal), New Zealand, state and territory governments to develop and implement uniform food standards

food system the path that food travels from 'paddock to plate'. It is a complex series of activities involving food's journey from the farm, its

movement to food processors, then on to the food retailers and finally on to the consumer's plate at home or in a restaurant

frying cooking food by total or part immersion in fat or oil that is heated to temperatures between 150 °C and 220 °C

functional foods foods that provide a health benefit beyond basic nutrition

fusion foods foods that are a combination of different cultural cuisines in a single eating experience

gelatinisation the process that occurs when starch granules absorb liquid in the presence of heat and thicken the liquid, forming a gel

Gen Z people born between 1995 and 2021

global food system the production of food and its processing and distribution throughout the world

globalisation a process by which the world has become interconnected as a result of increased trade and cultural exchange

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

Green Revolution a large increase in crop production in developing countries achieved by the use of artificial fertilisers and high-yield crop varieties

grilling a fast, dry method of cooking that uses intense heat radiated by an electrical element, a gas flame, glowing charcoal or an open wood fire

Hazard Analysis Critical Control Points (HACCP) a food safety system that identifies potential food hazards and their control points at all stages in the production of food

horticulture the cultivation and management of a garden or orchard

hunter-gatherer the term used to describe humans who obtain their food from nature, hunting animals and gathering wild plants

industrialisation a process in which a country or society is transformed from a primary agricultural society to one based on the manufacturing of good and services

irrigation the artificial application of water to the land to enable agricultural crops to grow

koulourakia a Greek twisted butter biscuit traditionally served at Easter

loukomades delicate, golden balls of deep-fried dough, drizzled with honey and cinnamon served as a dessert in Greece

Maillard reaction when a protein and sugar or starch are present in the same mixture and dry heat is applied during baking, creating a golden-brown crust and a wide range of aromas

mandatory warning statements prescribed statements that must be included on food labels using the exact words listed in the standard

meal solutions ingredients or preprepared products that can be combined and cooked quickly to form a meal

mixed farming grazing sheep and cattle or raising of pigs, as well as broadacre farming of cereal grains

monopsony a marketing board that consists of one body or organisation that controls the market by selling to many buyers

mouthfeel the way the food feels against the skin on the inside of the mouth

multinational corporations companies that operate and do business in more than one country, with headquarters in their home country

native foods foods that are native to Australia; they include animals, birds, fish, seafood, reptiles, insects, fruits, flowers, vegetables, mushrooms and herbs and spices

nitrogen fixing the use of nitrogen-fixing bacteria in certain plants to change nitrogen gas from the atmosphere into solid nitrogen usable by plants

nuoc cham a Vietnamese dipping sauce

organic farming an environmentally sustainable food production system, as it uses farming practices that produce crops and animals without the use of artificial chemicals, instead using natural systems

organic food system a food production system that produces food without the use of pesticides, herbicides or chemical fertilisers

organoleptic the sensory properties of food such as appearance, aroma, flavour and texture

physiological considerations the ability of food to provide all the nutrients necessary for the body to function normally

poaching a method of cooking delicate foods in liquid at a temperature just below simmering point (85 °C)

private label products products that a supermarket sells under its own company name

proprietary products products that a company makes under its own brand

prototype a sample product or trial model of the product idea that was outlined in the design brief

qualitative or sensory analysis sensory tests that are used to rate and/or rank the organoleptic or sensory properties of food such as appearance, aroma, flavour and texture

quantitative tests scientific techniques that can be used to measure physical features such as size, height, weight, volume, texture, colour, viscosity, shelf life, gel and nutrient content

Ramadan the Muslim month of prayer and fasting, when Muslims fast each day from sunrise to sunset

resources factors that affect meal planning and preparation; they include the ability to manage time efficiently and skills in managing the family food budget

roasting the cooking of food in an oven using some fat or oil

sedentary hunter-gatherer communities groups of people who settled in one place, near a rich food resource

spanakopita cheese and spinach triangles made with filo pastry; they are a popular Greek dish usually served as an appetiser or first course

specifications the constraints and considerations that will impact on the product development

spices seeds, flowers, bark, roots, berries and fruit that are used as flavouring ingredients in food, medicines, perfume and incense

steaming the cooking of food in the steam from boiling water

stewing a long, slow method of simmering food in a small amount of liquid

subculture a group of people who have a view that is different from that held by the majority of the community

sugar produced from both sugar cane and sugar beet

swidden farming an agricultural technique that involves slashing and burning the plants in a forest to create fields to grow crops

tzatziki a yoghurt, cucumber and garlic dip often used as an accompaniment to spicy Greek meat dishes

umami usually described as a savoury, meaty or 'moreish' flavour; it is often described as the fifth taste

vegans people who do not eat or use animal products

vegetarian diet consists of grains, pulses, nuts, seeds, vegetables and fruit; the diet does not include any meat, poultry, game, fish, shellfish or by-products of slaughter

Vietnamese 'boat people' people who fled Vietnam by boat, seeking asylum in other countries

Vietnamese herbs and spices lemongrass, Vietnamese mint, Saigon cinnamon, bird's-eye chilli and kaffir lime leaves

wheat, rice and corn (maize) important cereal crops grown in various regions throughout the world

wild einkorn and emmer ancient varieties of wheat

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