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Food for VCE

Food Studies Units 1 & 2

Sally Lasslett • Chrissy Collins
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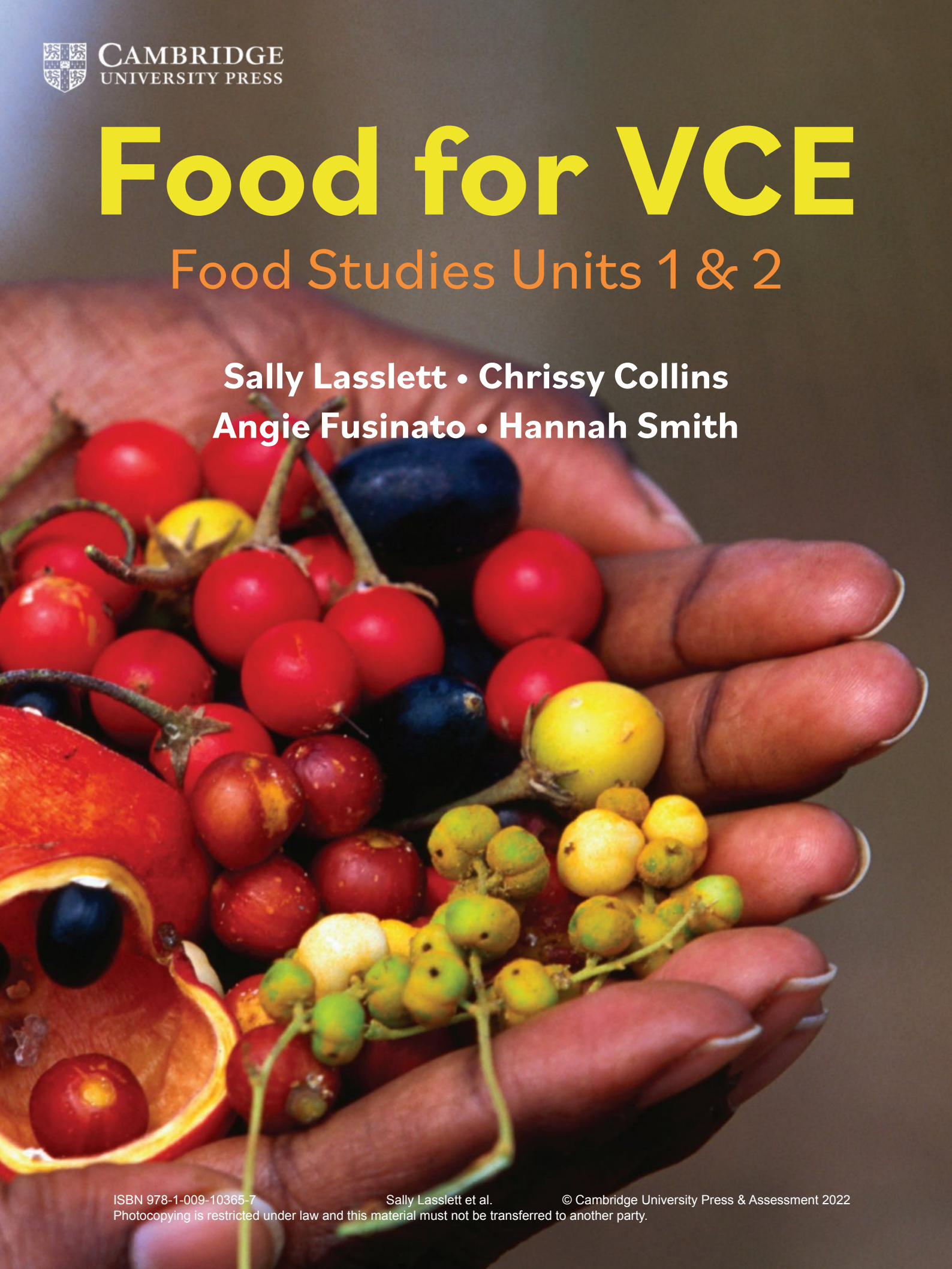

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Please be aware that this publication may contain images of Aboriginal and Torres Strait Islander people who are now deceased. Several variations of Aboriginal and Torres Strait Islander terms and spellings may also appear; no disrespect is intended. Please note that the terms 'Indigenous Australians' and 'Aboriginal and Torres Strait Islander peoples' may be used interchangeably in this publication.

Cambridge University Press & Assessment acknowledges the Australian Aboriginal and Torres Strait Islander peoples of this nation. We acknowledge the traditional custodians of the lands on which our company is located and where we conduct our business. We pay our respects to ancestors and Elders, past and present. Cambridge University Press & Assessment is committed to honouring Australian Aboriginal and Torres Strait Islander peoples' unique cultural and spiritual relationships to the land, waters and seas and their rich contribution to society.

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Foreword

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

The authors of *Food for VCE Units 1 & 2* understand the importance of practical and applied learning. We have developed a textbook that is hands-on and practical, and allows for important discussions of key issues. The richly illustrated, full-colour text seeks to ensure that you are interested by the subject content and will want to extend your food knowledge and skills, and also explore further concepts in a self-directed manner. Students will develop practical food skills, be informed food consumers and identify factors enabling them to acquire and apply these skills.

The student textbook is supported by an Interactive Textbook featuring additional resources to help you to apply and understand the knowledge and skills developed throughout Units 1 & 2.

We hope this textbook excites in you a passion for all things food, allowing you to progress to Food Studies Units 3 & 4 and then explore further training and employment opportunities in the fields of home economics, food technology, food manufacturing and hospitality.

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List of practical activities and recipes

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Chapter 8: Maintaining a safe food supply

Chapter 9: Considerations and influences in food planning

Chapter 10: Developing food skills for life

Chapter 11: Cooking food

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How to use this resource

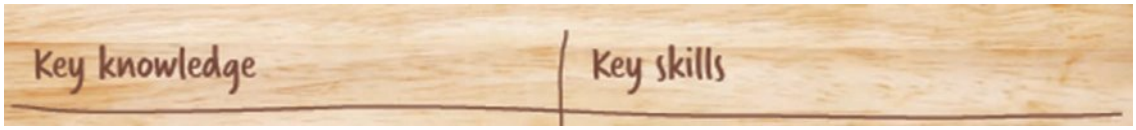
Structure

This textbook *Food for VCE: Food Studies Units 1 & 2* has been designed to closely follow the 2023 VCE Food Studies Study Design and support your learning in a variety of ways.

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

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

Chapter features



Key knowledge and Key skills – each chapter opens by stating the learning objectives, taken directly from the Study Design.

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

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

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

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

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

Activities

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

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

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

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

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

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

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

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

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

Chapter review

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

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

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

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

At the end of each Area of Study, you will find an additional exam-style **Extended response question** including the Let's unpack it feature.

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

Digital resources

For a list of links to all the websites referred to in this book, go to: https://www.cambridge.edu.au/foodforvce12

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

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

The Teacher Resource Package includes:

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

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Common Australian cooking measurements

Cups

30 ml	⅛ cup
60 ml	¼ cup
80 ml	⅓ cup
125 ml	½ cup
180 ml	¾ cup
250 ml	1 cup
310 ml	1¼ cup
375 ml	1½ cup
430 ml	1¾ cups
500 ml	2 cups
625 ml	2½ cups
750 ml	3 cups
1 L	4 cups
1.25 L	5 cups
1.5 L	6 cups
2 L	8 cups
2.5 L	10 cups

Spoons

1.25 ml	¼ teaspoon
2.5 ml	½ teaspoon
5 ml	1 teaspoon
10 ml	2 teaspoons
20 ml	1 tablespoon (4 teaspoons)
30 ml	1½ tablespoons (6 teaspoons)
40 ml	2 tablespoons (8 teaspoons)
50 ml	2½ tablespoons (10 teaspoons)
60 ml	3 tablespoons (12 teaspoons)

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About the authors

Sally Lasslett

Sally has been an educational leader in a variety of school settings and roles for over 25 years. Sally is an advocate for successful pathways and transitions for disengaged young people. She is a leading principal in the independent flexible senior school setting and has been innovative in ensuring that essential wellbeing supports are provided in this setting.

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

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

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

Chrissy Collins

Chrissy is an experienced Health and Human Development and Food Studies teacher. She has been an author for Cambridge University Press since 2007, developing junior and senior Health and Human Development and Food Studies textbooks.

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

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

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

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Angie Fusinato

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

Angie has had various roles with the VCAA, including exam preparation and marking, and as chief examination assessor, and has used her extensive knowledge of contemporary food patterns and trends to help shape the study design.

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

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

Hannah Smith

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

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

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

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How to unpack exam questions

This guide will help you with the practice exam questions in each chapter. You will need to refer to this guide when looking at the 'Extended response question' feature at the end of each Area of Study.

A Annotate the command word

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

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

B Brackets around different parts of the question

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

C Count the marks

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

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

D Determine key words to use

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

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

E Evidence

If required

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

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

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Exam question

Identify and describe a chemical change that occurs when bread is toasted. 3 marks

Unpack the question using the guide on page xvi.

(Identify and describe) a (chemical change that occurs when bread is toasted.) 3 marks

Command words
Identify: state the chemical change
Describe: provide characteristics of the chemical change

Key words and concepts:
Chemical change:
- Dextrinisation

Context:
- Toasting the bread

Brackets around different parts of the question:
- Identify the chemical change
- Describe the change

Count the marks:
3 marks
1 = identify
2 = describe

Sample response

Dextrinisation: The starch in the bread is exposed to the dry heat of the toaster, the starch breaks down to dextrin, resulting in browning.

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Command terms

Understanding the meaning of the command term when answering a question in your Food Studies program will help you to answer exactly what you're being asked. This glossary is designed to be used as a reference when answering practice questions. Use this glossary to help you to consider what you are being asked to do in the question and help to formulate how you will respond.

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

Source: VCAA, Glossary of Command Terms

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Cross-study specifications

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

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

Aboriginal and Torres Strait Islander knowledge, culture and history

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

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

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

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

Food citizenship

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

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

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

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

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

Food security and food sovereignty

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

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

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

Food security has five dimensions:

- Availability – sufficient supply of food for all people at all times
- Accessibility – physical and economic access to food at all times, which means equity of access to food
- Acceptability – access to culturally acceptable food which is produced and obtained in ways that do not compromise people's dignity, self-respect or human rights
- Adequacy – access to food that is nutritious, safe and produced in environmentally sustainable ways
- Stability – reliability of food supply.

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

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

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

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

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

Food systems

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

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

Healthy eating

Eat for Health Program

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

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

Innovations and technologies

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

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

Issues in food

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

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

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

Sustainability

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

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

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

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

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

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The nutritional rationale underpinning the Eat for Health Program

The Eat for Health Program groups foods primarily on the basis of their type and nutrient contribution. The main distinguishing nutrients for each of the Five Food Groups are shown in Table 001, although foods within each group also make significant contributions of other dietary components. Note that the grouping system is a simplification for educational purposes and the foods within each group can vary.

The model on which the Five Food Groups is based assumes that foods within each grouping are eaten in types not too dissimilar to the average intakes in Australia. The amounts recommended for consumption were determined using the Food Modelling System and are based on the nutrient requirements for each age and gender group of different height and activity levels in the population.

Table 001: Nutritional characteristics of the Five Food Groups

Food group name	Grain (cereal) foods, mostly wholegrain and/or high-cereal fibre varieties	Vegetables and legumes/ beans	Fruit	Milk, yoghurt, cheese and/or alternatives, mostly reduced fat	Lean meat and poultry, fish, eggs, tofu, nuts and seeds, legumes/ beans
Main distinguishing nutrients	Carbohydrate Protein Iron Dietary fibre Thiamin Folate Iodine	Beta-carotene and other carotenoids Vitamin C Folate Dietary fibre	Vitamin C Dietary fibre	Calcium Protein Riboflavin Vitamin B_{12}	Protein Iron Zinc Vitamin B_{12} (animal foods only) Long-chain omega 3 fatty acids
Other significant nutrients*	Energy Magnesium Zinc Riboflavin Niacin Vitamin E	Carbohydrate (potato, sweet potato, sweet corn, legumes) Magnesium Iron Potassium	Carbohydrate Folate Beta-carotene Potassium	Energy Fat Carbohydrate Magnesium Zinc Potassium	Dietary fibre (plant foods only) Energy Essential fatty acids Niacin Vitamin E (seeds, nuts)

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

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Messages and visuals used in the Eat for Health Program

Enjoying healthy choices

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

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

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

1. Eating from a variety of food groups on average every day, in the proportions recommended, is likely to result in a diet containing sufficient amounts of all nutrients essential for health. This will also decrease the risk of consuming too much of any particular food component and minimise intake of foods that should be eaten less often. It is not necessary to eat from each food group at every meal.
2. The foods in each food group vary in the amount of particular nutrients and other beneficial components they provide, so achieving nutritional adequacy also depends on eating a variety of food from within each group. For example, in the vegetables and legumes group, orange vegetables such as carrots and pumpkin contain significantly more beta carotene than potatoes. Similarly, kangaroo, beef, lamb, mussels and oysters are a better source of iron than most of the other foods in the meat, fish, poultry, eggs, tofu, nuts and seeds, legumes/beans group. Nuts and seeds have more vitamin E and several other nutrients compared with animal foods in this same group. By selecting a variety of foods each day, over the week and at different times of the year, there is a greater likelihood of obtaining sufficient quantities of all nutrients.
3. Eating a variety of foods of different biological origin is also believed to be beneficial to health in many ways:
   - Dietary fibre is a constituent of plant foods that contributes to health – for example, dietary fibre from oats or barley may be beneficial in causing a modest reduction in blood cholesterol levels whereas dietary fibre from wheat may assist bowel function.
   - Eating cruciferous vegetables such as broccoli, cabbage, cauliflower, brussels sprouts and bok choy may be associated with protection against some cancers.
   - Some foods containing saturated fat may increase blood cholesterol levels, with high levels being a risk factor for cardiovascular disease. Choosing foods from a variety of biological sources (both animal and vegetable) helps ensure a variety of fats in the diet and a balance of the different types of fats.

What about 'healthy' fats such as unsaturated spreads and oils?

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

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

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What are 'discretionary choices'?

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

Where does water fit in?

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

Proportion of the Five Food Groups in the diet

The foods that form the basis of a healthy diet are shown in the *Australian Guide to Healthy Eating*, where the size of each segment of the circle is a visual representation of the recommended proportion of the diet from each food group, based on the average recommended daily serves for men and women 19–50 years of age.

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

Foods illustrated for each of the Five Food Groups

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

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

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

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The importance of health and safety

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

Safety in the kitchen

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

Let's talk

Discuss why safety of each other must be considered at all times in the school kitchen.

Why is food safety essential when preparing food for yourself or for others?

Tools of the trade

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

Let's Talk

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

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

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

Protective clothing

Protective clothing and footwear are essential in the kitchen. Kitchen clothing, such as an apron, provides a protective layer for our bodies against hazards such as hot elements or food. Kitchen clothing is also important to protect our street clothing or school uniforms, and ensures that the food we are preparing does not become contaminated. Clothing worn in the kitchen should always be clean, and free of hanging elements such as neckties or straps, as they can pose a safety risk.

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Hygiene in the kitchen

A high standard of personal **hygiene** is important in the kitchen (Figure 001). It helps to prevent the spread of bacteria and micro-organisms, which can live and multiply both on food and on kitchen benches and equipment.

Washing your hands

Did you know that there are between two and ten million bacteria found between your fingertips and elbows, with the number of bacteria doubling after you use the toilet? Before preparing food, after going to the toilet and after handling uncooked meat, poultry and seafood, always be sure to rewash your hands.

Hygiene
The practice or principles of cleanliness in order to preserve health and prevent the spread of disease.

Figure 001: The principles of good personal hygiene

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Happy Birthday to you! Don't forget to sing 'Happy Birthday' twice as you go – this is the length of time it should take you to wash your hands properly.

How to Handwash?

WASH HANDS WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB

Duration of the entire procedure: 40–60 seconds

World Health Organization | Patient Safety — A World Alliance for Safer Health Care | SAVE LIVES Clean Your Hands

May 2009

Figure 002: Recommended handwashing technique
Source: World Health Organization

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Ensuring food is safe for consumption

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

- temperature
- time
- storage
- cross-contamination.

Let's Talk

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

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

Explain how food poisoning can occur. What can you do to avoid food spoilage and contamination when preparing food at school or at home?

Temperature

The danger zone

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

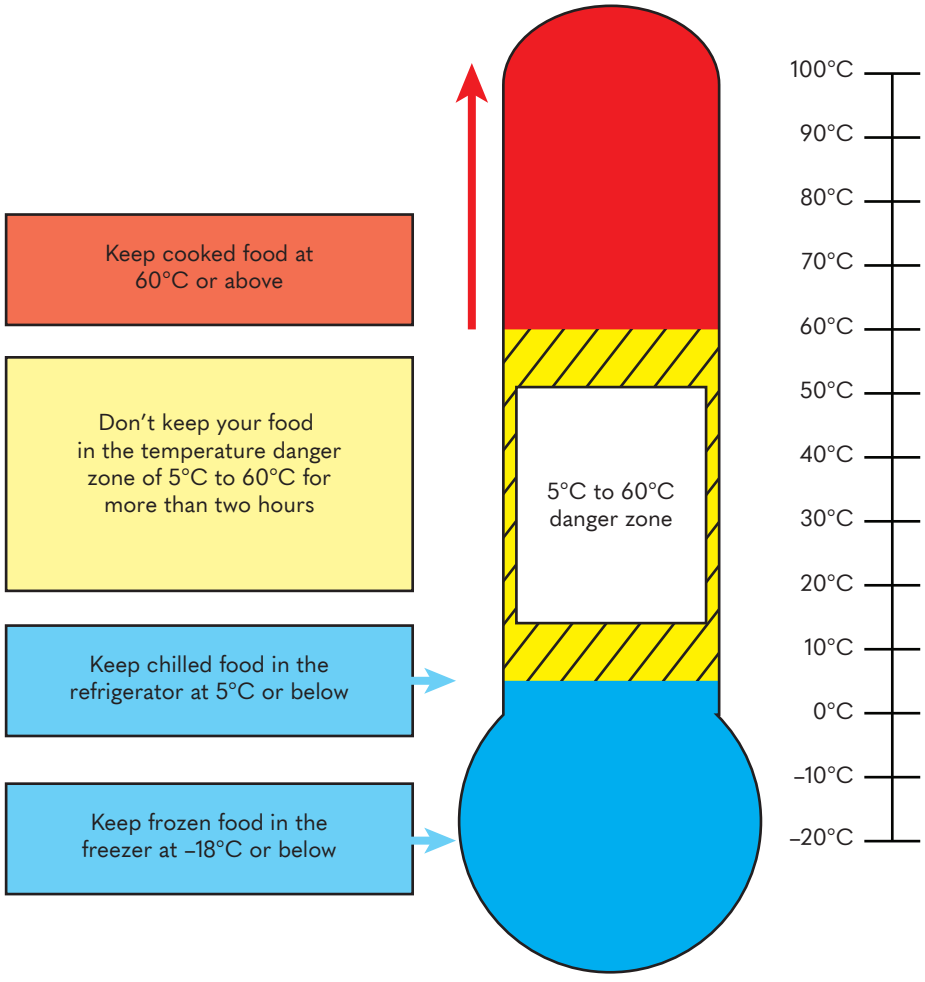

Figure 003: The range between 5°C and 60°C is known as the temperature danger zone.

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Time

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

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

Storage

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

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

Let's Talk

How can the coloured chopping boards below prevent cross-contamination?

Cross-contamination

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

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

Bacteria
Single-celled micro-organisms responsible for decay, fermentation and ultimately food spoilage.

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

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Sensory properties of food

Think about the smell of fresh baked bread, the visual appeal of a bunch of grapes, or the wonderful texture and feel in your mouth of a crispy and crunchy stick of celery.

Consider how your appetite or desire for food can be tricked by your senses. What happens when you head to Bunnings and smell the sausage sizzle cooking?

What about your feelings of fullness after a big meal when the fruit salad arrives? Our senses play a big part in the foods we choose to eat and how much we eat. How the food looks, smells, tastes and feels in our mouth impacts our food decisions.

The **sensory properties of food** are related to the five human senses: taste, smell, sight, hearing and touch. These are all important as we learn to like or dislike foods. Our perceptions of food are ruled by these senses, as is our appreciation of food.

Let's talk

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

- Ice-cream
- Roasted potatoes
- Corn chips
- Carrot
- A piece of steak cooking
- A meat pie
- Watermelon
- Bacon cooking in the pan

Appearance

This is related to the sight of the food. What does it look like? This is the dominant sense when it comes to food choice. If the food does not look appealing, then is it really a quality food item that you would want to eat?

Sensory properties of food
The characteristics of food that are detected by the five senses.

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

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Taste

There are five basic tastes, and each leaves a lasting impression when we eat a food item. If, for example, the orange does not taste like you thought it would, would you continue to eat it? Or would you think there might be something wrong with it? Often a food item does not taste right – this is because the sensory properties of that food have been altered, making it no longer appealing.

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

Figure 006: When eating foods, the tongue has taste buds that detect different types of tastes.

Umami
A Japanese word translated as 'pleasant savoury taste'. This is one of the five basic tastes.

Activity **001** (Inquiry): The basic tastes – sweet, salty, bitter, sour and umami

Develop a list of foods that are sweet, salty, bitter, sour and **umami**.
Copy and complete the table below:

Basic tastes	List of foods
Sweet	
Salty	
Bitter	
Sour	
Umami	

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Texture

Physically feeling the texture of the food is so important. Consider the first bite of a crunchy apple or a chewy, sticky lolly. What about the slippery feeling of yoghurt? When we bite, chew and swallow food, this all impacts our appreciation of or dislike for a food item. A well-planned meal will have a variety of textures, which is what makes the consumer interested and the dining experience pleasurable.

Figure 007: Think about the texture of these pistachio nuts.

Let's talk

Talk about the meals you have eaten that have a variety of textures. Why is texture so important?

Aroma

The smell, or aroma, of food can either make us want to eat it or turn us right off. Consider cauliflower – it tastes nutty, but it can be smelly when it is being cooked. The aroma of food has a significant role to play in our experience of eating. Simply smelling a food item can cause a mouth-watering response and create an appetite or feeling of hunger.

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

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

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Unit 1
Food origins

Area of Study 1: Food around the world

In this Area of Study, students explore the origins and cultural roles of food, from early civilisations through to today's industrialised and global world. Through an overview of the earliest food production regions and systems, students gain an understanding of the natural resources, climatic influences and social circumstances that have led to global variety in food commodities, cuisines and cultures, with a focus on one selected region other than Australia. Through practical activities, students explore the use of ingredients available today that were used in earlier cultures. These activities provide opportunities for students to extend and share their research into the world's earliest food-producing regions, and to demonstrate and reflect on adaptations of selected food from earlier cuisines.

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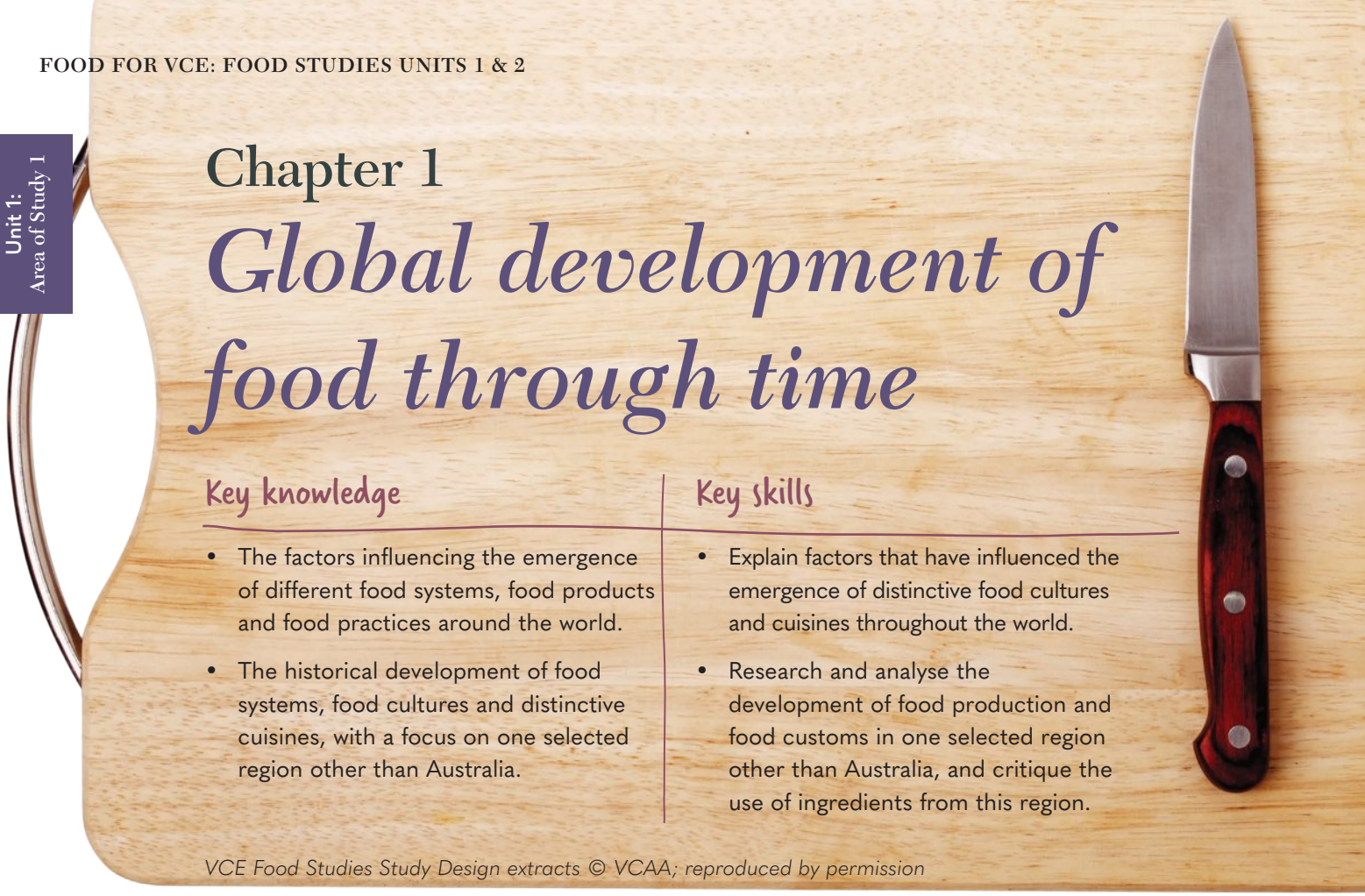
Chapter 1
Global development of food through time



Key knowledge

- The factors influencing the emergence of different food systems, food products and food practices around the world.
- The historical development of food systems, food cultures and distinctive cuisines, with a focus on one selected region other than Australia.

Key skills

- Explain factors that have influenced the emergence of distinctive food cultures and cuisines throughout the world.
- Research and analyse the development of food production and food customs in one selected region other than Australia, and critique the use of ingredients from this region.

To understand the food of today, we need to look through the lens of where food has come from. Reflecting on history, location and culture from countries around the world gives us great insight into current food systems, food products and food practices.

Get knowledge ready

1. **List components within food systems.**
2. **Describe a food practice from outside Australia.**
3. **Discuss how climate impacts food availability in different regions.**

What are food systems?

Food systems
All the elements and activities related to producing and consuming food, and their effects, including economic, health, and environmental outcomes (OECD).

Food and its origins have a rich history and tell the story of how people have survived and lived throughout time. **Food systems** – that is, anything involving the production, processing, transport and consumption of food – tell that story. They are intricate systems that, when looked at throughout history, show us how people lived, what jobs they had, what foods they survived on and what their way of life was like.

Food products

The development of food products has increased over time as global food systems have developed and populations have grown. Food products are those that are prepared for and used as food, and in most cases can be sold. Food producers are always trying to meet their customers' needs and wants when creating food products.

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

Video 1.1: Chapter Overview

Activity 1.1 (Inquiry): Your own food systems

1. Brainstorm and collate a range of images that represent food systems.
2. Reflect on your brainstorm and annotate comments about what you think, see and wonder.
3. Design your own image of food systems.
4. Describe your role in food systems.

Cuisine
Ingredients, techniques and dishes that represent a style of cooking associated with a particular culture.

Culture
Characteristics, knowledge, behaviours, attitudes and practices of a particular group of people.

Food practices around the world

The emergence of distinctive food **cultures** and **cuisines** can be studied by looking at the role food plays in our lives, our health and our identity. Food systems are different for each individual, community and country, and have changed throughout history. There are several factors that, over time, have influenced the different food systems, food products and food practices around the world.

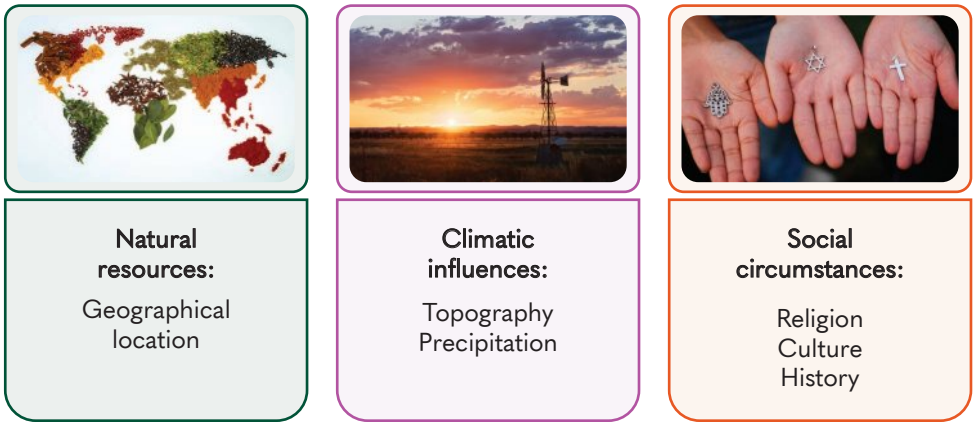

Figure 1.1: Various factors influence the emergence of different food systems, food products and food practices around the world.

Natural resources

Geographical location

A country could be geographically located anywhere above or below the equator, and this location determines the climate of the area. Growing and farming conditions need to suit particular climates, which is why certain foods are easier to grow in particular countries or regions.

The geographical location of a country also determines whether it is situated in a cool climate, a **temperate climate** or a hot climate. The terrain of the country will also impact the foods that are farmed, as the landscape of the country will determine the most suitable **crops** and livestock to be grown.

Temperate climate
Weather or climate free from extreme temperatures or conditions.

Crops
Plants or plant products that can be grown for food.

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Figure 1.2: A country could be geographically located anywhere above or below the equator, and this location determines the climate of the area.

Figure 1.3: The natural landscape of a country varies on the basis of where it is located – anything from arid desert to lush rice paddies.

Let's talk

Describe the natural landscape of your local area. What types of foods are grown there? Discuss whether this has changed over time and why this may be the case.

Climatic influences

Climate refers to the weather conditions predominant in an area in general or over a long period. Climate and weather play a large role in the types of foods we grow and consume, and shape food systems all over the world. Crops and animals will be more suited to a particular climate, which means climate plays a major role in the types of foods that come from a particular country. For example, tropical fruits such as mangos and pineapples will thrive in tropical regions.

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In recent times, food producers have been using advances in technology to create foods that are resistant to a range of climatic influences – for example, drought-tolerant rice crops. Climate change presents a challenge to food systems, with more frequent and severe droughts altering rainfall patterns and extreme weather events leading to agricultural land becoming marginal or unviable for farming.

Precipitation

Precipitation is another factor impacting the climate of a landscape. It forms part of the global water cycle, as does evaporation and condensation. Precipitation is any liquid or frozen water that forms in the atmosphere and falls back to the Earth. Examples include rain, sleet and snow. Precipitation and its different levels impact global food systems and have changed over time, impacting food culture and cuisine all over the world. Heavy rainfall causing flooding washes away fertile topsoil, impacting farming land and reducing availability in our food systems.

Topography

Topography, the forms and features of the land surface, impacts the types of foods we see grown in regions throughout the world and over time. Topography refers to mountains, valleys, rivers or craters on the surface of the land. The topography of the land influences the food culture and cuisine of a country as it impacts the types of foods that can be grown and farmed in that area.

Figure 1.4: Precipitation, such as rainfall, impacts the types of foods that are farmed and the crops that are grown all over the world.

Precipitation
Water that forms in the atmosphere and falls to the ground, such as rain, hail and snow.

Topography
The surface of the Earth's land mass. Examples of land surfaces include mountains, valleys, rivers, craters, flats and swamps.

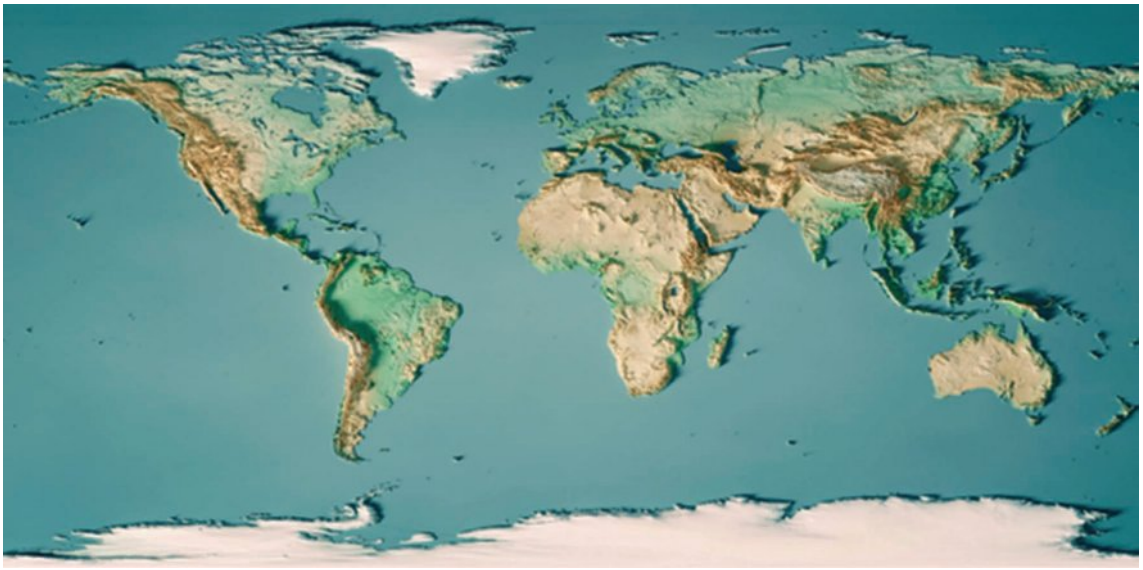

Figure 1.5: The topography of the land differs greatly around the globe, and influences the types of foods that can be grown and farmed.

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Social circumstances

Religion

Food plays an important role in religious observance and spiritual faith. Religions around the world share in practices with food that community members follow as a sign of respect and obedience to their religious commandments. Examples include Catholics who, in the period of Lent leading up to Easter, fast and do not eat meat on Ash Wednesday and Good Friday. These days mark the beginning and end of the Lenten Season (February to April). Members of the Jewish faith consume meats that must be killed and prepared in a kosher way and must be kosher certified. Muslims celebrate the month of Ramadan, during which they fast during daylight hours. Halal food products have become more readily available to meet consumer demand for such items.

Let's talk

Name a religious celebration and list the foods that are commonly shared as part of it.

Figure 1.6: Ramadan is the Islamic celebration of the ninth month of the Muslim calendar. It is the holy month of fasting. Muslim families gather for iftar food during Ramadan. Iftar is an evening meal consumed at sunset. The fast is broken with the call to evening prayer.

Culture

Culture refers to the shared patterns of behaviour and identity of a group of people. Around the world, cultures are very diverse. Culture forms the identity of groups of people who share in the different characteristics of those groups. Food is one memorable aspect of culture, which creates opportunities for people to come together to share experiences.

Figure 1.7: Cultures around the world are made up of a range of defining characteristics.

Figure 1.8: Making Nonna's authentic pasta is often a multi-generational family affair and a traditional cultural practice of many Italian families.

Let's talk

Share a cultural food experience in which you have participated. Explain who was there, what foods were part of this cultural experience, when it occurred and why.

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History

History, the study of past events, is a record of knowledge and events that have occurred over time. Food is deep in tradition, custom and history dating back to the beginning of time. Studying the history of food helps us build an understanding of the influences it has had on food culture and cuisine. We can make meaning from history and understand why food systems and food products are what they are today.

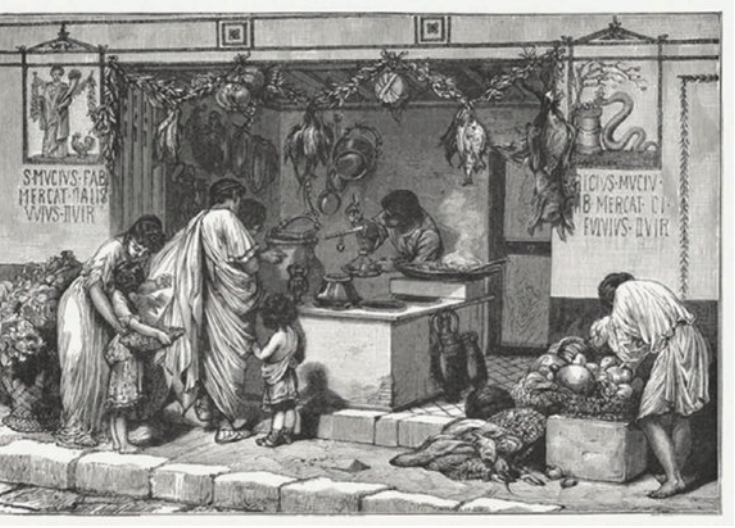

Figure 1.9: Depicted is a scene from ancient Rome, a delicatessen business with an array of fresh food. We learn about food cultures and cuisines over time through images and historical records that capture moments in time.

Let's talk

How is food represented in Figure 1.9? What do you wonder about foods in this era?

For example, when first introduced into Europe, the potato was seen as ugly and thought to carry diseases such as leprosy.

Another example is the apple in the story of Adam and Eve. The apple had a reputation as the forbidden fruit since it had been recorded that Eve ate the apple in the Garden of Eden. Through translation of language, historians have considered that the forbidden fruit could well have been a fig or quince.

Activity 1.2 (Practical): Product analysis – McKenzie's Ancient Grain Soup Mix

Source: Courtesy of McKenzie's Foods

Research the product shown above on the McKenzie's Foods website then answer the questions below.

1. Referring to the list of ingredients on the food label, list the ingredients you think are considered to be ancient grains.
2. Discuss the health benefits of consuming ancient grains.
3. Explain how you think the pleasures of these ancient grains came to be shared with the rest of the world.
4. Discuss the reasons why you think they still exist today.

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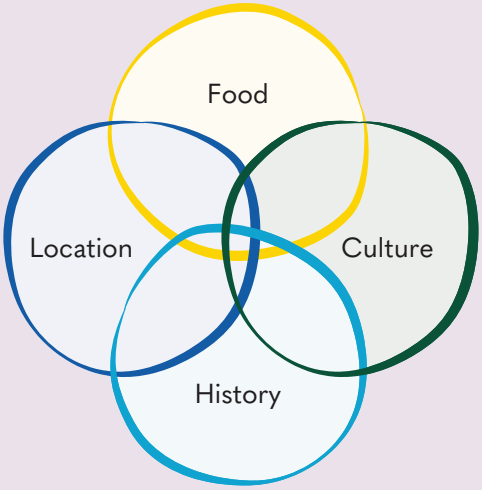
Activity **1.3** (Inquiry): Food connections

Brainstorm examples of how history, culture, food and location interconnect.



The factors influencing the emergence of different food systems, food products and food practices around the world help us to understand the historical development of food today. Some of the earliest food-producing regions have shaped our contemporary food systems and practices.

Let's talk

Consider the food-producing regions from around the world, as shown in Figure 1.10. How many of these regions have you travelled to? What do you know about food and food influences from these regions?

Figure 1.10: The earliest agricultural food production regions from around the world.

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Activity **1.4** (Practical): Discovering ancient foods

Prior to the rise of agriculture in the 'Fertile Crescent' (Middle East) around 10,000 years ago, many foods we still know and enjoy today were consumed.

1 Complete a sensory test of 'ancient' foods from the earliest farming regions. As you taste each food, describe its sensory properties using a range of descriptors in your response.

2 Why do you think these 'ancient' foods still exist today?

'Ancient' foods	Appearance	Aroma	Taste	Texture
 Oats				
 Peas				
 Olives				
 Grapes				
 Cucumbers				
 Figs				

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'Ancient' foods	Appearance	Aroma	Taste	Texture
 Quinces				
 Chickpeas				
 Fava (broad) beans				
 Lentils				
 Almonds				
 Pistachios				

Neolithic Revolution
A period that saw the beginning of agriculture. Humans made the transition from hunter-gatherer lifestyles to farming and settled villages.

Hunter-gatherer
A person who lives a nomadic life by hunting and gathering food that is found in the wild.

Early food-producing regions

Approximately 10,000 years ago, early food-producing regions generated gradual changes in civilisation, a time that is referred to as the **Neolithic Revolution**, or Agricultural Revolution. Since the evolution of humans, they lived a nomadic, **hunter-gatherer** lifestyle.

The Neolithic period was when humans began to settle permanently in areas that had reliable food supplies. Agriculture was born and farming methods such as irrigation were discovered. As we will find out, the development of intricate food systems began.

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The 'Fertile Crescent'

12,000 BCE

The Neolithic Revolution begins.

10,000 BCE

First populations of the 'Fertile Crescent' form. Agriculture and the domestication of animals begin in the region.

9000 BCE

The cultivation of wild grains and cereals develops throughout the region.

5000 BCE

Irrigation of agricultural crops is fully developed as the major rivers of the region are utilised.

3400 BCE

Priests who occupy the temple complexes are given the responsibility of distributing food and monitoring surplus storage for trade.

Let's talk

Why do you think this region is called the 'Fertile Crescent'?

Figure 1.11: The Euphrates River in south-east Turkey today. One of the most important rivers in the world, along with the Tigris, it provided the water that supported the development of ancient Mesopotamian culture.

The 'Fertile Crescent' region of the Middle East was home to some of the world's first civilisations, which began thousands of years ago. Today it is found in south-western Asia, which includes parts of Iran, Iraq, Turkey, Syria, Lebanon and Israel. This region was also known as the 'cradle of civilisation', the region where civilisation was thought to have emerged independently. This region became home to the earliest agricultural civilisations because of its favourable natural resources. It is regarded by many as the birthplace of agriculture, urbanisation, writing, trade, science, history and organised religion.

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- Dating back around 10,000 years ago, the 'Fertile Crescent' is documented as home to the rise of agriculture.

- Small rural communities developed along the rivers. As the civilisations grew, technological advances in agriculture and domestication of animals occurred.

- The Tigris Euphrates Valley was the birthplace of the ancient civilisations of Assyria, Babylonia and Sumer.

- Mesopotamia means 'between rivers' in Greek. It is the region located between the Tigris and Euphrates Rivers, and was home to many of the first civilisations.

- Climate in the 'Fertile Crescent' was **semi-arid**. The humidity of the region and the proximity of the Tigris, Euphrates and Nile Rivers encouraged the cultivation of crops.

Semi-arid
Climate of regions that receive minimal precipitation. They tend to have extreme to hot summers and warm to cool winters. These are not desert regions because they receive more rainfall than a desert.

Figure 1.12: The 'Fertile Crescent' of Mesopotamia and Egypt and the location of the first towns. Below the Euphrates River is the Syrian Desert and above the Tigris River are the Zagros Mountains.

Historical perspectives

Food systems

Prior to the beginning of agriculture and the domestication of animals, hunter-gatherer food systems were the simplest food systems that existed. They consisted of the nomadic life and hunting and gathering foods found in the wild.

With fertile soil, access to water for suitable irrigation and agriculture, flourishing food systems developed. The 'Fertile Crescent' was lush and thriving. Fertile soil was good for growing crops and, because of this, people who had previously moved from town to town decided to settle in this region. They began to practise agriculture and farming, as well as to develop laws, writing and governance. It was the development of these practices that historians say made the region one of the earliest civilisations.

Suitable conditions for production of foods meant excess foods could be processed and/or transported throughout the region. This increased consumption of foods from the local area. Food helped to provide access to trade routes.

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Let's talk

List and discuss the steps in processing of foods that might have happened in the food systems of the 'Fertile Crescent'.

Food production

Foods produced in abundance in the 'Fertile Crescent' included those favoured to grow in the lush and thriving landscape. Wild gazelles, goats and sheep were now being raised. Crops grown included emmer wheat, barley, chickpeas and lentils. Crops were planted, harvested and consumed by the farmer, who was then able to pass on excess to temples, where priests would store food supplies and monitor trade.

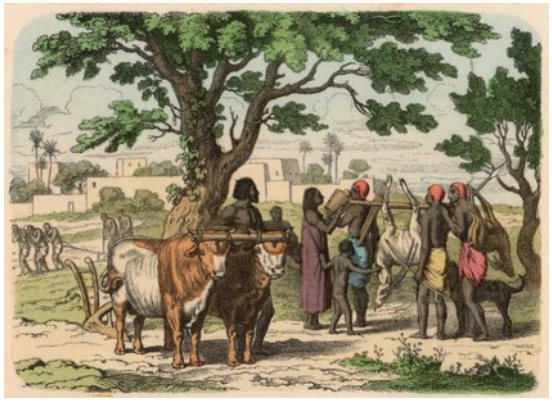

Figure 1.13: The 'Fertile Crescent' was home to many cultures.

Let's talk

Looking at the image in Figure 1.13, tell the story of the ancient food systems. Describe the landscape, production, processing, transport and consumption depicted in the image.

Cultural perspectives

Cultures

Mesopotamia was home to the first civilisations: the Sumerian, Assyrian, Akkadian, and Babylonian civilisations. This was a significant time in history because it led to the sharing of culture and ideas. Civilisation arose in this region because people had writing, they created permanent villages, animals were **domesticated**, they planted their own foods and they had opportunities to specialise in particular jobs.

Domesticated
Transition from a wild or natural state to a farmed and/or cultivated environment that humans manage and from which they benefit.

Figure 1.14: Sumer, a town located in the southernmost part of Mesopotamia, was home to one of the world's first civilisations.

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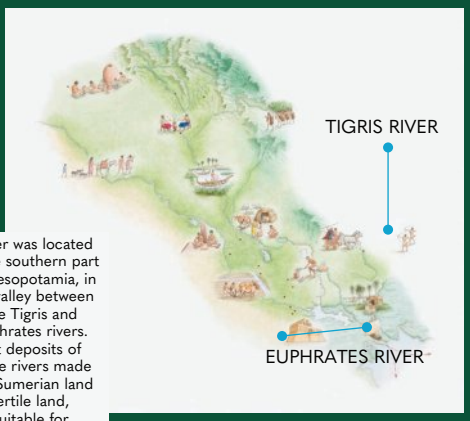
Activity **1.5** (Case study): Ancient civilisation – Sumer

Ancient civilisation: Sumer

Home to one of the world's first civilisations, Sumer was considered an early dynasty of its time, around 5000 BCE. Archeological evidence of clay tablets showing writing provides the earliest forms of written language to be discovered.

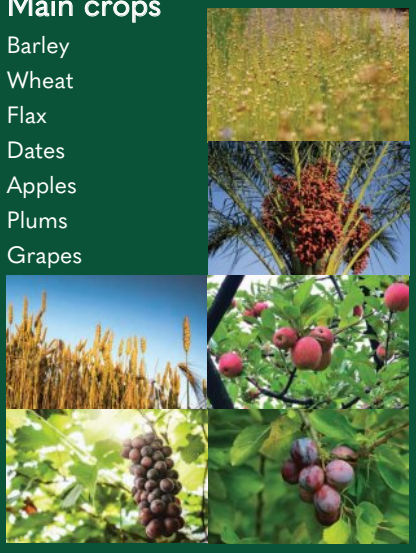
Location



Sumer was located in the southern part of Mesopotamia, in the valley between the Tigris and Euphrates rivers. Silt deposits of these rivers made the Sumerian land fertile land, suitable for farming.

Main crops

Barley
Wheat
Flax
Dates
Apples
Plums
Grapes



The workforce

Storehouse recorders
Overseers
Labourers
Work foremen
Harvest supervisors
Temple personnel
Farmers

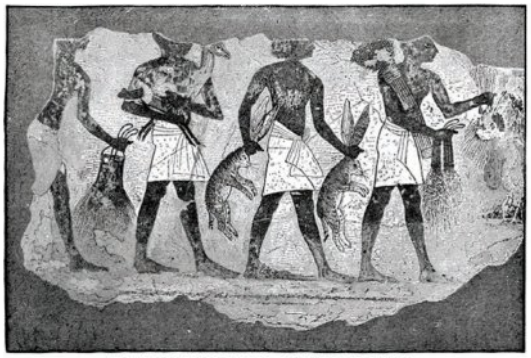
Technology

The fertile land was cultivated by oxen pullling light ploughs.

Case study questions

1. List the foods produced in Sumer.
2. Explain how these foods were produced.
3. Choose two of the main crops from ancient Sumer and describe what you think is the best way to prepare and eat these foods.
4. Explain how you think the pleasures of these foods came to be shared with the rest of the world.

Distinctive food cuisines



FRAGMENT OF AN ASSYRIAN WALL.

Figure 1.15: The Assyrians were among the first civilisations of the 'Fertile Crescent'. Depicted here on an Assyrian wall are men lined up with offerings of food for the king.

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Let's talk

What does the image in Figure 1.15 tell us about the distinctive cuisine of the Assyrian civilisation?

The western parts of the 'Fertile Crescent' were seen as home to grain-based economies. The east was home to mainly livestock-based economies, which began food production systems that supported both crops and agriculture. Most of the foods that originated in this region are still used throughout the world today in traditional dishes and celebrations.

- Major food crops were grown, including grains such as barley, from which bread and beer were made. Wheat was also a major grain cultivated in the region.
- Legumes, including lentils and chickpeas, were cultivated.
- Vegetables and fruits, including beans, onions, garlic, leeks, melons, eggplants, turnips, lettuce, cucumbers, apples, grapes, plums, figs, pears, dates, pomegranates, apricots, pistachios and a variety of herbs and spices, were all grown and eaten by Mesopotamians.
- Wild gazelles, sheep and goats were hunted before the domestication of sheep and goats occurred in this region (around 10,000 BCE).
- Fish were part of the local diet, and came from the waters in the area.
- Smaller animals were also consumed at the time, including ducks, pigs and pigeons.
- Fermentation processes were used to make food items such as cheese from the milk of domesticated animals.

Activity **1.6** (Practical): Sensory test

The earliest domesticated animals of the 'Fertile Crescent' were sheep and goats. The increase in numbers of goats and sheep led to an increase in milk and its by-product, cheese. The making of goat cheese is thought to be the oldest cheese-making method in the world. Goat cheese is made using acid and heat.

Depending on what is available to you in your local area, taste a variety of sheep or goat products, then copy and complete the sensory tasting table below. Products could include milk, yoghurt and cheese from a sheep or goat.

Food product	Appearance	Aroma	Taste	Texture

1. Of the products you tried, what was your preferred product and why?
2. Research the origins and history of goat or sheep milk and by-products, such as cheese and yoghurt. Find out how they would have been produced and eaten.
3. Explain how these products may have been stored in ancient times.
4. Suggest typical dishes, recipes or preparation techniques using these ingredients that are popular today.

Activity **1.7** (Inquiry): The origins of agriculture

Create an annotated timeline of the history of food. You may like to use the TimeToast website to do this. Your timeline should highlight agriculture's beginnings and map the regions in which agriculture was first practised.

For each region, identify the major food crops and domestication of animals for farming and any historical food developments. This is all part of the rich history of food in the world and helped to shape the food systems we know today.

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Ancient grain salad

Serves two

This recipe is an adaption of the famous Cypriot grain salad at former Melbourne restaurant Hellenic Republic, a nutty and grainy salad that uses a variety of ancient grains. Quinoa could also be substituted for the grains in this salad.

Ingredients


¼ bunch coriander, chopped


¼ bunch parsley, chopped


⅛ red onion, finely diced


½ cup McKenzie's Lentils, Freekeh & Beans SuperBlend (or quinoa)


2 teaspoons toasted pumpkin seeds


2 teaspoons toasted slivered almonds


2 teaspoons toasted pine nuts


2 teaspoons baby capers


⅛ cup currants


Juice of ¼ lemon


3 teaspoons extra virgin olive


¼ pomegranate, deseeded, to serve


Sea salt to taste

Dressing


¼ cup thick Greek yoghurt


¼ teaspoon cumin seeds, toasted and ground


1 teaspoon honey

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Method

1. Cook the 'Lentils, Freekeh & Beans SuperBlend' according to packet instructions. Drain well and allow to cool.
2. To make the cumin yoghurt dressing, mix the yoghurt, ground cumin and honey until combined.
3. Toast nuts in a dry frypan for 1–2 minutes. Do not leave unattended, as they will burn quickly.
4. In a medium bowl, place the coriander, parsley, red onion, grains, toasted nuts, baby capers, currants, lemon juice and olive oil. Mix well and season to taste.
5. Place into a serving dish and top with the dressing and pomegranate seeds.

Evaluation questions

1. Suggest what makes this an 'ancient salad'.
2. Describe the sensory properties of this salad.
3. Would you make any changes if you wanted to use this recipe as a main meal? Justify your response.
4. Explain the role of historical food cultures on today's cuisine.

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Chapter revision

- Food and its origins have a rich history and tell the story of how people have survived and lived throughout time.
- Food systems – that is, anything from the production, processing, transport and consumption of food – tell a story. They show us how people lived, what jobs they had, what foods they survived on and what their way of life was like.
- A range of factors influence the emergence of different food systems, food products and food practices around the world, including various natural resources, climatic influence and social circumstances.
- Understanding the development of food production and food customs throughout history allows us to better understand the food systems and food cultures of today.
- The 'Fertile Crescent' was home to the first civilisations and the invention of agriculture, irrigation, domestication of animals and trade of excess foods.
- History and research into the significant food history of our past paint a detailed picture of food and the journey it has been on to get to our tables in Australia today.

Apply your knowledge

1 Explain what is meant by the term 'food systems'.
2 Identify and explain one difference between a food culture and a food cuisine.
3 Consider the emergence of distinctive food cultures and cuisines all over the world:
   a List three factors that have influenced the emergence of distinctive food cultures and cuisines throughout the world.
   b For each factor, explain how it has influenced the emergence of distinctive food cultures and cuisines throughout the world.
4 The 'Fertile Crescent' is described as being the place where agriculture began. Explain what is meant by this.
5 How have the food systems of the 'Fertile Crescent' influenced our food of today?
6 Explain the food systems, food production, food customs and food culture of a historical region other than Australia.

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Practice exam questions

Question 1

The 'Fertile Crescent' is the historical region best described as:

A One of the earliest food production regions that offered fertile soil, access to water for suitable irrigation and agriculture.

B The only ancient civilisation that produced food.

C A flourishing food system that could not survive the weather patterns of the region at the time.

D A food system that produced many of the tropical fruits that we consume today, including banana and mango.

1 mark

Question 2

List and explain one factor that influenced the emergence of distinctive food cultures and cuisines throughout the world. **3 marks**

Question 3

Other than Australia, select one region and discuss its historical development in food production and food customs. **6 marks**

Region	
Food production	
Food customs	

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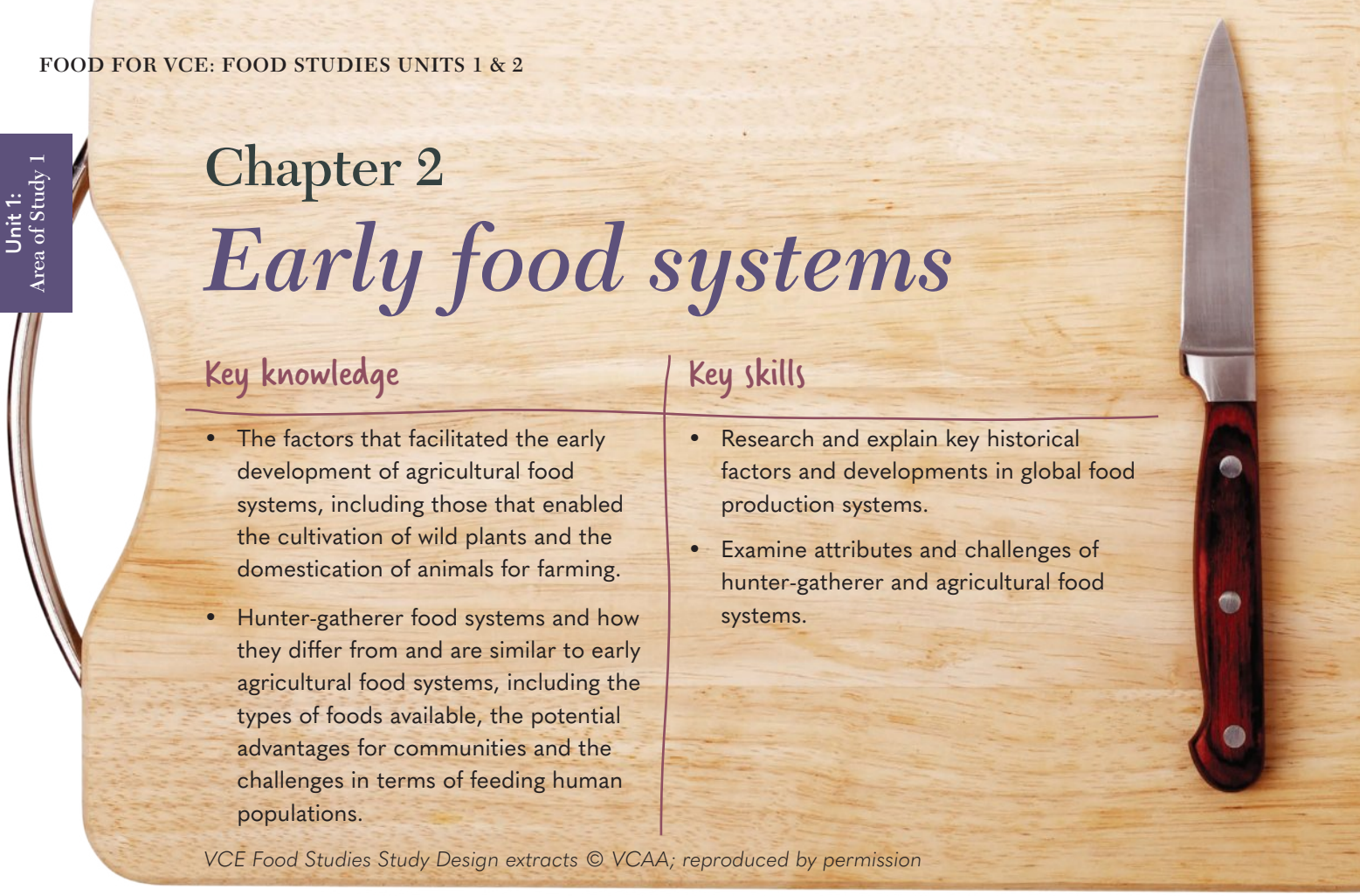
Chapter 2
Early food systems



Key knowledge

- The factors that facilitated the early development of agricultural food systems, including those that enabled the cultivation of wild plants and the domestication of animals for farming.
- Hunter-gatherer food systems and how they differ from and are similar to early agricultural food systems, including the types of foods available, the potential advantages for communities and the challenges in terms of feeding human populations.

Key skills

- Research and explain key historical factors and developments in global food production systems.
- Examine attributes and challenges of hunter-gatherer and agricultural food systems.

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Agriculture
The practice of farming, which involves cultivation of land for growing crops and feeding, breeding and raising livestock.

Egalitarian
A belief that all people and resources are equal, and that all people are entitled to the same rights and opportunities as each other.

To improve our understanding of the historical development of early food-producing regions, this chapter looks at factors that facilitated the early development of **agriculture**. Similarities and differences of the hunter-gather food systems will be compared to early agricultural food systems. We will unpack challenges and examine attributes of these early food producing systems, the types of foods they made available and their potential to feed the human population of the time. Thanks to the work of archaeologists, historians and scientists who can date artefacts using a range of modern scientific techniques, we can learn about how people lived in the ancient past. This chapter relies on the work of experts in these fields, and what this tells us about early food systems.

Get knowledge ready

1. **Outline the differences between hunting and gathering.**
2. **Describe agricultural food systems.**
3. **Name some of the first foods that were domesticated and suggest reasons for this.**

Hunter-gatherer food systems

For nearly 200,000 years, our ancestors gathered, hunted and foraged in the wild. Food is a basic need, and humans would spend their days in search of their next meal.

Eating off the land was a way of life. In general, hunter-gatherer societies viewed resources as belonging to everyone. This was known as an **egalitarian** society: the land was not owned, and resources were shared equally.

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Let's talk

Discuss the advantages and challenges of hunter-gatherers living in an egalitarian society.

Video 2.1: Chapter Overview

Figure 2.1: Key features of hunter-gatherer society

Types of foods used by the hunter-gatherers

Wild plant-based foods, fungi and wild animals were important staples in the Palaeolithic diet. Early humans would also forage for insects and scavenge what was left of the remains of dead animals to ensure food for that day. Wildlife, including game and fish (if near a water source) were hunted for food. Wild plants were gathered and eaten when available. Insects were also consumed when found, which provided vitamins and minerals for the body.

Activity 2.1 (Inquiry): Nutrients and the hunter-gatherer

Investigate the nutrients that were provided in the diet of the traditional hunter-gatherer. Explain the health benefits of the traditional hunter-gatherer diet.

Studies have shown the hunter-gatherer lifestyle was 'healthier' than the agrarian lifestyle. Would you agree? Justify your response.

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Table 2.1: Advantages and challenges of the hunter-gatherer lifestyle

Advantages	Challenges
• Worked together as a group – everyone had a role • Often equal rights in the group • Lived off what the land could provide • Supportive society; sharing was equal • Egalitarian	• Solely dependent on food supply • Could not carry large amounts of food or resources • Climate change affected available resources • Faced starvation if food was not found • Dangers of hunting • When moving to a new area, poisonous foods may be unknown • Large amount of energy required to find food and not guaranteed to find any

Figure 2.2: Paleo man, from the Old Stone Age, is a well-documented and known hunter-gatherer. Humans in the Palaeolithic era hunted and gathered any wild animals and plants that could be eaten.

Hunter-gatherers in modern times

For the vast majority of human history, food was acquired through hunting and gathering. But not all the world's population has moved on from the traditional hunter-gatherer practices, and there are some cultures that still follow this way of life.

Mbuti People of Africa

Figure 2.3: The Mbuti are one of the oldest indigenous people of the Congo region of Africa. They live together in small groups, ranging from 15 to 60 people.

San of South Africa

Figure 2.4: A San man

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Inuit of North America

Figure 2.5: An Inuit man harvests a seal from a trap underneath the sea ice. Inuit hunters live in a very cool climate and dress in traditional trousers and boots made from polar bear fur for hunting.

Hadzabe of Tanzania

Figure 2.6: A young Hadzabe man makes an arrow for a hunting bow. Hadzabe (or Hadza) are among the last hunter-gatherers in the world. The Hadzabe are an Indigenous ethnic group in north-central Tanzania. The population of the Hadza tribe is just under 1000 people, and they are an endangered tribe.

Activity 2.2 (Case study): Yanomami people (Amazon, South America)

Remote forest of the Orinoco River basin in southern Venezuela

Northernmost reaches of the Amazon River basin in northern Brazil

Figure 2.7: The Yanomami people mainly live in South America.

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Figure 2.8: A traditional Yanomami home where a child cooks *beju* (cassava cake) indoors

Figure 2.9: A Yanomami woman with her baby, weaving a basket

Figure 2.10: Deep in the Amazon rainforest of Venezuela, a Yanomami man climbs a palm tree to pick fruit.

Figure 2.11: Men and children cooking inside a traditional Yanomami hut in the Amazon

Figure 2.12: Traditional hunting methods, such as a bow and arrow, are used by the Yanomami people.

Figure 2.13: The hunter-gatherer food system of the Yanomami includes fishing in a lagoon in the rainforest.

1. Choose a traditional hunter-gatherer society that exists today.
2. Explore the extent to which this society's hunting and gathering practices have survived to the present time.
3. Record information on the society's food practices and how they incorporate hunting and gathering into their everyday lives.
4. Present your information to the class.

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Activity **2.3** (Practical): Edible insects

Part of the ancient hunter-gatherer food systems was the act of foraging insects to eat. Still consumed today in many cultures, insects provide many nutritional benefits and are being considered in modern times as sustainable alternative food sources to feed our growing population. Farmed edible insects are widely available to buy locally and online.

- Research insects that are available to buy and cook in your local area.
- Choose one insect or insect product to incorporate into a dish of your choice.

Evaluation

- Prepare your dish and complete a sensory test of your final outcome.

1 Describe the sensory properties of the insect product that you prepared. Copy and complete the table below.

Taste	Texture	Appearance	Aroma

2 How easy was it to access an edible insect in your local area? Why?

3 Describe the challenges and advantages for ancient hunter-gatherer people of including insects in their diet.

4 Explain why insects are considered a sustainable alternative to feeding a growing world population.

Let's talk

'For better or for worse, agriculture was a driving force behind the growth of civilisations.' What have been the benefits of agriculture for civilisation? What have been the challenges to civilisation since the introduction of agriculture?

Over thousands of years, humans shifted from the hunter-gatherer life to agrarian civilisations. There are many plausible reasons why this may have occurred all over the world:

- *Climate change:* Was it too hot, too cold or too dry to rely on wild food sources?
- *Population growth:* Was the population growth too dense for the food that was available in the wild? Was farming a better solution to feed everyone? What came first: population pressure or excess food allowing for population growth?
- We know of the existence of megafauna such as the woolly mammoth, which are now extinct. Was this because of over-hunting?
- Inventions of technology, such as irrigation, made agriculture a viable solution to food production.

Let's talk

Discuss ways in which agriculture has influenced the world we know today.

Rise of the Neolithic Era

The human **epoch**, or human development through time, is labelled by archaeologists using terms that describe the types of materials that tools were made of at that given point in time. Examples of this are the Stone Age, Bronze Age and Iron Age. As we learn about the development of agriculture throughout history, we will refer to the different eras, in particular that of the Neolithic Era.

Epoch
A unit of geological time that measures the history of the Earth; it is less than a period and greater than an age.

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Ice Age – occurred approximately 2.4 million years ago and lasted until around 11,500 BCE. The Earth's climate changed from very cold periods with glaciers covering the land to very warm periods where the glaciers would have melted. It is important to know when the Ice Age occurred because it is this change in climate that is thought to have influenced the natural resources and climate of the ancient 'Fertile Crescent' (see Chapter 1).

Let's talk

Can you explain the difference between the terms BCE and CE?

Figure 2.14: Woolly mammoth and bison were animals hunted during the Ice Age.

Stone Age – use of stone tools. Each period of the Stone Age is characterised by the degree to which humans used stone tools to survive, including their use in food hunting and gathering.

Table 2.2: Characteristics of the Stone Age

Old Stone Age	Middle Stone Age	New Stone Age
Palaeolithic	**Mesolithic**	**Neolithic**
Approx. 2.5 million years	Approx. 10,000 to 4000 BCE	Approx. 4000 to 2500 BCE
Paleo humans	Hunting, gathering and fishing	Agriculture, farming and irrigation
Chipped stone was made to into tools such as pebble tools and hand axes. These would have been used in hunting and gathering.	Evidence of ancient 'querns' exists. These are stone tools that were used to hand-grind grains such as barley and wheat.	Archaeological evidence of the development of polished stone, pottery and weaving.

Figure 2.15: Hammers were used in the Stone Age for hunting and gathering practices.

Figure 2.16: Hunting and gathering practices in ancient times

Figure 2.17: Pottery was developed and was found to be useful to store and serve food.

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Bronze Age – development and use of metal tools. Approximately 3300 BCE to around 1200 BCE.

Figure 2.18: A primitive furnace used to create metal tools in the Bronze Age

Iron Age – development and use of iron and steel tools across the world. Approximately 1200 BCE to 600 BCE.

Figure 2.19: Iron cooking pots were used over open-flamed fires.

Tools were designed and invented to help with planting, harvesting, storing and preparing foods to be served. The Neolithic period was a time of great invention and transition of food and food systems. As we learn more about early agriculture in this chapter and the hunter-gatherer food systems, we will refer to the different periods of time to help explain the origins of our food.

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Let's talk

Do you recognise any of the tools and pieces of equipment featured on the previous pages? What might their modern-day equivalents be and how are they now made?

Nomadic
Moving from one place to another, with no fixed home location. An individual is called a nomad.

Early agricultural food systems

The development of early agriculture is one of the most important transitions in human history. Hunter-gatherers essentially gave up on their **nomadic** lifestyle, settling into villages and towns where they began domesticating a variety of plants and animals.

This change of lifestyle was not immediate: the transition happened over thousands of years. Whereas hunter-gatherers have lived for 200,000-plus years, the development of agriculture has only been around for approximately 13,000 years, and is thought to have been widely established only around 7000 years ago.

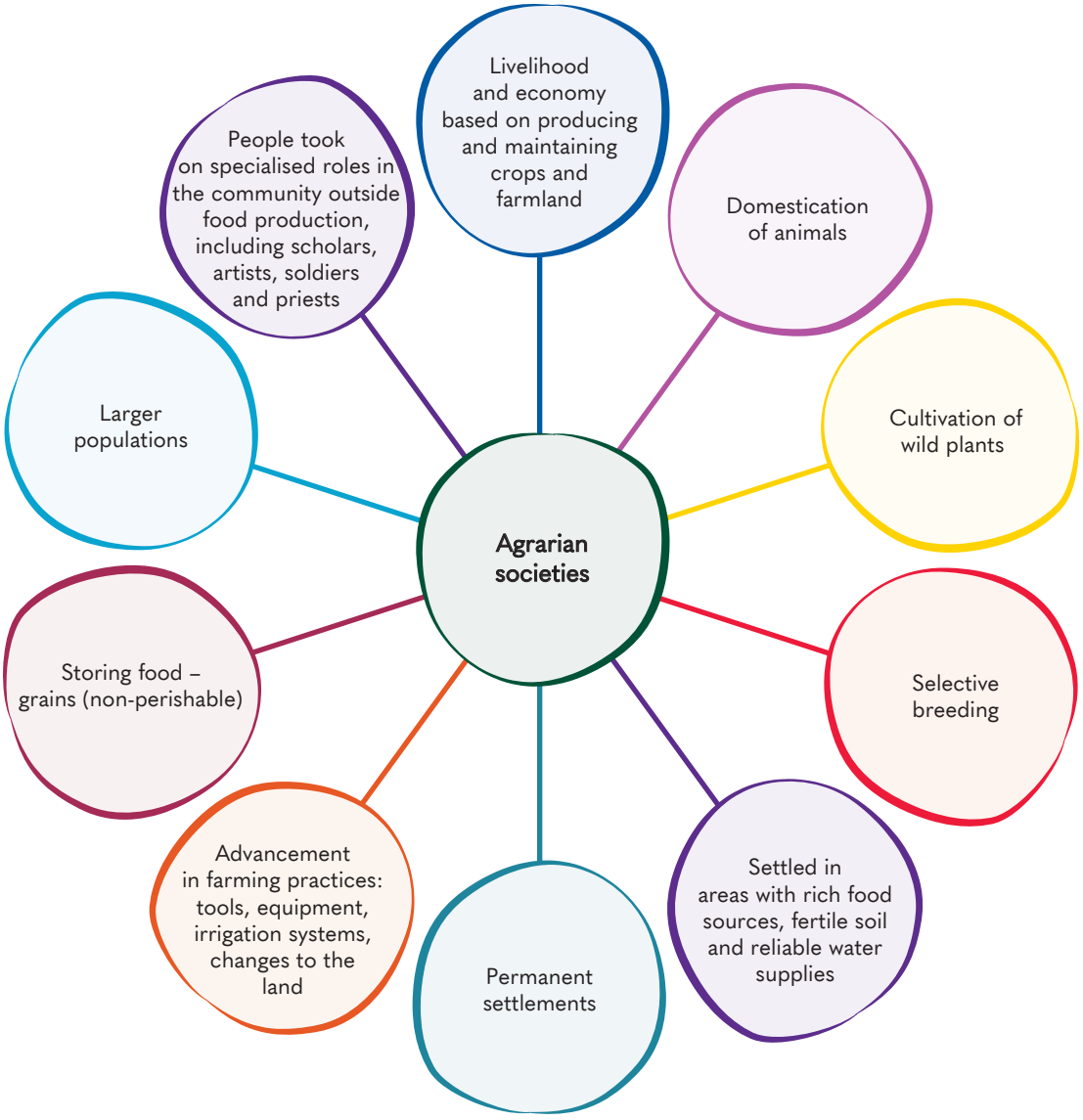

Figure 2.20: Key features of agrarian society

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Hunter-gatherers and **agrarian** cultures coexisted for many thousands of years. The transition to agriculture, a form of animal and plant production, changed food systems forever.

Foraging was replaced with farming, and the birth of agriculture occurred. Agriculture is believed to have originated in The 'Fertile Crescent', as discussed in Chapter 1. Today the 'Fertile Crescent' includes modern-day Iraq, Syria, Lebanon, Palestine, Israel, Jordan, Egypt and some parts of Turkey, Iran and Kuwait.

Let's talk

The world's population in 10,000 BCE is estimated to have been around four million, compared with approximately eight billion today. Why do you think agriculture is thought to have fuelled population growth and transformed human society?

Activity 2.4 (Inquiry): Mapping the 'Fertile Crescent'

On a map, outline the modern day 'Fertile Crescent'. For each country – Iraq, Syria, Lebanon, Palestine, Israel, Jordan, Egypt and some parts of Turkey, Iran and Kuwait – list foods and facts about their food culture. Share with your class and discuss any links you can find with early agriculture and its influence on the country's food cultures today.

Figure 2.21: Jericho, Palestine (pictured in modern times) was an ancient Neolithic settlement in the 'Fertile Crescent'. Pictured is a plantation where dates are grown and harvested on palm trees. Optimum growing conditions and seasonal flooding's of the rivers in the 'Fertile Crescent' ensured soils were rich in nutrients, water was abundant and the land was lush and green.

Let's talk

Optimum growing conditions were needed to establish **sustainable** agricultural practices. Outline what you think 'optimum conditions' would have been.

There are many advantages and challenges of the agrarian lifestyle that contributed to life in these times. These are shown in Table 2.3.

Agrarian
A place or country that uses land for cultivation and farming, and grows its economy based on what is produced.

Foraging
Gathering of wild food to eat. This form of hunting and gathering was a way of life for hunter-gatherers.

Sustainable
Able to be continually used without depletion; something that can be ensured for both current and future generations.

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Table 2.3: Advantages and challenges of the agrarian lifestyle

Advantages of the agrarian lifestyle	Challenges of the agrarian lifestyle
• Developed agriculture and a stable food supply • Settled in homes that offered space for food storage • Greater amount of food available – food surplus • All people did not have to spend their day foraging for food – tradespeople developed their skills, and art and creative pursuits increased • Controllable food supply • Manipulation of the environment to meet needs • Trade opportunities created for the community and developed wealth • Population growth	• Caused change to the environment and its natural resources • Often developed negative social structures and hierarchies • Developed inequality within the society • Excessive consumption of food • Conflict and war • Severe weather, catastrophe or war could severely impact food supply • Food supply not evenly distributed • Population growth

Other regions of the world where agriculture is believed to have developed independently include China and Central America. It is thought that by around 6000 BCE, most of the animals familiar to us today were being farmed. Scientists believe changes in climate, geography and environment of the area around 11,000 BCE possibly came about as a result of the last Ice Age. These factors worked to facilitate the early development of agricultural food systems.

Figure 2.22: Factors influencing the growth of farming and agriculture

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Let's talk

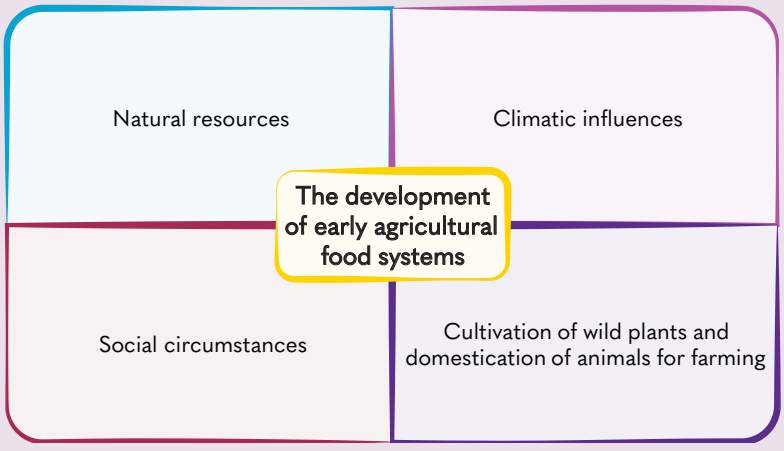
Theories about why the transition from hunter-gatherer to agrarian civilisations occurred include that food sources were scarce and hunting and gathering became difficult. Do you think this is a plausible theory? Why or why not?

Agriculture and its development led to a system of ownership over land, food and currency. The shift from forage to farming meant farmed land had to be cared for by the farmer, resulting in ownership of the land. Prior to this, land was cared for and shared by all. This shift to ownership and possession resulted in inequitable distribution and an unequal social order. These issues of land distribution and ownership are still faced today.

As researched in Chapter 1, early agricultural practices occurred in regions all over the world, including the Middle East, China, Mesoamerica (Mexico), South America, the highlands of Papua New Guinea and West Africa. Ancient Egypt, in the Middle East, was one region that influenced early agricultural practices, which we still use today.

Activity **2.5** (Inquiry): Key historical factors and developments in global food production systems

In Chapter 1, we learnt about the historical development of food systems and food cultures by examining regions all over the world. Copy and complete the matrix below by researching and explaining key historical factors and developments in global food production systems.



Activity **2.6** (Case study): Ancient Egyptian agriculture

Read the following information from the Food and Agriculture Organisation of the United Nations (FAO), and complete the evaluation questions focusing on explaining key historical factors and developments in global food production systems.

The civilization of ancient Egypt was indebted to the Nile River and its dependable seasonal flooding. The river's predictability and fertile soil allowed the Egyptians to build an empire on the basis of great agricultural wealth. Egyptians are credited as being

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one of the first groups of people to practise agriculture on a large scale. This was possible because of the ingenuity of the Egyptians as they developed basin irrigation. Their farming practices allowed them to grow staple food crops, especially grains such as wheat and barley, and industrial crops, such as flax and papyrus.

They excelled in horticulture. Orchards and gardens were developed in addition to field planting in the floodplains. This horticulture generally took place further from the floodplain of the Nile, and as a result required much more work. The perennial irrigation required by gardens forced growers to manually carry water from either a well or the Nile to water their garden crops. Additionally, while the Nile brought silt, which naturally fertilised the valley, gardens had to be fertilised by pigeon manure. These gardens and orchards were generally used to grow vegetables, vines and fruit trees.

The Egyptians grew a variety of crops for consumption, including grains, vegetables and fruits. However, their diets revolved around several staple crops, especially cereals and barley. Other major grains grown included einkorn wheat and emmer wheat, grown to make bread. Other staples for the majority of the population included beans, lentils, and later chickpeas and faba beans. Root crops such as onions, garlic and radishes were grown, along with salad crops such as lettuce and parsley. Fruits were a common motif of Egyptian artwork, suggesting that their growth was also a major focus of agricultural efforts as the civilisation's agricultural technology developed. Unlike cereals and pulses, fruit required more demanding and complex agricultural techniques, including the use of irrigation systems, cloning, propagation and training.

While the first fruits cultivated by the Egyptians were likely indigenous, such as the palm date and sorghum, more fruits were introduced as other cultural influences were introduced. Grapes and watermelon were found throughout predynastic Egyptian sites, as were the sycamore fig, dom palm and Christ's thorn. The carob, olive, apple and pomegranate were introduced to Egyptians during the New Kingdom. Later, during the Greco-Roman period, peaches and pears were also introduced. Egyptians relied on agriculture for more than just the production of food.

The Egyptians were creative in their use of plants, using them for medicine, as part of their religious practices and in the production of clothing. Herbs perhaps had the most varied purposes: they were used in cooking, medicine, as cosmetics and in the process of embalming. Over 2000 different species of flowering or aromatic plants have been found in tombs. Papyrus was an extremely versatile crop that grew wild and was also cultivated. The roots of the plant were eaten as food, but it was primarily used as an industrial crop. The stem of the plant was used to make boats, mats, and paper. Flax was another important industrial crop that had several uses. Its primary use was in the production of rope, and for linen, which was the Egyptians' principal material for making their clothing. Henna was grown for the production of dye.

Source: Food and Agricultural Organization of the United Nations

Case study questions

1. Outline the conditions that provided the Egyptians with the opportunity to build agricultural wealth.
2. Identify what the 'ingenuity of the Egyptians' was and explain its influence in the development of agriculture.
3. State the foods that were grown during this period.
4. During this time, fruits introduced to Egypt were also grown. Suggest how these fruits may have made their way to Egypt.
5. Agricultural practices were not only intended to produce plants to be eaten as food. Describe other uses for plants in Ancient Egypt.
6. Suggest how the development of these early agricultural practices has influenced our food systems today.

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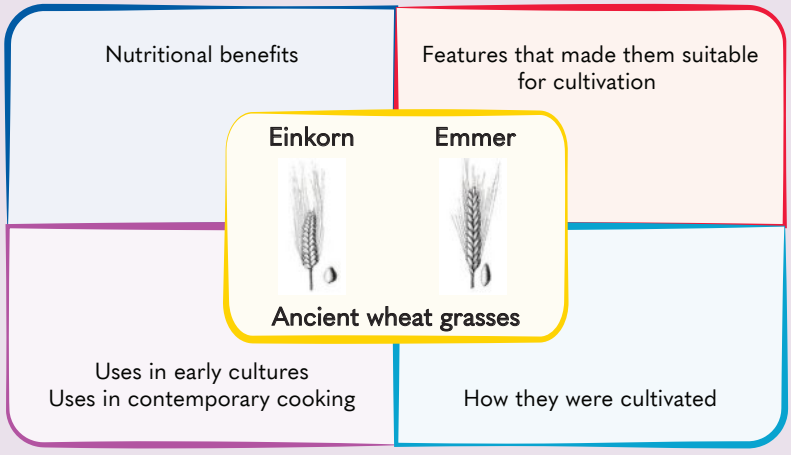
Cultivation of wild plants

Wild plants grow spontaneously and could exist without any human action. **Cultivated** plants emerged through the action of humans, and they depend on humans for their survival. Where a hunter-gatherer would gather what they could find in the wild to eat, early agricultural practices meant that plants could be cared for and grown in optimum conditions, ensuring their success in producing a stable food supply. Trees that bore fruit and plants that had edible components were tended by early farmers to ensure a consistent supply of foods for the growing population. Wild varieties of plants still exist today, but agriculture and farming have become more favourable to ensure a stable food supply to feed a rising world population.

Cultivation
The planting, tending, improving, or harvesting of crops or plants and the process of fostering their growth.

Activity **2.7** (Inquiry): Cultivating wild plants in early agriculture

1 Complete the matrix by researching the earliest cultivated wheat grasses: einkorn and emmer.



2 From the images above, choose another plant that was successfully cultivated and is still part of modern cuisine today. Complete a matrix to display your findings.

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Activity **2.8** (Case study): Ancient crops for a sustainable future

The properties of pulses have been known for centuries. In his *Rerum Rusticarum* (37 BCE), the ancient Roman scholar Marcus Terentius Varro recommended planting legumes in poor soils as they do not require many nutrients. According to Varro, these crops offered not only immediate returns in the form of grains, but they also enriched soils for subsequent crops.

Pulses, however, are far older than the Roman Empire. These crops are inextricably linked to the first civilisations, which developed in the 'Fertile Crescent' during the Neolithic Age, as well as to the origins of agriculture.

Thanks to a temperature increase during that era, as well as to the region's abundant water supply and other natural resources, groups of nomadic hunter-gatherers learned how to grow crops and domesticate animals, becoming the first settled farmers in history. Agriculture had started.

From then on, farmers continued to cultivate some of the most important crops, including pulses and cereals, and to raise livestock such as sheep, goats and cows. Among the first major pulse crops grown were fava (or faba) beans, chickpeas, peas and lentils. Although beans and cowpeas were also domesticated in ancient times, they in turn were grown in Latin America and Africa.

As a staple food, pulses played a crucial role in ancient diets. Compared with other crops, they were easy to store thanks to their long shelf life – refrigeration did not exist! – and proved to be a key ally against famines.

Pulses, as we know them today, evolved from their ancestors through farmers' genetic selection. This is confirmed by the fact that domesticated pulses present features that cannot be found in wild varieties: thinner peel; increased seed size; lack of dissemination (i.e. pod shattering); seed dormancy mechanisms (i.e. germination inhibition); and determinate growth habit (i.e. seeds germinate all together).

Let's take a walk through the history of the major pulse crops.

Faba beans (*Vicia Faba*)

Faba beans are among the world's most ancient crops. During the Neolithic, Bronze and Iron Ages, they played an important role in spreading agriculture throughout Eurasia and North Africa, along with other pulses and cereals. They can be found in numerous archaeological deposits.

Peas (*Pisum sativum*)

Peas also belong to one of the oldest domesticated crops. Archaeological evidence dates their existence back to 10,000 BCE, in the Near East and Central Asia. During the Stone and Bronze Ages, they spread to Europe and the Mediterranean, then to India in 200 BCE.

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Chickpeas (*Cicer arietinum*)

Chickpeas originated in an area located between the south-east of Turkey and the western part of the 'Fertile Crescent'. They were domesticated around 7000 BCE. This is why chickpeas are culturally bound to the Middle East and Asia, and why they are a basic constituent of Asian diets.

Lentils (*Lens culinaris*)

Lentils were also domesticated in the 'Fertile Crescent' – in what today is Iraq. As far back as 8500–6000 BCE, archaeological evidence confirms the existence of lentils. Just like chickpeas, lentils are a basic constituent of Asian diets.

Cowpeas (Vigna unguiculata)

Cowpeas, as we know them today, originated in Sub-Saharan Africa, but the origin of wild varieties has been traced to southern Africa. Although today cowpeas are cultivated throughout the world, they are still an important component of traditional intercropping systems in the dry savannahs of Sub-Saharan Africa, due to their high shade tolerance. Ever since their domestication, they have been culturally bound to this region.

Common beans (*Phaseolus vulgaris*)

The genus *Phaseolus* originated approximately seven million years ago. Wild forms of common beans can be found from north-western Argentina to northern Mexico. Among the main food crops, common beans show the greatest rate of variation. They were a basic constituent of various Native American groups' diets, and are currently one of the most important crops in the Americas.

Lupine (*Lupinus*)

Lupinus is regarded as one of the most diverse genuses in the legumes family. It is crucial for its very high protein content – up to 45 per cent – and for its versatility, ranging from human nutrition to forage. The two main varieties domesticated by ancient civilisations are part of two geographically isolated groups: White lupine (*Lupinus albus*) of the Old World group and Andean lupine (*Lupinus mutabilis*) of the New World group.

As shown in this brief historical overview, pulses have been one of the key drivers of civilisation. Life as we know it today would not have been possible without these small but powerful allies.

But the role of pulses is far from over. They not only contribute to food security and good health, due to their high nutritious value, but they also increase biodiversity and provide an important contribution to climate change adaptation and mitigation. Even though they have been around for centuries, pulse crops will play a fundamental role in our sustainable future.

References:

International Year of Pulses 2016
Food and Agriculture Organization of the United Nations; A. M. De Ron (ed.), *Grain Legumes*, Handbook of Plant Breeding 10, Springer Science+Business Media, New York 2015

Source: Food and Agriculture Organization of the United Nations

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Case study questions

1 Identify the wild plants and animals linked to first civilisations.
2 Outline the factors that led to the development of agriculture.
3 Explain why legumes are considered a beneficial crop to grow. Why were they planted after harvesting other crops?
4 Name any foods listed that are prominent in our food systems today.
5 Explain the role played by pulses in the ancient diet.
6 Outline the changes in the properties of pulses over time and explain how these changes have occurred.
7 Choose one example of an ancient pulse crop available today and make a nutritious, delicious meal showcasing it as the main ingredient.
8 Research the similarities in the development of agricultural practices between the Roman and Egyptian civilisations.

Food storage

The domestication of plants resulted in a surplus, so vessels were needed to store these cultivated goods. Stone, wood and clay were all developed into suitable food-storage vessels. This led to new trades and jobs in the communities as there was a growing need for food storage. The way food was consumed also changed as meals and dishes were produced, rather than individual food items being eaten. This required the development of serving dishes and utensils, further developing new trade ventures.

The ability to store foods resulted in a change in diet patterns and food consumption of people in the Neolithic era. Before food storage was available, foods were eaten when available and in season. Food storage allowed for foods to be consumed all year round. Legumes, dried grains, beans and smoked meats were examples of foods that could now be consumed all the time, rather than just being seasonally available. This change in food consumption patterns also altered the food systems of the time.

Figure 2.23: In Israel, a staircase leads down to a huge public granary or silo built between the eighth and seventh centuries BCE. It is 7 m deep and 11 m in diameter; wheat kernels and straw found between the stones identified it as a granary.

Activity **2.9** (Practical): 'Ahhh, this porridge is just right'

Porridge is a traditional breakfast meal option that is essentially a grain or seed cooked in water to form a thick, gelatinous, hearty dish. The storage of grains from excess cultivated plants meant stock was on hand to be used all year round. Countries all over the world have their own varieties of porridge that are part of their food culture.

1 Your task is to make porridge using a variety of grains that have been cultivated around the world for thousands of years – for example, quinoa, rolled oats, flaxseed, teff, farro, brown rice, freekeh and millet.
2 Complete a taste test of the variety of porridges that you make in class and complete the task evaluation.

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Quick and easy porridge

Ingredients

¼ cup grain (e.g. quinoa, oats, flaxseed, teff, farro, brown rice, freekah and millet)

½ to 1 cup water or milk, as needed to reach desired consistency

Method

1. Add the grain to a small pot with the water OR milk.
2. Heat over medium heat, stirring often, until heated through.
3. Scoop into a bowl and serve.

As you are completing a sensory evaluation, toppings are not required. However, if cooking at home, add any additional toppings such as nuts, fruit, almond butter, maple syrup or coconut yoghurt.

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Evaluation questions

1 Copy and complete the table to describe the sensory properties of each porridge.

Grain	Appearance	Aroma	Taste	Texture

2 Name which porridge you prefer and explain why.

3 Discuss the reasons why a product such as porridge has been a staple for years in regions all over the world.

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Domestication of animals

During the Neolithic Age, around 10,000–8000 BCE, the early domestication of animals has been documented, which is thought to be part of the beginnings of agriculture.

Let's talk

A decision was made at this time to domesticate some animals and not others. Why would this be the case?

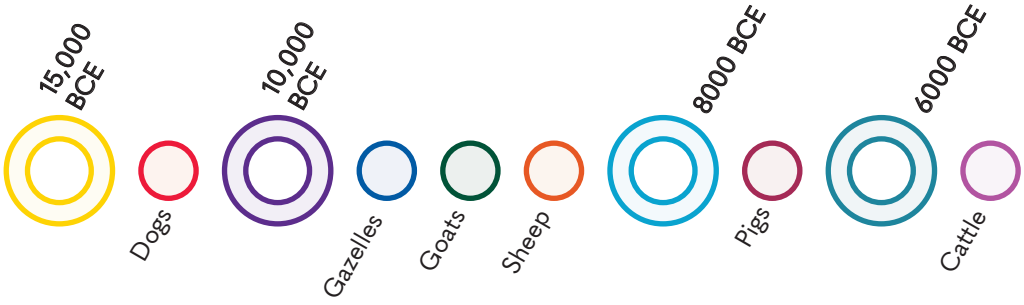

Figure 2.24: A timeline of some of the domesticated animals of the Stone Age

Figure 2.25: Gazelles, sheep and goats were some of the earliest domesticated animals.

A number of features were desired in order for successful domestication of animals to occur, such as a calm temperament. While animals were initially farmed for meat, domestication of animals also occurred for milk and for fur to be used for textiles. Additionally, domesticated animals were also used for farm work and transport. An animal that provided all or some of these desired features was more likely to be domesticated at this time.

Domesticated animals were cared for and relied on by humans, who supplied resources such as food and water as well as protection from predators. This is different from animals found in the wild, which had to fend for themselves.

Figure 2.26: Dogs have historically been recorded as being domesticated from as far back as 15,000 BCE to help nomadic people with their hunting.

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Let's talk

What has happened to the gazelle? Is it still domesticated today? Why do you think the gazelle is not farmed like cattle or sheep in countries such as Australia?

Wild plants and animals being domesticated and cultivated by human labour meant that they could meet specific requirements and adaptions needed for growing food systems that could feed a growing population. Plants and animals with desired traits were used in selective breeding practices, which enabled crops and animals to be produced that met the needs of people. Plants that flourished and bore fruits or vegetables with the seasons, and animals that could be used for milk, meat and fur for textiles were popular at the time.

Activity **2.10** (Inquiry): Animal research

Donkeys, camels, reindeer, horses and rabbits are some animals that have been around for centuries.

Research these animals and their contribution to agricultural practices around the world.

Activity **2.11** (Practical): How many ways can you preserve meat?

As the transition from hunter-gatherers to agrarian societies occurred, so too did the need to make excess food last. Methods of preservation were needed when agriculture took off as food became more abundant and the population grew. Food could not be wasted as it had become a valuable commodity that could be used for barter and trade, and there were more people to feed.

1 Copy the table below and complete a sensory test of a variety of preserved meat products. Examples you might sample could include: pickled herrings, jerky, tuna in brine, lap cheong, bonito flakes (*Katsuobushi*), and cured meats such as salami and prosciutto.

	Product 1	Product 2	Product 3
Appearance			
Aroma			
Texture			
Flavour			

2 Choose one product from the taste test to investigate. Copy and complete the table below in your investigation.

Food product	
Method of preservation and how it extends the shelf life of the food	
Potential advantages for communities of this preservation method	
Challenges of this preservation method in terms of feeding human populations	

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Activity **2.12** (Inquiry): Comparing hunter-gatherer food systems to early agricultural food systems

Copy and complete the table below by researching the differences and similarities of early agricultural food systems compared with hunter-gatherer food systems.

	Hunter-gatherer food system	Early agricultural food system
Types of food available		
Potential advantages for communities		
Challenges of food systems feeding the human population		

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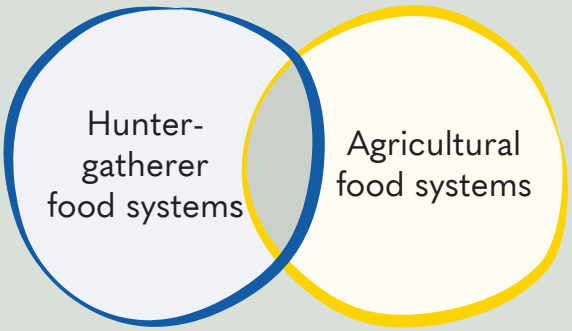
Chapter revision

- Factors that facilitated the development of early agriculture included a change in climate, fertile land and a plentiful water source.
- Agrarian societies' livelihood and economy are based on producing and maintaining crops and farmland, domestication of animals and cultivation of wild plants.
- Key features of hunter-gatherer societies included obtaining their food from nature, hunting animals and gathering wild plants, and all members of the society contributing to hunting and gathering.
- Hunter-gatherer societies were known as egalitarian and shared resources equally.
- Population growth is thought to have been an influential factor in the rise of agricultural civilisations.
- The beginning of agriculture saw the creation of inventions in technology, such as irrigation, that helped make agriculture a viable solution to food production.

Apply your knowledge

1. Describe features of the hunter-gatherer lifestyle.
2. Suggest reasons why many hunter-gatherer communities gradually developed into agricultural communities.
3. Describe features of the early agrarian lifestyle.
4. How would wild plants have been chosen for cultivation?
5. Identify the features of animals that were desired in order for successful domestication.
6. Create a Venn diagram similar to the example below to compare the hunter-gatherer food systems to early agricultural food systems. Include:
   - the types of foods available
   - the potential advantages for communities
   - the challenges in terms of feeding human populations.



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Practice exam questions

Question 1

A challenge for the hunter-gatherers in terms of feeding human populations was:

A Sole dependency on food supply.
B Could carry large amounts of food and resources.
C Abundant food supply.
D Guaranteed to find food but not enough storage.

1 mark

Question 2

Discuss two reasons why humans would give up foraging and adopt agriculture.

4 marks

Question 3

'The agricultural revolution changed our species and our planet.' Discuss what is meant by this statement.

6 marks

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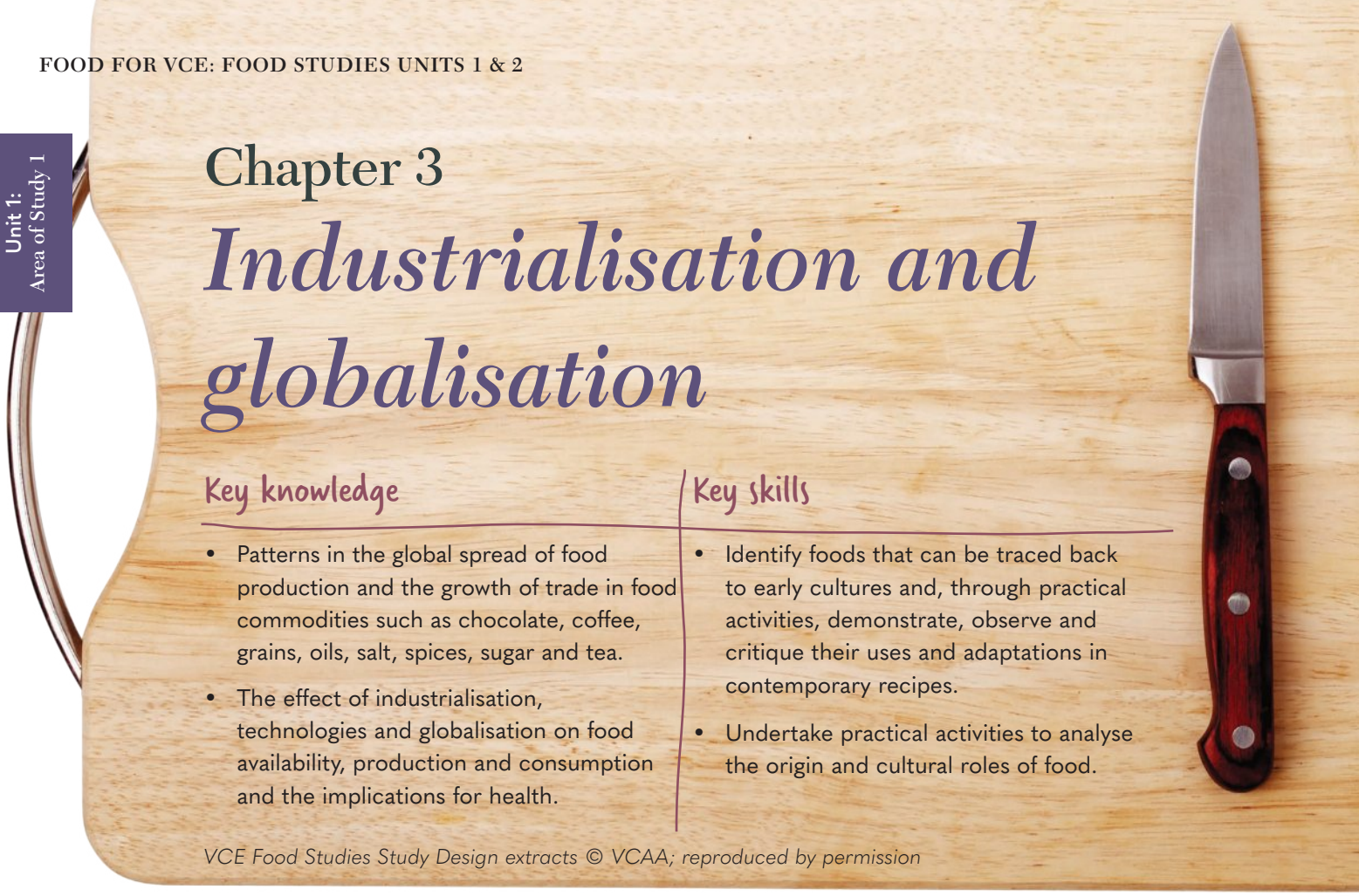
Chapter 3
Industrialisation and globalisation



Key knowledge

- Patterns in the global spread of food production and the growth of trade in food commodities such as chocolate, coffee, grains, oils, salt, spices, sugar and tea.
- The effect of industrialisation, technologies and globalisation on food availability, production and consumption and the implications for health.

Key skills

- Identify foods that can be traced back to early cultures and, through practical activities, demonstrate, observe and critique their uses and adaptations in contemporary recipes.
- Undertake practical activities to analyse the origin and cultural roles of food.

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Industrialisation
A social and economic process of transition from an agrarian and artisanal lifestyle to one controlled by manufacturing and trade.

Technologies
New machinery and equipment created to improve processing and production, using scientific knowledge.

Globalisation
Integration of local and national economies and industries. It involves the movement of goods and services and increases in the flow of processing and production of food systems on a global scale.

Tea and coffee are two of the most popular beverages consumed all around the world. Their origins date back centuries, and each has a rich history of trade and ceremonial use. The growth of food commodities such as these can be traced back to early cultures where food was valued for more than its taste. In this chapter, we will examine the global spread of food production, focusing on food commodities that are still popular today. We will analyse the effect of **industrialisation**, **technologies** and **globalisation** on food availability, production and consumption, as well as examining the implications for health.

Get knowledge ready

1. **Suggest how coffee has become a staple beverage all over the world.**
2. **List some factors that have led to the global spread of food production.**
3. **Explain how changes in technology have impacted food availability and consumption.**

The global spread of food production

The journey from hunting and gathering food to modern-day food systems has spanned thousands of years. Agriculture and the domestication of animals were practised on most continents by 5000 BCE, and it was the development of agriculture that assisted in the growth of civilisations. Explorers who took native foods with them on their travels, and exchanged these foods and knowledge for local commodities, had huge impacts on the growth of food around the world.

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The growth of trade in food commodities

Food commodities connected cultures and early civilisations, and created an exchange of ideas. Foods were traded and opened up communication between people from different religions and cultural backgrounds. The establishment of trade routes provided the ability to exchange seeds for crops, spices and animals, and the food trade began to grow.

As new trade and shipping routes were discovered, explorers were able to find new markets for their countries' food commodities, providing more opportunity for trade (Figure 3.2). Each exchange offered an opportunity for a new food to be discovered and introduced back home.

As we look more closely at food commodities that have influenced our food systems, it is evident that many were part of an exchange in history that led to the global spread of the food.

Video 3.1: Chapter Overview

Figure 3.1: Trade in food was happening as far back as 130 BCE and possibly even earlier on trade routes such as the Silk Road. This trade route remained in use until 1453 CE for commodities such as tea, spices, honey and cattle. Explorers such as Christopher Columbus were influential in obtaining raw materials and agricultural crops to introduce to other countries and to bring home to their own countries.

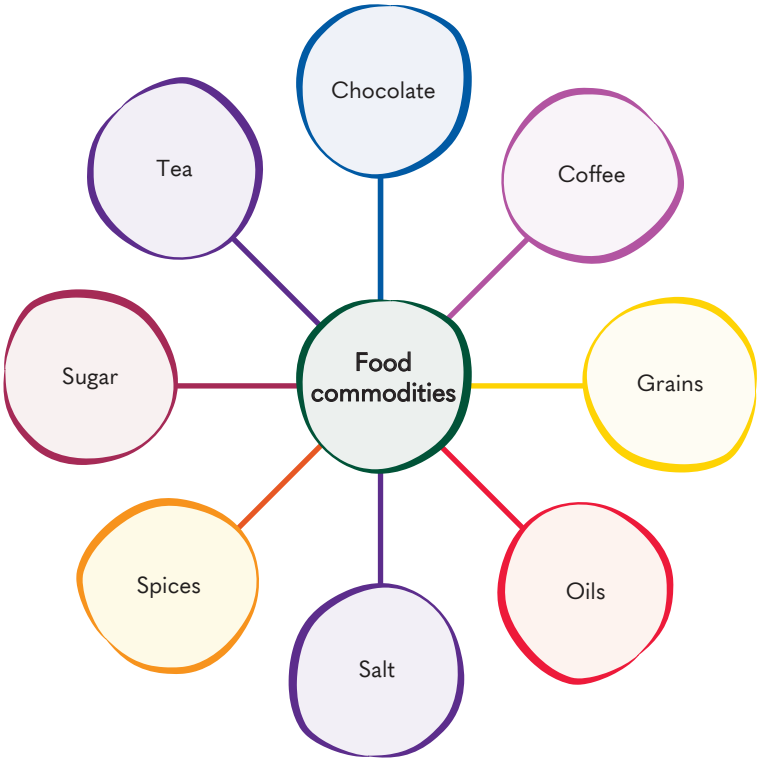

Figure 3.2: Examples of common food commodities that have been influenced by trade and are now global staples.

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Activity **3.1** (Inquiry): Food through time

Create an infographic on a chosen food commodity through time to display in your classroom. Trace the history of your chosen commodity and explain the effect that industrialisation, technologies and globalisation have had on the commodity's availability, production and consumption. Be sure to highlight any implications the commodity has for health.

Chocolate

The history of chocolate is thought to have begun in Mesoamerica, which is modern-day Mexico. The Aztecs domesticated the cacao tree and are thought to have used the beans in rituals, as currency and as a drink for the kings.

Figure 3.3: A snapshot of the journey of the cacao bean around the world

Late 1500s
- Spanish conquistadors (explorers) took cacao beans back to Spain. The Spanish used the bean as a drink and added ingredients such as spices like vanilla and cinnamon to make the drink more palatable.
- Chocolate made its way into Europe. It was expensive at the time and was only affordable by the wealthy. Chocolate houses popped up around France, London and Amsterdam – a place for the wealthy to drink their hot chocolate and socialise.

1765
- A water-powered mill used to grind beans was invented in Massachusetts, America.

1828
- In the Netherlands, Dutch scientist CJ van Houten invented the cocoa press. The cocoa press squeezed out a fatty butter from the bean and left behind a dry powder.

1847
- Fry and Sons, a British chocolate company, solidified chocolate into bars by using the powder and adding butter and sugar.

1876
- Daniel Peter of Switzerland added dried milk to the solid chocolate mixture to make milk chocolate. The rapid growth of solid chocolate in a range of flavours soon occurred around the world.

Figure 3.4: A cacao plantation in the jungle of Peru. When opened, the fruit of the cacao plant, the cacao pod, contains the seed – the cacao bean. The fermented beans (cocoa) have become a valuable commodity over time and are traded worldwide as the key ingredient in chocolate.

Figure 3.5: A close-up of cacao pods, which contain the seed of the plant, the cacao bean

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Figure 3.6: Farmers cut open cacao pods and the beans are extracted, ready to be fermented.

Figure 3.7: Cacao pods (top) and fresh cacao beans in pulp (middle). Cocoa beans (bottom) are dried and fermented cacao beans.

Figure 3.8: Roasting cocoa beans is part of the chocolate manufacturing process. Over time, the development of technology has allowed for food processing techniques, such as roasting, to be more efficient. This has enabled food manufacturers to produce food commodities in large quantities, in a shorter timeframe.

Figure 3.9: Cocoa in a variety of forms for use in modern cooking, such as chunks, nibs, sauce and powder.

Let's talk

Dark chocolate has a reputation as being a healthier chocolate that is high in antioxidants. What are antioxidants and why does dark chocolate have this reputation? Outline the health effects of the consumption of antioxidants.

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Activity 3.2 (Practical): It all tastes the same, doesn't it?

This activity requires a selection of chocolate blocks from the same company (such as Lindt) but with each one having a different percentage of cocoa.

- Create a list of words that you would use to describe the sensory properties of chocolate.
- Using your word list as a reference, conduct a sensory evaluation of samples of chocolate that have been provided for you and rank your preference, with 1 being your chocolate of choice. Copy and complete the table in your notebook.

% cocoa	Appearance	Aroma	Taste	Texture	Ranking
50					
70					
78					
85					
90					
95					
99					

1. Explain your chocolate preference, referring to the sensory properties in your response.
2. Compare the sensory properties of the chocolate with 50 per cent cocoa to that with 95 per cent cocoa, explaining the effect of the different amount of cocoa on the product.
3. Suggest a reason why a company would produce so many varieties of the same chocolate with varied amounts of cocoa.

Fairtrade
A labelling system specifying that fair trading standards are met at every stage of production, and that a certain portion of profits is returned to the producers and communities.

Unfortunately, not all trade is fair. This is certainly true for cacao farmers around the world who have suffered poor trade arrangements for their commodity. Chocolate-making is a very labour-intensive process; often the cacao is farmed in one country and exported to another where the chocolate-making process begins. Cacao farmers who supply the chocolate industry are not always guaranteed a profitable price on their commodity, and this has been exploited by some global companies as the demand for chocolate has grown over time.

Fairtrade is an organisation that supports the cocoa industry and endorses products that have been sourced from suppliers who were paid fairly and treated well.

Activity 3.3 (Inquiry): Fairtrade?

Have you ever noticed this symbol on your chocolate? Explore Fairtrade and what it means to have this symbol on a food product such as chocolate.

FAIRTRADE
AUSTRALIA
NEW ZEALAND

Let's talk

Can you name Fairtrade brands of chocolate for sale in Australia? Do you choose Fairtrade chocolate when available? Describe the benefits of purchasing Fairtrade products.

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Coffee

Coffee, the ground and roasted beans of the tropical, evergreen coffee plant, is one of the most consumed drinks around the world.

Described as having an invigorating effect, it is the **caffeine**, a chemical compound present in coffee, that has made the beverage so popular.

Caffeine
A natural chemical that has a stimulating effect on the body and is found in coffee, tea and cacao plants.

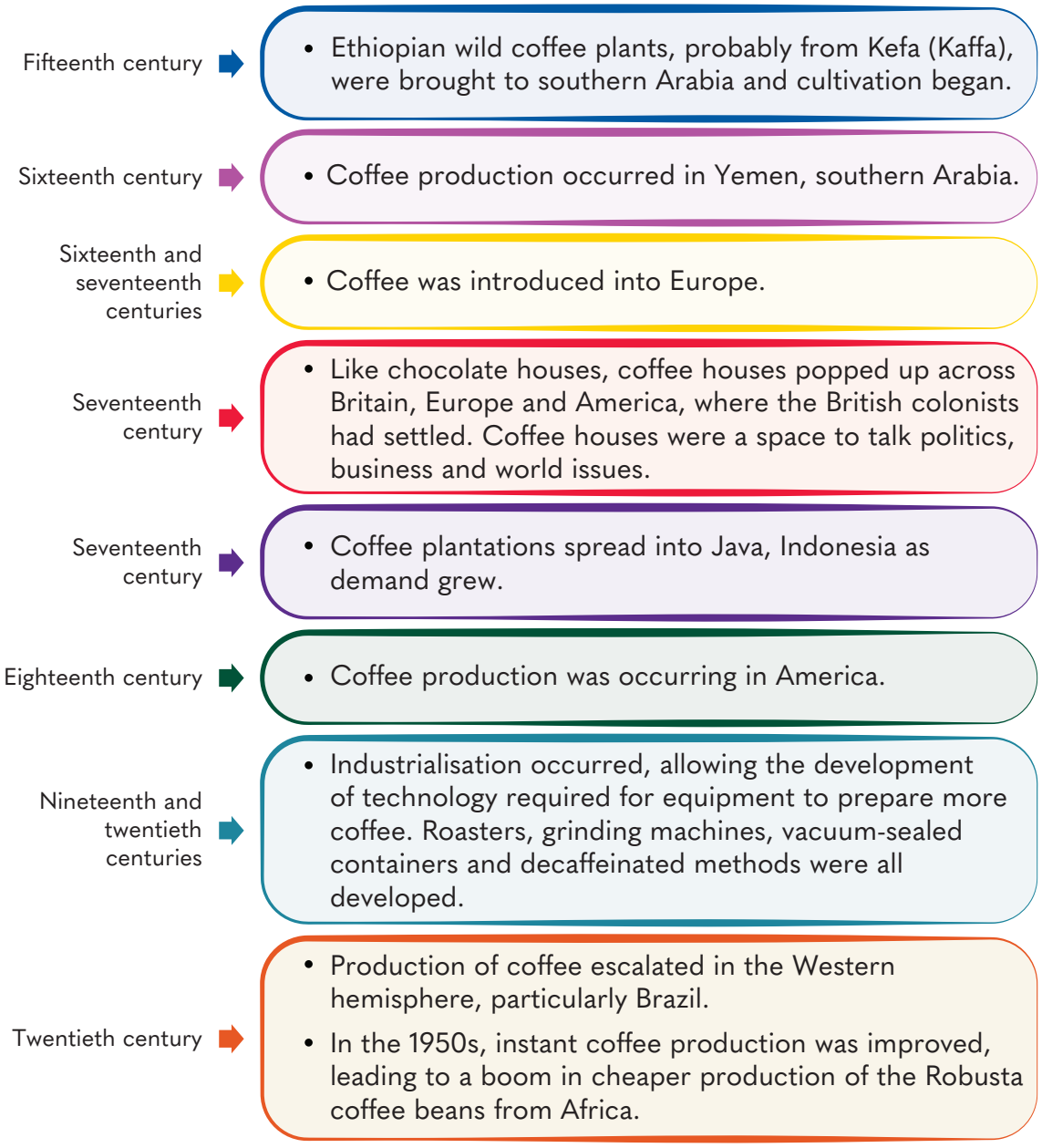

Figure 3.10: The early coffee trade saw a growth in the coffee industry and increased global popularity and consumption.

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Let's talk

Discuss what the memes are telling us about coffee.

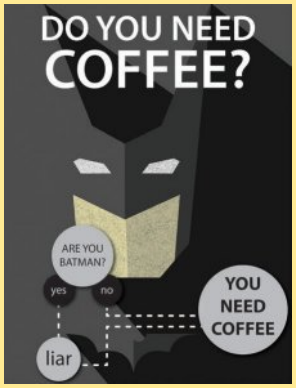

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Figure 3.11: Coffee is picked and sorted on plantations before being hulled and dried.

Arabica coffee

- Comes from the coffee plant species *Coffea arabica*
- Flatter more elongated bean
- Milder flavour; aromatic when brewed
- In primary production is more delicate and vunerable to pests and requires shade to grow
- Grows in cooler, suptropical climates at a higher elevation
- Mainly grown in Latin America

Robusta coffee

- Comes from the coffee plant species, *Coffea canephora*
- Rounder, more convex bean
- More intense flavor and twice the caffeine content of arabica
- In primary production, the robusta bean is much cheaper to produce and much hardier to grow; it is the bean of choice for many commerical coffee companies
- Grows at a lower elevation compared with arabica
- Mainly grown in Africa

Figure 3.12: Two main types of coffee are produced globally: arabica and robusta.

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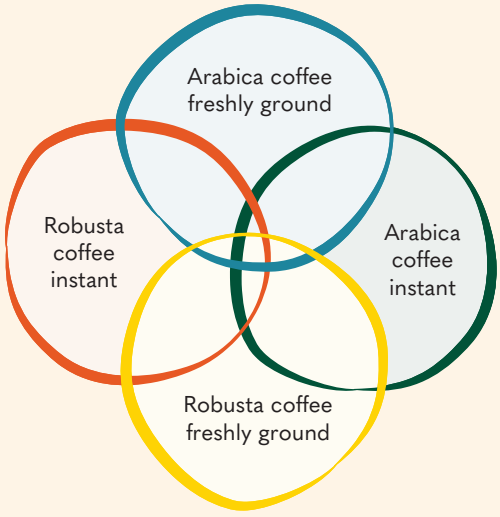
Activity **3.4** (Practical): Sensory analysis of coffee

1 Taste-test a sample of coffee varieties and compare their sensory properties.
2 Copy the table below and rate your preference of each type of coffee on a scale of 1–5, with 1 being strongly dislike it and 5 being like it very much.

	Appearance	Aroma	Taste	Texture	Rating 1– dislike very much 3 – neutral 5 – like very much
Arabica coffee freshly ground					
Arabica coffee instant					
Robusta coffee freshly ground					
Robusta coffee instant					

Evaluation questions

Using the Venn diagram, compare similarites and differences in the coffee varieties.



1 Explain why there are differences in the sensory properties of the coffee varieties.
2 Consider the preparation of the coffee varieties in the kitchen. Which do you prefer and why?
3 Discuss reasons why you think milk and sugar are commonly added to coffee.

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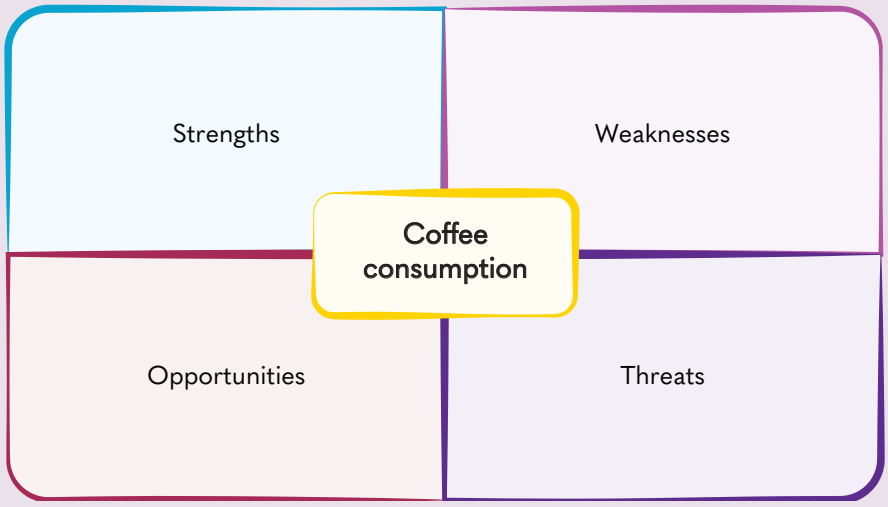
Activity **3.5** (Inquiry): As long as the world has coffee, how bad could things really be?

Complete the SWOT analysis to critique the suitability of coffee as one of the top three consumed beverages in the world. In your research, consider:

- impacts of globalisation
- impacts of the growth in production and trade
- innovations in technology
- coffee availability and sustainability
- consumption trends
- health impact.



Grains

Grains are the cultivated grasses of edible fruit and seeds, also known as cereals. Grain foods are the dietary staples for many cultures. Grains provide a good source of carbohydrates and dietary fibre, essential for energy, digestive health and providing a feeling of fullness.

It is believed that people started to cultivate weeds and grasses in fertile regions in the Middle East 10,500 years ago. In China 1000 years later, rice and millet were cultivated from wild grasses. Corn was the main grain to be cultivated in America.

Let's talk

Why do you think grains are the dietary staple for many cultures?

Figure 3.13: Name the whole grains you can identify in the image. What are the health benefits that these whole grain foods provide?

Wheat

Wheat is the most commonly grown cereal in the Western world, including in Australia. The wheat grain is milled to provide flour, or it can be processed to make many other products, including breads.

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Let's talk

Bread is one of the oldest and most diverse foods made from wheat. What other food products do you know of that are made from wheat?

As we discovered in Chapter 2, wheat originated in the Middle East in the area known as Mesopotamia, which is now part of Iraq. Ancient wheat grains were known as emmer and einkorn.

Bread, one of the most widely consumed food products in the world, was central to the formation of early ancient communities. Wheat grains were available and used to bake bread. Rich in the history and culture of many countries and cuisines, bread is often part of meals and associated with sharing. Every culture has a bread staple.

Sourdough was used by Ancient Egyptians in 4000 BCE.

Grinding stones known as 'querns' were used to process the whole grain into ground flour.

Radiocarbon dating, used by archaeologists, has found charred remains of risen barley bread thought to date back to 3500 BCE. The rise tells us that yeast had been used in bread baking since Neolithic times.

Figure 3.14: Every culture has a bread staple.

Figure 3.15: Dosa, eaten in India, is made from rice and lentils.

Figure 3.16: Injera is the national dish of Ethiopia, made from teff.

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Figure 3.17: Pão de queijo (cheese bread made using tapioca flour) is a popular snack and breakfast food in Brazil.

Figure 3.18: Pumpernickel is a dark rye bread made in Germany.

Figure 3.19: Each Scandinavian country has its own version of rye bread.

Figure 3.20: Tortillas are a corn-based flatbread and a staple of Mexican cuisine.

Activity **3.6** (Practical): Knowing your flours

When a whole grain is milled, the result is flour. Flour used commonly in baking, especially in commercial settings, comes mainly from wheat. Flour also comes from other wholegrains, and the type of flour you use is vital to get the product you are making right. Different types of flour are suited to different recipes, and all flours are different. You cannot switch from one type of flour to another without consequences. To achieve success, it is important to know the right flour for the job!

As a class, make some Turkish bread and experiment with a variety of flours to work out the best flour for the Turkish bread.

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Turkish bread

Ingredients


1¾ cups flour


1 teaspoon salt


1 teaspoon dried yeast


1 cup warm water


½ teaspoon rice flour


¼ cup milk


1 tablespoon sesame seeds

Allocate each class member a type of wholegrain flour. You could source and use rye flour, spelt flour, self-raising flour, plain flour, gluten-free flour, rice flour, buckwheat flour, arrowroot flour or cornflour.

Method

1. Preheat the oven to 220°C.
2. Place flour, salt, yeast and water into a food processor and mix for 10 minutes.
3. Cover bowl with plastic wrap and allow to sit for 20 minutes in a warm kitchen. This mixture will look very sticky, like glue.
4. Lightly grease an oven tray.
5. Pour the mixture very gently to make an oval shape on the oven tray. It is important to be very gentle here as you do not want to pop all the gas bubbles that have formed.
6. Sprinkle with the rice flour.
7. Brush very gently with milk.
8. Sprinkle lightly with sesame seeds.
9. Bake in the oven for 12 to 15 minutes.

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Copy and complete the table below to compare your results by analysing the sensory properties of the flours.

Type of flour	Appearance	Aroma	Taste	Texture	Ranking

Evaluation questions

1. Describe the sensory properties of the bread you have made. How did the flour used impact the sensory properties?
2. Justify the best flour to use when making the Turkish bread.
3. Explain the role of yeast in cooking.
4. Investigate the origins of Turkish bread and the whole grain that traditionally was used to make the bread. Why do you think Turkish bread is still around today?

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Rice

Rice has been a staple food in Asian countries for centuries. Rice is one of the most valuable trade commodities in the world and is part of many cuisines globally. Archaeological evidence shows rice existed in China as far back as 7000–5000 BCE. India and South-East Asia are also rich in rice cultivation history. Rice was quick to migrate to Ancient Greece, Persia and Africa as exploration occurred.

More than two-thirds of the world's population relies on the nutritional benefits of rice.

Let's talk

A global staple, rice is found all over the world. Glutinous, jasmine, brown and wild, rice is used in paella, pilaf, and pudding – the list goes on. Discuss the attributes of rice that make it so versatile.

Figure 3.21: The rice plant. Rice is a type of cereal, an edible grass, and comes in many plant varieties.

Figure 3.22: Rice seedlings grow submerged in 5–10cm of water during their growing season. A rice field is known as a paddy. Successful rice farms need quality soil, adequate irrigation and sunshine.

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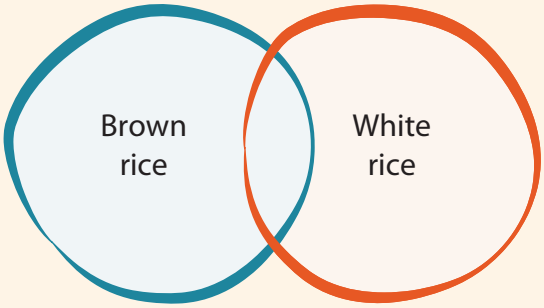
Let's talk

Discuss the nutritional benefits of rice. Outline why this is a staple grain for many cultures.

Activity 3.7 (Practical): Exploring the sensory properties of rice

Investigate the differences between brown rice and white rice.

1. Explain how each type of rice is grown.
2. Develop a list of recipes or dishes that use these different varieties of rice.
3. List the nutritional benefits of each type of rice.
4. Taste-test a sample of each type of cooked rice, then copy and complete the Venn diagram to compare the similarities and differences in the sensory properties.



Corn

Activity 3.8 (Inquiry): Corn

Corn, also known as maize, is one of the oldest cereal grains known to exist, and is rich in history. Investigate corn through time and complete the matrix. Use the matrix headings to guide your research and consider the positive and negative effects of the production of corn over time.

The production of corn over time					
History			Effects – positive and negative		
Availability	Production	Consumption	Technology	Globalisation	Industrialisation

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Oils

Oils have been used for thousands of years in a variety of ways, one being in the process of cooking. Oils are liquid at room temperature and often come from plant sources (seeds and nuts). Oils contain fats, which have a variety of functions in the human body, including providing energy and absorption of the fat-soluble vitamins.

People worked out quickly that placing oily plants in the sun, by a fire or near an oven meant oils could be extracted for other uses. It is thought that in some countries peanuts were ground up and put in boiling water. As the natural oils floated to the top, the fats were skimmed off and used in cooking. The Chinese and Japanese produced soy oil early on, and the Europeans were early producers of olive oil. Technology and a better understanding of the chemistry of fat saw a variety of oils produced from range of plant-based products in the mid-1900s.

Figure 3.23: Oils from a variety of plant sources have been used since Neolithic times, including olive oil – which was used in Ancient Greece.

Table 3.1: Common oils used in cooking

Oil	Source/origin	Uses in cooking	Did you know?
Olive oil	Olive plant	Salad dressing Cooking oil	The largest producers of olive oil today are Italy and Spain. Used in ancient times to preserve foods such as fish, olive oil is an excellent source of vitamin E, which in connection with monounsaturated lipids reduces the incidence of heart disease.
Peanut oil	Peanut plant	Stir frying Mayonnaise Salad dressing Margarine	It is estimated that two-thirds of the world's peanuts are pressed into cooking oil.
Sunflower oil	Sunflower plant	Cooking Salad dressing Margarine Shortening	Richest oilseed source of vitamin E. Believed to have originated in Mexico; today the major producing countries are Russia, the United States and Argentina.
Almond oil	Almond plant	Salad oil Baking	Used in cooking; however, Ancient Egyptians also used it for health reasons, including prevention of wrinkles.

Activity 3.9 (Practical): Making croutons

Working in groups of four, each student should make the following crouton recipe using two different oils.

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Croutons

Ingredients


1 thick slice bread


1 tablespoon canola oil


1 tablespoon macadamia nut oil


1 tablespoon olive oil


1 tablespoon extra virgin olive oil


1 tablespoon sesame oil


1 tablespoon peanut oil


1 tablespoon avocado oil


1 tablespoon coconut oil

Method

1. Cut your bread slice into small, evenly sized cubes. Divide cubes in half.
2. Decide with your group who is going to use which of the oils listed – each person should have two different oils.
3. Toss half of your bread cubes into one of the oils you are using and place on one side of a baking tray.
4. Toss the other half of your bread cubes into the other oil and place on the other side of a baking tray.
5. Bake for 8 minutes.

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Evaluation questions

1. Copy and complete the table below for each of the oils used to make the croutons.
2. Determine which oil makes the best croutons and why.

Oil	Appearance	Aroma	Taste	Texture

3. Identify which oil gave the best colour.
4. Identify which oil gave the best texture.
5. Identify which oil gave the best flavour.
6. Suggest the best use for each of the oils used in this activity.

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Salt

Salted popcorn, salted chips, salted nuts, salty pretzels, salt and pepper calamari, salted caramel ... are you salivating yet? Salt is one of the five basic human tastes and the more salt we consume, the more we crave. The chemical term for salt is sodium chloride.

Figure 3.24: Salt comes in many varieties, including table salt, pink Himalayan salt, rock salt and garlic salt.

Salt is used in both sweet and savoury dishes to enhance flavour. While a small amount of salt is essential for our bodies, there are concerns that we are consuming more salt than we should, because over time we have developed a taste for it. Sodium is used by the body to conduct nerve impulses and regulate fluid levels. A diet high in sodium is linked to high blood pressure and associated health conditions such as hypertension.

Figure 3.25: Salt comes from two main sources: the sea (sea salt) and mining deposits (rock salt).

Let's talk

Salt is required by the human body, so if we need some salt, why is consuming too much salt a health risk?

People have been using salt for preservation for centuries. A highly sought-after trade commodity in the Neolithic era, salt was most commonly used for seasoning and preserving. Our appetite for salt grew when our ancestors started settling the land and learnt about the functions of salt. Not only did salt preserve foods such as meat, increasing shelf life, but it also enhanced the flavour of food. Salt has an indefinite shelf life, but does absorb moisture, which can make it go lumpy.

Let's talk

Salt is a preservation method for salami. Can you think of any other examples of foods preserved with salt? How does salt make foods last longer? The popularity of this method has changed over time. Why do you think this is the case?

Figure 3.26: Ancient Roman soldiers were paid with salt, which was used as a method of trade and currency. The word 'salary' is derived from the Latin word for 'salt' – 'sal'.

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As the transition from nomadic to agricultural life became more common, so too did the use of salt, which was a highly valued commodity.

Seen as pure, salt was part of rituals and often used as a sacrificial offering by Greek and Roman worshippers.

Nomads, who consumed a diet high in wild animals and plants, obtained salt in their diet from the meat they consumed. With the shift to agriculture came a more plant-based diet. Salt was used as a seasoning on plant foods and was a highly valuable commodity of the time.

Figure 3.27: Salt is widely used in food production today, including as a preservative in food products and as a flavour enhancer.

Italy:
The Via Salaria (Salt Route) is one of the oldest roads in Italy. On the coast near Rome, the Romans carried salt from the town of Ostia to Rome and onto other parts of Italy.

China:
China was one of the earliest countries to mine salt, and salt has many uses in Chinese cuisine, such as in pickled vegetables and the popular condiment, soy sauce.

China, United States, India, Germany, Canada and Australia:
The world's largest salt producers of the twenty-first century.

Black Sea and Aegean Sea:
An ancient salt trade route used by the Russians.

Ethiopia and Tibet:
Cakes of salt had monetary value and could be traded for other food commodities or textile products.

Figure 3.28: Salt around the world

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Figure 3.29: Salt production occurs in Australia today. These salt evaporation ponds operate off the coast of Western Australia and the salt is sold to food producers and manufacturers.

Figure 3.30: Extraction and manufacturing of pure pink salt flakes occurs from Lake Tyrrell, Victoria. The lake itself is said to be the last remaining parts of a mega inland sea.

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Hot chips

Ingredients

1 medium sebago potato

1 tablespoon olive oil

Salt

Method

1. Preheat oven to 210°C. Line a baking tray with baking paper.
2. Cut potatoes into 1 cm thick slices/chips.
3. Cook chips in a large saucepan of boiling water for 4 minutes.
4. Drain and pat dry with paper towel to remove any moisture.
5. Place chips onto baking tray and drizzle with the olive oil.
6. Roast for 45–50 minutes until golden and crisp. Turn occasionally during cooking.
7. Serve your chips in a bowl.
8. Add the amount of salt assigned to you from Activity 3.10.

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Activity **3.10** (Practical): Season with salt, please

What is the right amount of salt for a bowl of hot chips?

1 In a group of five students, each student seasons their chips with one of the amounts of salt from the table below.
2 Taste each group member's chips to determine the right amount of salt for a bowl of chips. Complete the table by rating each of five varieties of salt seasoning.

Amount of salt	Taste	Rating
pinch		
¼ teaspoon		
½ teaspoon		
1 teaspoon		
1 tablespoon		

Evaluation questions

1 Determine what was the right amount of salt to your taste.
2 Compare your choice with those of the others in your group. Did you agree or differ? Explain why.
3 Explain the role of the salt in a bowl of hot chips.
4 Describe the sensory properties of too much salt on a food product.
5 Suggest why salt is used all over the world in every culture and region.

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Preserved lemons

Ingredients


1 lemon


1 heaped teaspoon sea salt


½ dried bay leaf


¼ cinnamon stick


Fresh lemon juice

Method

1. Wash a 250 mL (1 cup) capacity glass jar with lid (don't use a metal lid – the salt may corrode it). Dry your jar and set aside.
2. Wash your lemon under cold water and pat dry. Cut into quarters lengthways (don't cut through base).
3. Place sea salt in the centre of your lemon. Pack the lemon firmly into the jar.
4. Add bay leaf and cinnamon stick to jar.
5. Cover with fresh lemon juice and seal the jar.
6. Store in a cool place away from direct sunlight for at least four weeks. If the liquid level drops, add more lemon juice to cover lemon (if the lemon isn't submerged in liquid, a harmless white mould may appear).

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Activity **3.11** (Practical): Preserved lemons

A great way to add flavour to salads, tagines and curries is to add some preserved lemons. Preservation with salt has been used over time to prolong the shelf life of a food product.

Working in pairs, complete an experiment by preserving lemons with salt and make a preserved lemon without the use of salt. Check in on your lemons over a month and see the effects of the salt.

1 Check in on your lemons and keep a record of their appearance in your notebook using a copy of the table below.

Preserving with salt – results	Lemon with salt				Lemon with no salt			
Date								
Appearance								
Additional lemon juice needed?								
Observations/notes								

2 To use, remove the lemon from the jar. Rinse under cold running water to remove salt. Pat dry. Remove the rind and chop as desired. Discard flesh and white pith – they are too salty to use.

Evaluation questions

1 Is salt suitable for preservation?

2 Describe how using salt changes the physical and sensory properties of foods.

3 Did you have to add any additional lemon juice to the jars? Explain why or why not.

4 Suggest why salt is not as commonly used in food preservation today as it was in the past.

5 'Preservation allowed for the growth in trade of a range of food commodities.' Discuss this statement.

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Spices

Spices are the dried seeds, buds, fruits, bark or roots of plants. Spices add flavour, colour and aroma to our foods and are used globally in all cultures and cuisines. Spices help to shape a food culture and identity.

Spices are readily available today, in their original state or as a ground powder. When ground up, the spice does not last as long, and as it ages it loses its flavour and fragrant aroma. Throughout history, spices were used to hide the foul aromas and tastes of food that may have spoiled or been preserved with large amounts of salt and eaten during the winter when it was hard to find fresh food. Not only are herbs and spices bursting with flavour, aroma and colour, but they are also used for their medicinal properties, and some have been used to preserve foods.

Let's talk

Name a spice with which you are familiar and name a food culture to which it belongs.

Figure 3.31: In the Neolithic era, spices such as caraway and mustard seeds were used to add zest to savoury and sweet dishes. Other common spices used were chervil, thyme, horseradish, mustard and garlic.

Let's talk

Can you name the spices pictured below and state how each is used in cooking?

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Activity **3.12** (Inquiry): Spicing things up

Investigate why some parts of the world use spices more than other cultures. Discuss the factors that have impacted the use of spices in cooking in these cultures.

Figure 3.32: Ancient Egyptians not only used cinnamon as a spice, but also as a perfume and an embalming agent.

The search for spices was one of the reasons why the great explorers such as Marco Polo and Christopher Columbus went on their sea expeditions. Spices were brought back to Europe from Asia and Africa, and they were highly valued for their medicinal properties, perfumes and flavours. This made spices very expensive during this time. Some of these spices included cardamom, cloves, coriander and cinnamon.

Let's talk

Consider the spices brought back from the East to Europe and name foods that may have been produced during this time.

Adding spices to dishes creates excitement. Spices improve flavour and are often used in dishes where salt, sugar or fat content has been reduced. Research has shown that herbs and spices provide a wide range of nutrients and **phytochemicals** that help prevent disease and contribute to better health.

Spices contain high concentrations of antioxidants, as well as a variety of vitamins including vitamin C. Chinese medicine uses many herbs and spices in treatments.

Figure 3.33: In traditional Chinese medicine, garlic is used for protection against coughs and colds.

Phytochemicals Chemicals found in plants that can help prevent disease.

Activity **3.13** (Inquiry): Spice origins

Choose a spice and investigate its origins throughout history. Did the spice travel the world? How has the spice become a commonly used ingredient in cooking today? What are the health benefits of the spice?

- Spices originating from Asian regions: cinnamon, pepper, ginger, cloves, nutmeg.
- Spices originating from the Caribbean region and Central America: allspice, vanilla, chillies.
- Spices originating from the Mediterranean region: coriander, fenugreek, mustards.

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Table 3.2: Popular spices

Spice	Part used	Uses in cooking	Did you know?
Cinnamon 	Bark	Used in both savoury and sweet dishes, including curry pastes, Moroccan tagines, Indian rice, chocolate desserts, cakes, drinks and cinnamon toast; also used for mulled wine.	Cinnamon is indigenous to Sri Lanka. It is often used in incense and pot pourri. There are references to cinnamon in the Bible.
Cloves 	Bud	Adds flavouring to roasted meats; used in pies, baked fruit dishes, cookies, biscuits and gingerbread.	The word 'clove' comes from the French word for 'nail', as it is shaped like a small nail. Indonesia produces 80 per cent of the world's cloves. In Roman times, the clove, along with nutmeg and pepper, was highly prized.
Coriander 	Seed	Ground to flavour curries and Indian dishes.	Coriander is the only product that can be both a herb and a spice, as we use the seeds, stems and leaves of the coriander.
Saffron 	Stamen	Used in curry powders, sauces, soups, paella, bouillabaisse and risotto; it is not only used for its flavour, but also its vibrant colour, which dyes the food.	Saffron is the most expensive spice in the world because each stamen has to be hand-picked. It is also used as a dye by many cultures, including by Buddhist monks, who colour their robes with it.
Star anise 	Pod	Used to flavour Asian soups, marinades, spice mixes and chai tea; an ingredient commonly used in Indian, Chinese and Vietnamese cuisines.	Star anise fruits are harvested unripened and dried in the sun, during which time they develop their characteristic aroma and flavour, and deep, reddish-brown colour.
Vanilla 	Bean	Used in ice-cream, custards, baking and chocolate; you can also make vanilla sugar by placing a bean in a jar of sugar.	Vanilla was used for centuries by the Aztecs in Mexico and was offered as a tribute to the Aztec emperor by his people. Real vanilla is expensive, so cheap chemical imitations are common. This product is known as vanilla essence; vanilla extract is natural. Vanilla is not only used in foods, but is also found in many perfumes.

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Let's talk

The most popular spice in the world is black pepper. From where does black pepper originate? Why do you think it is so popular? Can you think of ways it is used in cooking?

Activity **3.14** (Practical): Comparison of curry pastes

1. Soak vermicelli noodles in boiling water to soften.
2. Heat 1 tablespoon of each of the curry pastes in the table below with a little oil.
3. Toss some vermicelli noodles through each of the curry pastes and a teaspoon of water or coconut cream for sensory testing. Copy and complete the table in your notebook.

Curry paste	Massaman	Tikka masala	Keen's Curry Powder	Rendang	Yellow	Laksa
Ingredients						
Appearance						
Aroma						
Taste						
Texture						
Spice rating						
Heat (chilli) rating						
Country of origin						

4. Which curry paste did you prefer? Justify your response.
5. Discuss how trade contributed to the consumption of curry.

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Spicy mocha cupcakes

Ingredients

Batter


1 cup plain flour


1 cup caster sugar


½ cup cocoa


1 teaspoon baking powder


½ teaspoon baking soda


½ teaspoon salt


1½ tablespoons instant espresso powder


1 teaspoon cinnamon


½ teaspoon cayenne pepper


½ teaspoon smoked paprika


½ cup milk


¼ cup vegetable oil


1 egg

½ teaspoon vanilla


½ cup boiling water

Frosting


150 g unsalted butter, at room temperature


2 cups icing sugar

1½ teaspoon vanilla extract


3 teaspoons instant espresso powder


cayenne pepper for sprinkling, optional

Method

1. Preheat oven to 160°C fan-forced. Line a cupcake tin with cupcake liners.
2. In a large bowl mix together flour, sugar, cocoa powder, baking powder, baking soda, salt, espresso powder, cinnamon, cayenne and paprika.
3. Add milk, vegetable oil, eggs and vanilla to the bowl with the flour mixture. Use an electric beater and beat together on medium speed until well combined.
4. Stop the beater and carefully add boiling water to the batter. Beat on high speed for about 1 minute to add air to the batter.

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5 Divide the batter evenly between the cupcake liners.

6 Bake at 160°C for about 18 minutes, or until a toothpick inserted in the centre comes out with moist crumbs.

7 Remove from the oven and allow the cupcakes to cool completely before frosting.

8 For the frosting, in a large bowl beat the butter with a hand mixer until light and fluffy. Add the powdered sugar, vanilla extract and espresso powder and beat together until combined and fluffy.

9 Frost the cupcakes and sprinkle lightly with cayenne pepper if desired.

Evaluation questions

1 Describe the role of the spices in this recipe. Describe how you think the sensory properties would differ if they weren't included.

2 Suggest why people are adding spices to dessert items.

3 Explain how the discovery and globalisation of both chocolate and spices have influenced the foods we consume today.

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Sugar

Wild honey was the first form of sugar used as a sweetener by humans, and has naturally been part of our diet throughout recorded history. Wild bees' hives were raided for the sweet, energy-dense liquid. Later, bees were encouraged to settle in hives, and honey production started.

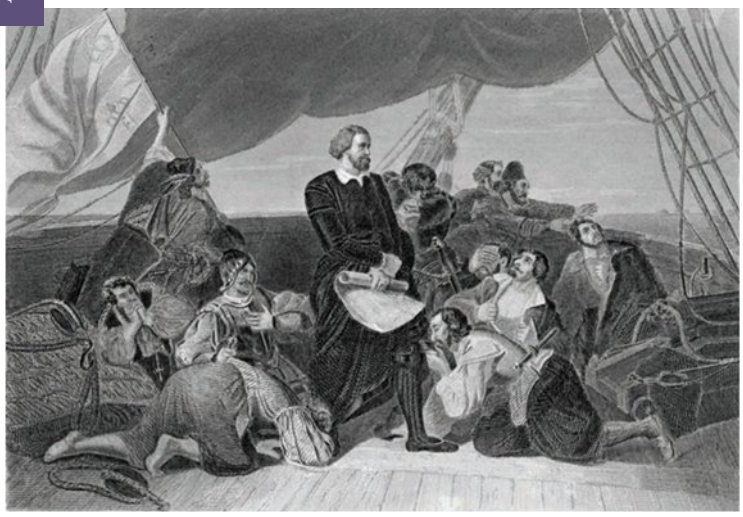

Figure 3.34: During the fifteenth century, Christopher Columbus brought sugar cane to the Americas, and it was there that it began to be cultivated. Sugar was expensive during these times, and was considered a luxury.

Figure 3.35: With the increase in globalisation, food technology and trade, it was not long before the preservation effects of sugar were being used in the food industry.

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Figure 3.36: Sugar is used in many commercial products, even those you would not expect, such as tomato soup and peanut butter, as it makes food tasty and brings out flavours, encouraging consumers to eat more.

Figure 3.37: Today sugar has many roles in recipe development and cooking techniques, with the main role being to provide sweetness. Sugar plays a role in preservation of food products such as jam and confectionery.

Activity **3.15** (Practical): What difference does sugar make?

Working as a group or a whole class, make a quantity of basic shortbread using different types of sugar – for example, caster, raw, brown, icing, muscovado, white, smart white, demerara, rapadura or dark brown.

Compare the different biscuits when cooked to see how different types of sugar function and taste.

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Shortbread

Ingredients


125 g margarine


½ cup sugar


1 cup plain flour


¼ cup rice flour

Method

1. Preheat oven to 160°C.
2. Line a baking tray with baking paper.
3. Use an electric mixer to beat the margarine and sugar variety until creamy and well mixed together.
4. Add the combined flours.
5. Cover with plastic wrap and place in the fridge to rest for approximately 30 minutes.
6. Lightly flour your surface and roll out your dough to 3 mm thick.
7. Shape your biscuits using a biscuit cutter.
8. Place on lined baking trays and bake for 12–15 minutes or until light brown in colour.
9. Leave to cool on tray before moving.
10. Set up the biscuits around the room for a blind taste test. Do not share which sugar you used.
11. Copy the table below and complete a sensory analysis, tasting and comparing each biscuit. Can you name which sugar was used for each one?

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Sample	Guess	Actual	Appearance	Aroma	Taste	Texture
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Evaluation questions

1. Describe the biscuit with the most appealing sensory properties. Name the sugar used to make this biscuit.
2. Describe the biscuit with the least appealing sensory properties. Name the sugar used to make this biscuit.
3. Describe how this activity has given you a sugar experience.
4. List an example of a recipe that incorporates each variety of sugar.
5. Outline why we have different varieties of sugars.
6. Discuss how trade contributed to the consumption of sugar.

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Tea

Tea is the second most consumed beverage in the world, behind water. Tea, which can be a hot or cold beverage, is made by steeping the leaf and bud in boiled water. There are many varieties of tea plants that are produced around the world. Drinking tea has been linked to many health benefits due to it being high in antioxidants. A diet high in antioxidants may reduce the risk of some forms of cancer and heart disease.

Figure 3.38: The tea plant, *Camellia sinensis*, is thought to have been cultivated in China since 350 CE.

Black

Oolong

Herbal

Rooibus

Green

Figure 3.39: Tea comes in many varieties from a range of plants. When steeped in boiled water, the flavours of the tea infuse into the water and create a drink consumed all over the world.

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Figure 3.40: Fifteen facts about tea

Let's talk

Choose three facts from Figure 3.40. Provide an explanation for why this fact is correct.

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Black tea biscuits

Makes approximately 18

Teacher note: Make a batch of biscuits without the tea to complete a comparison test of the sensory properties at the end of the practical. Consider the use of different teas, such as green tea or chai tea, as a comparison.

Ingredients

Biscuits


1 cup plain flour


¼ cup icing sugar


¼ teaspoon salt


2 tea bags English Breakfast Tea


½ teaspoon ground cinnamon


¼ teaspoon ground ginger


¼ teaspoon ground cardamom


¼ teaspoon allspice


⅛ teaspoon ground black pepper


125 g butter

¼ teaspoon vanilla

Black tea icing


2½ tablespoons milk


1 tea bag English Breakfast Tea


¾ cup icing sugar

Method

1. Preheat oven to 180°C. Line a baking tray with paper and set aside.
2. Cut open the tea bags and add tea leaves to the food processor.
3. Add all dry ingredients to the food processor and blitz for 3–4 seconds to combine.
4. Add butter and vanilla, and blitz until combined and a dough starts to form.

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5 Using a tablespoon measure, scoop dough and roll into balls. Place dough balls on prepared baking sheet about 3 cm apart. Press with a fork to flatten.

6 Bake in preheated oven for 10–12 minutes. Let stand on baking sheet 2 minutes before removing to cool on wire racks.

7 To make the icing: heat milk on medium low heat. Steep the tea bag in milk for 3 minutes. Squeeze and remove bag. Whisk milk tea mixture into icing sugar until smooth.

8 Once biscuits have cooled, use a whisk to drizzle icing over biscuits.

Evaluation questions

1 Complete a sensory comparison of the tea biscuit with the batch made with no tea in it.

Black tea biscuit

Similarities

Plain biscuit

2 Identify which biscuit you preferred and explain why.

3 Suggest other uses for tea as a flavouring in cooking.

4 Discuss how trade contributed to the consumption of tea.

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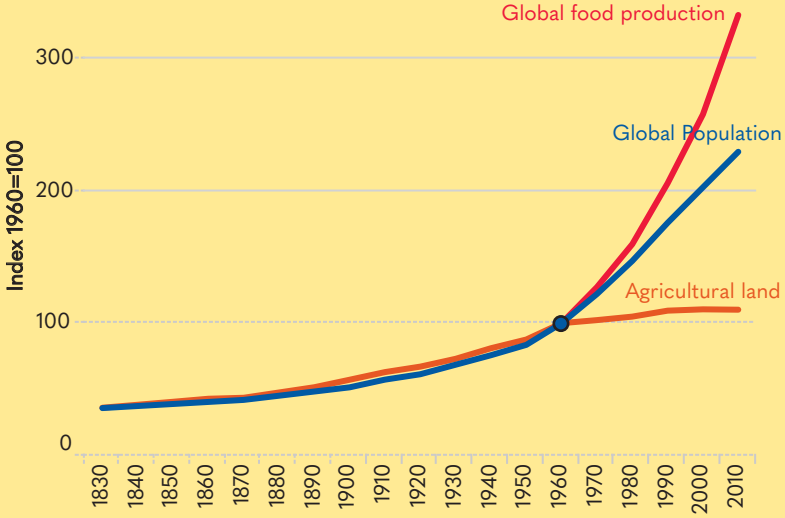
Industrialisation and globalisation

The effects of industrialisation, technologies and globalisation on food availability, production and consumption have allowed major food commodities to become staple food products worldwide. Around the eighteenth century, the shift into the Industrial Revolution and technological advancements created global food systems that changed agriculture, food production and processing.

Let's talk

Global food production, population and agricultural land use



Source: 'How We Feed The World Today', OECD

Discover the key events that could explain the trend in the data. Suggest pros and cons of this data trend on our global food systems.

Industrialisation

Described as being efficient, industrialisation enabled food systems to develop and feed the world's growing population. It allowed for the emergence and expansion of manufacturing of food products not seen before, on a scale that had not previously been achieved. New machinery was developed, new power sources were created and existing industries, including agriculture, became more productive and efficient.

The development of technology during the Industrial Revolution created highly automated machinery and assembly line production methods.

Agriculture was transformed in this new revolution as technology, new inventions and equipment were created for farming practices such as irrigation and ploughing techniques.

Food-processing industries were transformed as food was able to be produced in new ways and at a scale not reached before. Canning was one technology that increased the range of food availability, and demand for canned food products grew rapidly around the world. One of the benefits of canning was that it offered a longer shelf life for food products that were often only eaten in season, such as tomatoes.

Industrialisation saw a rise in the production of convenience foods. Aimed at making life easier, these commercially pre-prepared food products require minimum preparation by the consumer. There can be health implications of consuming such foods because they are generally higher in fats, salts and sugars, which can be associated with a range of health risks such as obesity, elevated cholesterol and high blood pressure.

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Tomato and chickpea curry

Use a variety of canned food products to make this tasty curry. The development of canned foods during the Industrial Revolution was an important innovation in the long history of food preservation.

Ingredients


2 teaspoons olive oil


1 onion, finely sliced


1 garlic clove, crushed


½ teaspoon garam masala


½ teaspoon turmeric


½ teaspoon ground coriander


200 g can diced tomatoes


200 mL can coconut milk


200 g can chickpeas, drained and rinsed


1 large tomato, quartered


¼ bunch fresh coriander, roughly chopped


1 cup cooked basmati rice, to serve

Method

1. Heat olive oil in a large pan and add finely sliced onions. Cook until softened, about 6–8 minutes.
2. Add garlic, garam masala, turmeric and ground coriander, then stir to combine.
3. Cook for 1–2 minutes, then pour in the canned tomatoes, mixing with a wooden spoon and simmer for 10 minutes.
4. Pour in the coconut milk and season. Bring to the boil and simmer for a further 10–15 minutes until the sauce has thickened.
5. Tip in the chickpeas and fresh tomato, and warm through.
6. Serve the curry over cooked rice and garnish with fresh coriander.

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Evaluation questions

1. Suggest why using canned ingredients is preferred when making this recipe.
2. Describe the importance of canning for families around the world.
3. Suggest what occurred before industrialisation that made canned products possible.
4. Explain how canned foods have increased variety in people's everyday cooking.
5. Describe why having canned goods in your pantry is beneficial.

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Technologies

Industrialisation saw the introduction of technology in food processing and production that had not been seen before. This enabled foods to be processed at a faster rate, as workers used machines to speed up production. As time went on and technology advanced, equipment and machinery became more automated, meaning food producers were able to mass produce products for a global market. Innovations in technology has allowed for more food to be produced using the same amount of land.

Let's talk

In the production of coffee, freshly roasted coffee beans are removed from a commercial roaster and fall into the cooling cylinder. Discuss the impacts of technological advancements in food processing and production.

Figure 3.41: Industrialisation of agriculture radically transformed how most of the world's food is produced. Methods of ploughing fields for crops to grow have been transformed with modern agricultural practices. Technology has played a significant role in the development of the plough over time.

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Activity 3.16 (Inquiry): Technological development

Investigate a technological development in primary food production that occurred in the last century and had an impact on the development of agriculture, and food production and processing.

Globalisation

Globalisation has had a major impact on current food systems around the world. It has allowed for the integration of local and national economies, industries and ultimately food systems. Barriers have opened, allowing for the movement of goods and services and increasing the flow of processing and production of food systems, including commodities, technologies, modes of distribution and marketing. The impact of industrialisation and technological advances on food systems has resulted in greater availability and diversity of food in most parts of the world, especially in urban areas. The major commodities in the world on which we have focused in this chapter have all felt the impacts of globalisation.

Let's talk

Choose a food commodity from this chapter and discuss the strengths, weaknesses, opportunities and threats caused by globalisation.

Vanilla is one of the most common ingredients in Australian households. Given that vanilla only grows 10 to 20 degrees north and south of the equator, how has it become a common ingredient in so many countries around the world? That's right: globalisation.

Activity 3.17 (Inquiry): Globalisation

Globalisation has seen the spread of many fast-food chains around the world. McDonald's, an American fast-food company, was founded in 1940 in California. This chain now has around 34,000 outlets operating in approximately 120 countries across the globe. Discuss the health impacts of this global operation.

Let's talk

Have you ever eaten a very similar product both here and overseas? Discuss why multinational companies offer very similar food items in almost every country around the world. Why do consumers locally and globally want to consume these products?

Figure 3.42: Globalisation is responsible for vanilla being available and used all around the world. Vanilla comes from the Spanish word 'little pod'.

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Figure 3.43: Originating in Mesoamerica, vanilla become a valuable commodity, traded along the Silk Road after the Spanish conquered the Aztecs in the sixteenth century. The Aztecs had acquired the taste for vanilla from the Totonacas, who they conquered in the fifteenth century.

Let's talk

Name all the recipes you can think of that use vanilla. Why do you think it is used in so many different recipes?

Figure 3.44: Countries where vanilla is produced today

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Let's talk

Explain how vanilla, originally from Mexico, is now grown in different locations around the world. Compare how vanilla would have been transported from production to households now and in the past. Explain how globalisation has contributed to these changes.

Figure 3.45: Vanilla is the second most expensive spice. It is very labour-intensive to produce, including often needing to be hand-pollinated.

Let's talk

There are positive and negative implications of globalisation. Discuss specific examples for each.

Implications of globalisation for health

The increased availability of products such as processed foods is the result of globalisation. Multinational companies are able to distribute their products through the reduction of barriers to trade and transport as the result of our increasingly connected world. Many of these products are high in saturated fats, salt and/or sugar.

Figure 3.46: Soft drink is available everywhere, due to globalisation. Energy dense, not nutrient dense, it is contributing to increased rates of obesity worldwide.

Increased access to processed foods and sugary drinks can result in people moving away from traditional diets, which are usually lower in fat, salt and sugar. This can lead to excess kilojoules being stored as fat, increasing obesity and other diet-related conditions, negatively impacting physical health and wellbeing.

Activity **3.18** (Inquiry): Coca-Cola

1. How many advertisements can you find online for the brand Coca-Cola for different countries?
2. Outline how they are similar.
3. Outline how they differ.
4. Describe why Coca-Cola has developed different marketing campaigns for different countries despite being the same product.
5. Explain how Coca-Cola is available globally.
6. Explain the impact on health of a diet with regular soft drink consumption.

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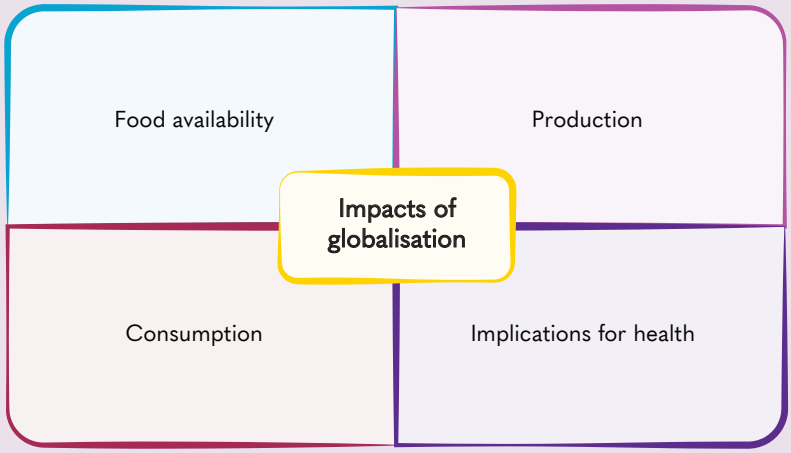
Figure 3.47: Cherries are a summer fruit in Australia, yet you can often purchase cherries during winter. Globalisation has increased the availability of foods for consumers outside their season as they are imported from the other side of the globe, impacting food availability and consumption.

Activity **3.19** (Inquiry): Summary map

Complete the summary map below.



Activity **3.20** (Inquiry): SWOT analysis

Using a SWOT analysis, critique the role and impact of globalisation on food systems. Consider multinational organisations, fresh produce available out of season and health impacts.

Strengths	Weaknesses
Opportunities	Threats

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Chapter revision

- Food commodities and their growth can be traced back to early cultures. Industrialisation, technologies and globalisation have all impacted the available production and consumption of food commodities.
- The movement of food commodities around the world has changed over time. The impact of history has seen greater access to and exchange of food, which has resulted in the global spread of food and commodities such as chocolate, tea, spices and grains.
- Unfortunately, not all trade in food is fair. The need for global supply of many commodities has seen farmers exploited in pursuit of profit. The trade in caffeine is a good example of this.
- Wheat, rice and corn are all staple grains, used by many cultures for a variety of different food products. As we trace the history of these grains, their uses can tell us a lot about the way of life of communities in early times.
- Salt has been used for thousands of years. It can be utilised to preserve flavour and in some cases hide the taste of foods that are not quite palatable. Our appetite for salt grew when our ancestors started settling the land and learnt about the properties of salt.
- Spices add flavour, colour and aroma to our foods and are used globally in all cultures and cuisines. Spices help to shape a food culture and identity.
- There have been positive and negative implications for health in the industrialisation and globalisation of food systems.

Apply your knowledge

1. List factors that led to the growth of trade in food commodities.
2. Outline the history of cocoa production through time.
3. Compare the use and suitability of sugar in cooking from the past to the present.
4. Select a grain and outline its contribution to the global spread of food production.
5. Define industrialisation and describe its effects on food production, consumption and implications for health.
6. Explain how advances in technology impacted food availability, consumption and health.
7. Discuss the effect of globalisation on the availability, production and consumption of vanilla.
8. Outline the impacts of industrialisation and globalisation for health.

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Practice exam questions

Question 1
Fairtrade is:

A Exploitation of a country's whole food system.
B A compulsory component of the food label of every imported food commodity.
C An endorsement of a product that has been sourced from a supplier offering the best price.
D A labelling system specifying that fair trading standards are met at every stage of production, and that a certain portion of profits is returned to farmers and communities.

1 mark

Question 2
Describe the importance of trade to past and present food patterns. **4 marks**

Question 3
Analyse the effect of industrialisation on food availability, production and consumption of food commodities, and health. **8 marks**

Strengths	Weaknesses
Opportunities	Threats

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Area of Study 1: Extended response question

Question 1

Explain and rank the three major factors you believe are the key contributors in the development of a global food supply.

8 marks

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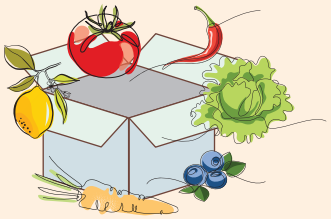
Let's unpack it



Refer to the **How to unpack exam questions** section on page xvi as a guide to the question breakdown below.

Question 1

Explain and rank the three major factors you believe are the key contributors in the development of a global food supply.

8 marks

A Annotate the command word

Explain: provide a detailed assessment about your chosen three major factors.
Rank: Place in an order.

B Parts of question

Choose three separate major factors.

C Count the marks – holistically marked

8 marks:
6 = explain
2 = rank

D Determine key words to use

Industrialisation
Technologies
Globalisation

E Evidence

Use your knowledge to provide evidence to support your statements made:
Provide a relevant, detailed example for each factor to demonstrate a deeper understanding.

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Unit 1
Food origins

Area of Study 2: Food in Australia

In this Area of Study students focus on the history and culture of food in Australia. They look at indigenous food prior to European settlement and the attempts of the first non-Indigenous settlers to establish a secure and sustainable food supply. Students consider the development of food production, processing and manufacturing industries and how Australian food producers and consumers today have been influenced by immigration and other cultural factors. Students conduct research into foods and food-preparation techniques introduced by immigrants over time and consider the resurgence of interest in Indigenous food practices, while reflecting on whether Australia has developed a distinctive cuisine of its own. Students explore trends in food practices and food subcultures in Australia and their impact on health.

Practical activities enable students to demonstrate, observe and reflect on the use of ingredients indigenous to Australia. These activities also provide students with opportunities to extend and share their research into a selected cuisine brought by migrants to Australia.

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Chapter 4
Food in Australia

Key knowledge

- The characteristics of food production and consumption among Victoria's first peoples prior to European settlement, including the range of foods and flavourings available; tools and technologies used; human and natural resources required; specialist knowledge and practices; and the contribution to health.
- The challenges encountered by the first non-Indigenous settlers in striving to establish a secure and sustainable food supply.
- The factors influencing the development of food production, processing and manufacturing industries across Australia.

Key skills

- Evaluate foods and flavourings indigenous to Australia and through practical activities demonstrate, observe and reflect on contemporary culinary uses.
- Explain influences on the development of Australian food production, processing and manufacturing industries.
- Participate in and reflect on practical activities to explore the history and culture of food in Australia.

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Video 4.1: Chapter Overview

How much do you know about the foods and ingredients growing in or on Australian land? Or about the history of the foods produced here that are not native to Australia but have become our national staples? In this chapter, we will evaluate the characteristics of food production and consumption among Victoria's First Peoples prior to European settlement. Aboriginal and Torres Strait Islander Peoples, the first Australians, are the oldest continuous living cultures in human history. We will explore the history and culture of food in Australia and look at the challenges encountered by the first non-Indigenous settlers in striving to establish a secure and sustainable food supply.

Get knowledge ready

1. **Name foods and flavourings indigenous to Australia.**
2. **Outline tools and technologies you think may have been used by Victoria's First Peoples prior to European settlement.**
3. **Explain a challenge that would have been faced by a non-Indigenous settler in establishing a secure food supply.**

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Victoria's First Peoples

For 60,000 years, Aboriginal and Torres Strait Islander communities have been gathering, growing, harvesting and using native ingredients from the land we call Australia.

Let's talk

Who are the traditional owners of the land on which you live in Victoria?

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

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

Source: VCAA, 2022, VCE Food Studies Study Design, 2023–2027, page 9.

Biodiversity
The variety of plant and animal life in a particular habitat or the world.

Resilient
Able to recover quickly or withstand difficult situations.

Stewardship
Careful and responsible management; taking care of something.

Equitable
Fair distribution to enable positive outcomes for all.

Food security: exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life.

Source: FAO, 2001

Food sovereignty: The right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems.

Source: Declaration of Nyéléni, 27 February 2007

Let's talk

Describe what you see in this image. How does this image make you feel? Suggest what you want to know more about from looking at this image.

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Activity **4.1** (Inquiry): The first agriculturalists

Search online for 'A real history of Aboriginal Australians, the first agriculturalists' to listen to the TEDx talk presented in Sydney by Aboriginal academic Bruce Pascoe, the author of *Dark Emu*.

1 As you listen to the presentation, complete a PMI table of ideas and information that comes up.

Plus	Minus	Interesting

2 Describe the scenes observed by many first European explorers.
3 Outline what was unique about the hillsides of Melbourne.
4 Explain what the 'ancient agricultural economy' is.
5 Describe the characteristics of food production and consumption among Victoria's First Peoples prior to European settlement, as presented by Bruce Pascoe.
6 What are the foods adapted for our climate?

Foods and flavourings

Let's talk

Name foods and/or ingredients you have heard about that are traditional bush foods. Which of these have you tried? Which do you eat regularly?

The range of foods and flavourings available to the First Nations Peoples came from the land. Investigating First Nations Australians food and cooking knowledge, including people's historical practice of growing, preparing and the sharing of food, provides us with great insight into Aboriginal and Torres Strait Islander Peoples' food traditions and the adaptions we can make in the future.

Let's talk

'If you care for Country, Country will care for you.'

Discuss the meaning of this belief of Aboriginal and Torres Strait Islander Peoples. How does this relate to food?

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Activity **4.2** (Inquiry): An indigenous food exploration

1 Look at the above images. Your task is to find out where the ingredients are from. List their health benefits and provide one way they were used in cooking.

2 It is estimated that up to 5000 native food species (almost 20 per cent of Australia's native flora and fauna) were utilised by Aboriginal Peoples. Investigate a list of Victorian indigenous plants and outline their health benefits and uses in cooking.

Ingredient	Origin	Health benefits	Use in cooking	Interesting fact
Finger lime				
Wattle seed				
Lemon myrtle				
Roselle fruits				
Quandong				
Saltbush				

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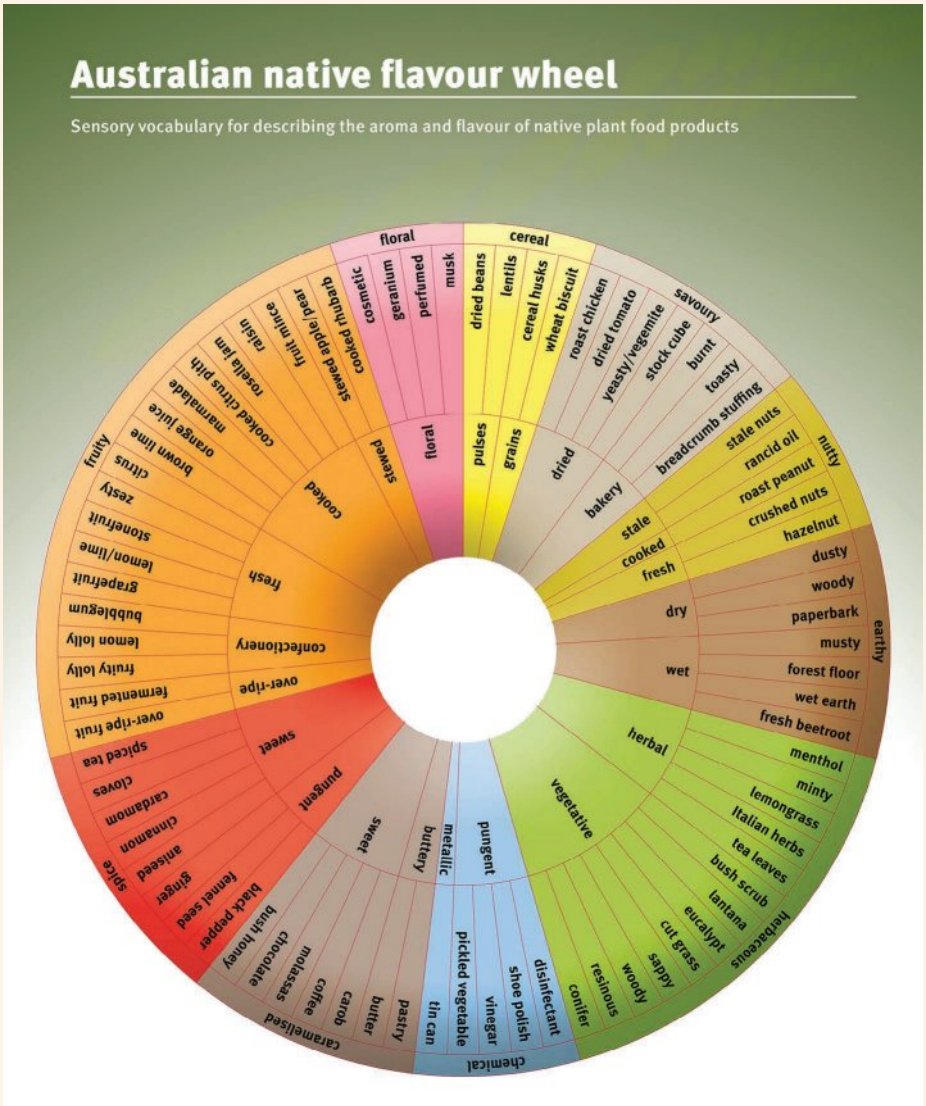
Activity **4.3** (Inquiry): *MasterChef Australia* – the outback challenge

Search online for *MasterChef Australia* – Season 13, Episode 52.
Set in Simpson's Gap in the Northern Territory, watch this episode as contestants create a dish using a variety of foraged bush foods.

1. Where is this filmed and who are the Traditional Custodians of this land?
2. Explain why this episode started with a Welcome to Country.
3. Name the ingredients Rayleen Brown brings with her.
4. Outline how the indigenous ingredients have been incorporated into the different dishes produced by the contestants.
5. Which ingredients would you use if you were involved in this challenge? What would you cook?

Activity **4.4** (Practical): Indigenous foods and flavours – a sensory explosion



Source: Agrifutures

1. Taste-test a variety of indigenous foods, which are local to you if possible. A suggested list includes finger limes, macadamia nuts, roasted wattle seed, lemon myrtle tea, wild herb salt, mountain pepper, aniseed myrtle, saltbush, warrigal greens and kangaroo.
2. Using the 'Australian native flavour wheel', complete a sensory analysis by identifying and describing the sensory profile of native Australian foods.
3. Evaluate the foods and flavourings tested today and suggest a contemporary culinary use for each.

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Poached pears with indigenous flavouring

Ingredients

Packham pears or beurre bosc pears, peeled (1 per indigenous flavour being tested plus control)

1 cup firmly packed brown sugar

1–2 tablespoons of indigenous flavouring (lemon myrtle, cinnamon myrtle, aniseed myrtle wattle seed, desert lime, native Australian hibiscus)

2 tablespoons double cream to serve

Method – for one pear

1. Place 4 cups cold water, sugar and indigenous flavour (if using) in a saucepan over medium-high heat. Bring to the boil. Reduce heat to medium-low.
   Note: one pear will need to be cooked without an indigenous flavouring as this is your control and needed for your comparison.
2. Add pear. Cook, partially covered, turning occasionally, for 15 to 18 minutes or until pear is just tender. Remove from heat. Allow pear to cool in syrup, turning occasionally. Using a slotted spoon, transfer pear to a plate.
3. Return syrup to medium-high heat. Bring to the boil. Boil for 10 minutes or until liquid is reduced by one-third, creating a sugar syrup.
4. Cut the pear in half and remove the core to serve. Serve pear with sugar syrup and cream.

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Evaluation questions

1 Taste and compare your indigenous-flavoured pear/s to a control pear cooked without the indigenous flavouring.

Pear and Flavouring	Appearance		Aroma		Taste		Texture	
	Ranking	Descriptor	Ranking	Descriptor	Ranking	Descriptor	Ranking	Descriptor
Control pear (no indigenous flavour								
Indigenous flavour								
Indigenous flavour								
Indigenous flavour								

- Provide descriptors for each sensory property.
- Give a score from 1 to 10 for each sensory property for your personal preference (1 = strongly dislike, 5 = neutral, 10 = strongly like).

2 Record your ranking on a star diagram.

3 Evaluate the indigenous flavourings and their contribution to the overall sensory appeal of the poached pear.

4 Explain your personal preference.

5 Suggest contemporary cooking ideas using the indigenous flavourings used in this test.

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Activity **4.5** (Practical): Kangaroo meat

Lean in nature, kangaroo meat has become a widely available meat product in supermarkets. Taste a sample of cooked kangaroo and complete the analysis.

Evaluation questions

1 Describe the sensory properties of raw and cooked kangaroo.

Sensory property	Raw kangaroo	Cooked kangaroo
Aroma		
Appearance		
Taste		
Texture		

2 Investigate the variety of kangaroo meat products available on the market.
3 Why do you think these products have become popular?
4 Investigate and outline advantages of using kangaroo meat as an alternative to other meat varieties, such as beef and lamb. Consider environmental, economic and health benefits in your response.
5 Outline the challenges of using kangaroo meat as an alternative to other meat varieties.
6 Suggest a recipe for which you could substitute the meat for kangaroo in modern cuisine.
7 Debate whether or not we should eat our national symbol.

Tools and technologies

First Nations Peoples designed and engineered tools and technologies that are still used today. Their tools and weapons were used to help work the land and have been passed down from generation to generation.

Let's talk

Look at the historical image of Australian Aboriginal Peoples preparing a meal. Name the tools you can see. Suggest what each tool being used for. How do tools assist in food preparation?

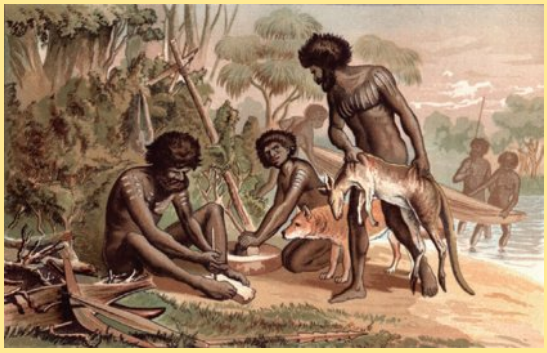

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Figure 4.1: Tools and technologies such as boomerangs and spearheads have been used to hunt and gather foods by Aboriginal and Torres Strait Islander Peoples for centuries. Other tools used to hunt, gather and prepare foods include traps for fish, eels and shellfish, along with spearheads, arrowheads, ropes and handles, canoes, grinding stones and bush ovens.

Let's talk

Throwing sticks, also known as hunting boomerangs, are a commonly known tool of Aboriginal and Torres Strait Islander Peoples. Hunting boomerangs come in many shapes and sizes, and are thrown to spin through the air and cause damage to an animal by clubbing them. Discuss the technology behind the design of the throwing stick and why it is an effective tool in hunting and gathering practices. Do you know of any other cultures that use a similar tool?

Activity 4.6 (Inquiry): First Nations Australians' tools and how they are used

Using the information about Uluru from Parks Australia, discover the range of tools and how they were used by First Nations Australians to provide food.

1. Explain the meaning of Tjukurpa. How does it relate to food?
2. What are the advantages of having 'one resource, many uses'? Give an example.
3. List the types of bush foods eaten by the Anangu people.
4. Create a list of women's tools. For each tool, state how it was used to provide food.
5. What were men's tools used for? Create a list of these tools and state how they were used to provide food.

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Activity **4.7** (Case study): Native Australian utensils

Find out which special utensils you will need to have on hand during cooking.

Paperbark

The bark of the melaleuca species can be wrapped around meat or fish before cooking to create a smoky flavour. Traditionally these parcels were buried underground with coals to cook them.

Bark troughs

Used to boil water on the open fire (large sea shells were also used for this job), the bark troughs were also employed to help separate seeds from other rubbish that may have been gathered with them (dirt and bark). Seeds were tossed into the air and then caught again in the trough. The lighter rubbish would blow away in the wind as the heavier seeds fell back into the trough. Heavier rubbish was later separated from the seeds by swaying the trough in a rocking motion.

Dilly bag

Made from bark and often decorated with feathers, dilly bags were used to help collect and transport bush foods. They were also sometimes strung in a creek under running water with the foods inside to help rid the foods of poisons and bitter tastes.

Source: SBS Food; *Utensils: Native Australian;* 31 May 2013

Case study questions

1. Explain how native Australian utensils are different from the utensils used in modern kitchens today.
2. Describe the advantages of using these utensils.
3. Describe the challenges of using these utensils.
4. Research other examples of tools and equipment used.
5. Explain the role of the natural environment in tool use/development.

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Activity **4.8** (Practical): Cooking with paperbark

Design a fresh and nutritious meal showcasing paperbark, as used in First Nations Australian cooking. Your meal needs to only serve one and should include a protein, being suitable for an evening meal. Consider the use of indigenous foods and flavours. This meal needs to be produced within your class time.

Human and natural resources, specialist knowledge and practices

Aboriginal and Torres Strait Islander Peoples were the first land managers. Land management practices ensured care for Country and helped to protect and create abundant food sources. An example of land management practices is use of a natural resource: fire. Fire was carefully managed and used to keep Country balanced and to promote health and regeneration of plants and trees.

Activity **4.9** (Inquiry): Firestick farming – how traditional First Nations Australian burning protected the bush

Search online for the article 'Firestick farming: how traditional Indigenous burning protected the bush' on the SBS website. Read this to answer the questions below:

1. Describe three advantages of traditional firestick farming and burning practices.
2. Suggest two challenges facing modern Australia in protecting the bush.
3. State one question about firestick farming you still want to know more about. Discuss as a class.

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Activity **4.10** (Inquiry): Kulin seasons

Investigate the Kulin seasons.

1 Name each Kulin season and explain its significance.

2 Copy the format below and complete a SWOT analysis during your research to discover the importance of Kulin seasons. How do the Kulin seasons impact food and food supply?

3 Suggest questions and ideas that you would like to investigate further relating to Kulin seasons. Discuss how you could have these questions answered.

Activity **4.11** (Inquiry): Growing native foods

Australian soils are relatively low in nutrients as a result of being so old compared to most soils in the world. They need fertiliser to grow exotic [introduced] plants but need nothing to grow ours [indigenous species]. They are perfect as they are. Our plants have had millions of years to adapt to low soil fertility.

Source: 'Future Fire, Future Farming' by Bruce Pascoe, Bill Gammage, Margo Neale (Editor), p36. Publisher: Thames & Hudson Australia Pty Ltd, 2021

1 Discuss the benefits of growing native foods in Australian soils.

2 How can we use this fact to our advantage when growing food today?

3 Suggest how this soil would have impacted European settlement.

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The contribution to health

Activity **4.12** (Inquiry): *Food Safari* – bush tucker

Search online for the *Food Safari* episode 'A Look at Bush Tucker' on the SBS website.

1. Explain why the bush is described as Neville's 'supermarket' and chemist.
2. Suggest why Neville doesn't like to chop down trees to get his honey.
3. How might honey have been collected before modern-day tools were available?
4. Explain why our Australian honey bees are vital for biodiversity and future honey production.
5. What are the benefits of eating Kakadu plum and how is it being used today?
6. How can the favour of the Kakadu plum be described?
7. Describe the benefit of eating fruit in season.

Activity **4.13** (Inquiry): Native grains versus wheat

Bruce Pascoe is working hard to reintroduce native grains and flours into Australia's food systems. Discover more about his work in this area by searching for the article 'Native Grains: Grass Roots', published in *Pip Magazine*, and complete the questions.

1. Compare native grains to wheat grains.
2. State the benefits of reintroducing native grains and flours into Australia's food systems.
3. Outline the challenges of reintroducing native grains and flours into Australia's food systems.
4. Explain the health benefits of including native grains in our diet.

Contemporary culinary uses of indigenous foods and flavours

Use of indigenous foods and flavours has become popular in recent times. Herbs and spices, native Australian meats and adaptation of products to include indigenous flavours are common in supermarkets across Australia.

As consumer demand grows, the food industry continues to respond by looking for ways to incorporate indigenous flavours into products and culinary delights.

Modern Australian restaurants are aiming to bring consumers native Australian ingredients that educate and inspire. Some chefs are even ensuring economic growth within Aboriginal communities by helping to build sustainable farming and foraging systems.

This is combined with a growing awareness of Australia's rich and unique native foods, which introduce a distinct indigenous flavour profile to otherwise international dishes and food products. The contemporary culinary uses are endless, and chefs, food producers and the food industry are exploring at a rapid rate. As consumer demand grows, the food industry continues to respond by looking for ways to incorporate indigenous flavours into products and dishes.

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Activity **4.14** (Inquiry): Mabu Mabu's Tuckshop

Search on YouTube for the video *This Indigenous Cafe is Making Australian Ingredients Mainstream in Melbourne*, from 'Seasoned Traveller'. Nornie Bero, Torres Strait Islander and owner of food business Mabu Mabu, talks about making Australian ingredients part of mainstream dining out. Evaluate foods and flavourings indigenous to Australia and reflect on their contemporary culinary uses.

1. 'Food is the best way to have conversation about culture.' Do you agree? Why or why not?
2. List the ingredients that are used in this clip, which are traditional to Aboriginal and Torres Strait Islander cultures.
3. Describe the main goal of Mabu Mabu's Tuckshop.
4. What are people expecting when they enter Mabu Mabu's Tuckshop, compared with what they actually get when they enter?
5. How did Nornie Bero learn to cook? What influences were there on her career?
6. State the meaning of Mabu Mabu.
7. Outline the best way for more native ingredients to become more mainstream.
8. Are native Australian foods 'superfoods'?
9. State the solutions Nornie Bero provides for those in the hospitality industry to increase the supply of indigenous foods.

European settlers

When the first Europeans arrived on Australian shores, they brought with them supplies of foods that were foreign to Australia. Attempts of the first non-Indigenous settlers to establish a secure and sustainable food supply were met with many challenges.

The Australian climate and landscape were vastly different from what these settlers had seen before. First Nations Australian populations had been living off the arid land for tens of thousands of years prior to the arrival of the First Fleet; however, the settlers thought the land was too barren and the climate too hostile. They considered the soil infertile and freshwater supplies insufficient.

The European colonisers brought food supplies with them; however, they needed to establish their own way of growing food to supplement the rations if they were to survive. They came ashore with stocks of white flour, salted meat, dried peas, butter and rice. Many of their supplies had deteriorated due to the excessive heat and infestation of weevils during the voyage. Domesticated animals also arrived on the ships of the First Fleet, including horses, cattle, sheep, pigs, rabbits, turkeys, geese, ducks and fowls.

They tried to establish farms, but most of the colonial administrators and convicts had few or no farming skills. For those who had experience, this knowledge did not translate well to the Australian climate and landscape.

Let's talk

Consider how the Australian landscape and climate differs from that of England, from which the First Fleet set sail. How did this make setting up farms a challenge?

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Figure 4.2: Attempts to establish a secure and sustainable food supply faced many challenges.

The colony nearly collapsed within the first few years due to crop failures and inconsistent food supplies brought in by ships. Colonists would trade with the Aboriginal Peoples for indigenous foods to supplement their rations. This trade included kangaroo, fish and fruits. Eventually, colonists learned to grow their own food and farms started to generate a viable food source.

Let's talk

Growing foods in Australian soil was challenging for European settlers. Discuss what you think might have been the reasons for this.

As more European settlers arrived, and their population grew, so did the conflict with the Aboriginal Peoples. Communication barriers coupled with the difference in culture resulted in hostility. Land ownership traditionally was marked by Europeans with fences and barriers; this was not what the first British colonists found when arriving in Australia. To the first settlers, it was as if no one owned the land. They did not understand the First Nations Peoples' connections to land, and to culture and communities. There was also no respect for the local spiritual sites of the Aboriginal Peoples. Likewise, the First Nations Australians did not understand European farming methods or their concepts of what land ownership was. Language barriers and misunderstandings would cause unease and conflict between the traditional landowners and the colonists.

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Activity **4.15** (Case study): Australian agriculture and rural life – life on the land

Living and working on the land has been part of the popular image of Australia since the earliest days of settlement. Colonisation of Australia saw a transformation of the natural landscape of our continent through agriculture.

For thousands of years before the first Europeans arrived, Indigenous Australians had been living on and manipulating the land and the environment. Indigenous Australian methods of agriculture, horticulture and aquaculture included crop-growing, fish-trapping and controlled burning ('fire-stick farming') to encourage new growth in native plants and to facilitate hunting.

Regularly burning off vegetation had the long-term effect of turning scrub into grassland, directly increasing the food supply of the Aboriginal Peoples by changing the composition of plant and animal species in an area. It also promoted the growth of edible ground level plants, such as bush potatoes, and boosted the population of grass-eating species such as the kangaroo.

When the First Fleet arrived in January 1788, the new settlers found themselves in a land with a very different climate from the one they had left. Their tools, methods of farming, crops and livestock were unsuited to the harsh, comparatively barren country around Port Jackson.

Governor Phillip had been instructed to begin cultivation immediately on landing. Once basic shelter had been provided, the main task was clearing, cutting, grubbing and burning of trees. English axes were blunted by the hard Australian timbers. Land clearing was achieved by sawing trees above the surface of the ground, leaving stumps that had to be removed by teams of convict labourers before the land could be tilled.

The first settlers, convicts and military personnel were keen to farm the land and raise food, but their inexperience in farming techniques and the unfamiliar landscape resulted in near-starvation due to early crop failures. The arrival of the Second and Third Fleets with supplies saved the colonists and made officials in London aware of the desperate need for experienced farmers and labourers in New South Wales.

Governor Phillip quickly realised that the land around Farm Cove would not support the colony. The search for suitable land for agriculture led to the discovery of arable plains fed by the waters of the Parramatta River, which Phillip named Rose Hill. By late 1791, agriculture had been abandoned at Farm Cove and all efforts were concentrated on the spread of cultivation

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at Rose Hill, now called Parramatta. The success of these farms was crucial to the food-obsessed colony and Governor Phillip rewarded early agriculturalists, like James Ruse, with grants of land.

When the British settled Australia, the colonial government claimed all lands for the Crown. Successive governors of New South Wales had exclusive authority to make land grants. In 1824, an Act of British Parliament established the Australian Agricultural Company (AACo), which was set up on one million acres at Port Stephens, New South Wales, to improve production of fine wool and other crops for export.

From the 1820s, however, the occupation of Crown land without legal title became a widespread practice in the colony. Such landholders, who took up residence on large unoccupied tracts of land for pastoral purposes, were known as 'squatters'.

In isolated rural districts, pastoral properties – or stations – were centres of activity and hospitality, which often belied the constant struggle for self-sufficiency and the loneliness of station life.

Life on the land could afford wealthy pastoralists an elegant lifestyle and plenty of time for rural leisure pursuits outside hectic breeding, sowing, shearing and harvesting seasons.

The advance of settlement saw a swift transformation from a natural to a cultivated landscape. Post-and-rail fences kept the bush at bay while homesteads with wide verandahs, surrounded by carefully manicured lawns and gardens, created a picturesque contrast between the wilderness of spreading plains and dramatic mountain backdrops.

Text and images courtesy the State Library of NSW

Case study questions

1. Describe how First Nations Australians manipulated the land and environment in order to obtain food and facilitate hunting.
2. Suggest how the Australian landscape and climate differed from that of England.
3. The First Fleet brought food, livestock and tools with it to Australia, with the expectation of establishing its own food supply on the lands being settled. Research each of these, including visual images and descriptions.
4. Explain reasons why early European settlers struggled to secure a sustainable food supply. Consider the knowledge and skills of the First Fleet, their resources, and the Australian climate and landscape.

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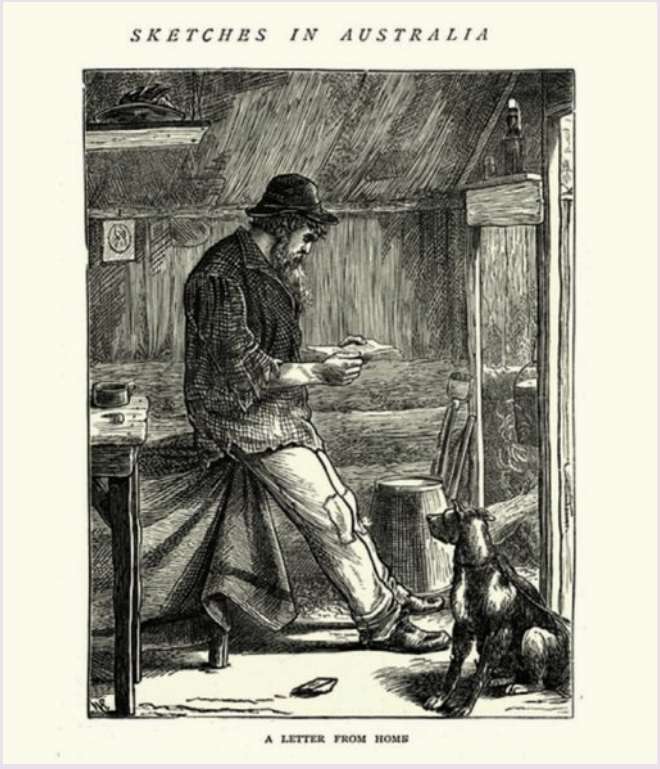
Activity **4.16** (Inquiry): Establishing a safe and secure food supply

English seafarer William Dampier observed in 1697 that, 'The earth affords them [Aboriginals] no food at all. There is neither herb, root, pulse nor any sort of grain for them to eat that we saw.' Blind to what was in front of them, the colonists adopted virtually no indigenous foods. Kangaroo meat was rarely touched.

For a century, colonial Australia remained highly dependent on imports, other than for meat, but from the 1880s, the railways opened up the hinterland to agriculture: wheat, milk, sugar and irrigated fruit.

Source: Australian Geographic; *Australia's cuisine culture: a history of our food;* by Michael Symons; June 27, 2014



1 Outline what European settlers were expecting to produce in order to establish their own secure and sustainable food supply.
2 Explain why Europeans were so dependent on imports when Aboriginal Peoples had an established, secure food supply.

Figure 4.3: Early settlers arriving on the First Fleet. They struggled to develop a sustainable food supply for the new colony.

Source: *Illustration by E. Le Bihan, courtesy State Library of New South Wales*

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Brief timeline of migration to Australia

1788 – convicts from Britain and Ireland

The First Fleet of 11 ships left Portsmouth, England in 1787 with more than 1480 men, women and children on board. Although most were British, there were also African, American and French convicts. After a voyage of three months, the First Fleet arrived at Botany Bay on 20 January 1788.

As it grew at Sydney Cove, the colony was critically short of food. The settlers brought with them food supplies aboard their fleet of ships; however, they needed to establish their own way of growing food to supplement the rations if they were to survive.

In desperation as food supplies became scarce, the HMS *Supply*, the colony's second navy ship, was sent to Indonesia for food. At this time, there was no understanding of the Australian climate or ability of the land to provide food. Food was being sent from afar as the colony continued to struggle to produce their own food from Australian land and waters. They tried to establish farms; however, most of the colony and convicts had few or no farming skills. For those who had experience, this knowledge did not translate well to the Australian climate and landscape.

Figure 4.4: The First Fleet came ashore with stocks of white flour, salted meat, dried peas, butter and rice. Many of their supplies had deteriorated due to the excessive heat and infestation of weevils during the voyage. Seeds, plants and domesticated animals also arrived on the First Fleet; however, the colony was struggling to grow these seeds and plants in this unknown environment.

Source: First Fleet Fellowship Victoria Inc; *Convict Transport 'Charlotte'* by Marine Artist Frank Allen

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1793 – free immigrants from Britain

During this period of immigration, thousands of convicts travelled via sea to Australia, in very rough, unhygienic and generally appalling conditions. If they survived the voyage, the convicts often arrived sick from malnutrition, scurvy, dysentery and fever. The supplies on board the Second Fleet were supposed to feed the convicts, but the ship sailed ahead of the convict transports and the ship's master withheld the supplies, starving the convicts so that there was more he could sell afterwards.

The leaders of the new immigrants to Australia became desperate to establish farms and a local economy. Two years after the arrival of the First Fleet, the colonial authorities had, according to plan, allocated land to male emancipists and expirees in settlements at Norfolk Island and New South Wales. After completing their term of hard labour, ex-convicts were encouraged to stay in the settlements and cultivate their 30 acres of land – or more if they were prepared to marry and have children. Tools, provisions, grain, cattle, sheep and hogs were provided.

The land was a gift, free of all taxes and rents for 10 years, provided the ex-convicts agreed to live on and improve it, while also reserving all the timber fit for 'naval' purposes for the British Government. These plans were a novel solution to the problem of how to establish a colony thousands of miles from Britain. Soon farms established at Rose Hill near Parramatta, and later at Richmond and Windsor, were producing crops.

By 1815, food supplies reaching Australia from abroad included canned food. The canned goods were greatly favoured by the colonies, especially as the food did not deteriorate during the voyage to Australia. In 1846, Sizar Elliot became the first food canner in Australia, with a small canning factory established in Sydney's Charlotte Place, now known as Grosvenor Street.

Figure 4.5: Explorers set out to find new land and areas were opened up in the Liverpool area for market gardens, viticulture and sheep grazing for wool.

Source: A view of part of Parramatta Port Jackson, J.W. Lewin, 1809. Courtesy State Library of New South Wales

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1850s – the gold rushes

This era saw a population boom. Many Chinese miners took advantage of the gold rush in Australia. The discovery of gold and a booming economy saw people come from a range of other countries, including England, Ireland, Scotland, Wales, the United States of America and Germany.

In time, people realised that gold was not the bonanza they had anticipated and they began to filter back into cities and towns looking for work and places to live. They noticed that large areas of land were not being used and wanted the chance to establish farms, just as the squatters had done before them.

Figure 4.6: With an increased population came further demand for land, food, clothes and buildings, and the Australian economy grew to accommodate these needs.

Source: Scene 2: Harvest of Endurance Scroll: A History of the Chinese in Australia, 1788–1988. Artist Mo Xiangyi, assisted by Wang Jingwen, with researcher Mo Yimei. Copyright Australia China Friendship Society. National Museum of Australia

1865–69 – drought

Eastern Australia suffered a severe drought that resulted in starvation and dehydration of animals and livestock, with vegetable crops withering and dying. Early farm establishments could not survive the conditions. The immigrants to Australia truly did not understand the Australian climate or landscape.

Let's talk

The Slippery Bob was a mixture of kangaroo brains, flour and water to make a batter. It was seasoned with salt and pepper and cooked in emu fat. This bush fare required a good appetite and excellent digestion.

Discuss why you think new settlers to Australia might have struggled with the Slippery Bob as a menu item.

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1901 – Federation restricted immigration to prevent the arrival of Chinese and South Sea Islanders

The *Immigration Restriction Act 1901* was one of the first laws passed by the federal government of the new Commonwealth of Australia. This introduced a test to prevent 'non-Whites' from entering Australia. These new laws laid the foundations for what became known as the 'White Australia Policy'.

Figure 4.7: The Australian Government looked to Great Britain as a source of immigrants, and encouraged those willing to consider resettlement in Australia by offering them assisted passage. British immigrants were also eligible to receive land grants, or encouraged to take labouring positions in rural areas.

Source: Poster, '"The Southern Cross": The stars which shine over Australia: the land of opportunity',
Source: National Archives of Australia

Factors influencing the growth of primary production, food processing and manufacturing industries

Growth in food industries, such as agriculture and horticulture, over time contributed to the development of a sustainable food supply in Australia. A number of factors influenced primary production, food processing and food manufacturing industries.

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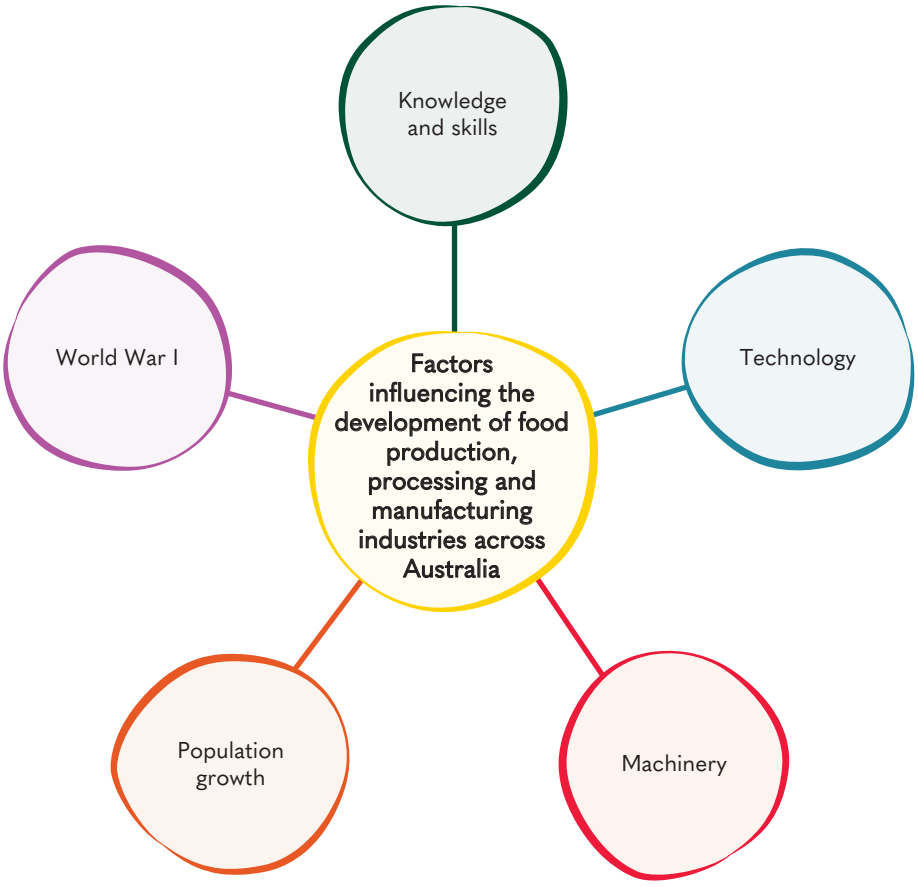

Figure 4.8: A range of factors can explain the influences on the development of food production, processing and manufacturing industries in Australia.

Knowledge and skills

Colonists came to Australia with little understanding of the country's plant and soil requirements. Over time, development of knowledge of Australia's landscape and climate helped to establish a successful primary food production industry. Research into viable plants and animals, and an increase in skills to farm the land, helped to influence food production success.

Growth in food knowledge and skills saw the development of new processing techniques, systems and technology. The introduction of heat processing and mechanical refrigeration saw the development of food production, processing and manufacturing industries, as this knowledge was spread within the food systems.

Let's talk

Discuss ways in which food knowledge and skills would have been shared in Australia during the early 1800s. How does this differ from today?

Machinery

The 1800s brought an innovation boom to Australia. Inventors had to be creative and complete trial-and-error testing, and they were excited by chance discoveries. In Australia, machinery such as the first mechanical grain harvester, the stump-jump plough and the Sunshine Harvester was invented. A dip for dressing scab and skin disease in sheep was even invented in 1840. The country's hot and dry climate resulted in the windmill being used to tap artesian water.

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Figure 4.9: Furphy's water cart, used to fight bushfires and water crops.

Source: Two men demonstrating the Furphy's water cart, used for fighting bushfires, Shepparton, 1900, Museum Victoria

Let's talk

The climate and dry conditions in Australia meant purpose-built ploughs, harrows and strippers needed to be made to tackle the difficult landscape.

Can you think of any other machinery that has been needed in Australia as a result of our landscape and climate?

Population growth

As the number of settlers to Australia grew over time, so did the demand for local grown foods. The colonists could not rely on continued deliveries of food from the homeland, and nor could they keep looking to other countries. The greater demand for a viable food systems meant that those who moved to the land had to begin to understand the climate and the soil conditions. British settlers needed to begin to understand how to use the edible flora and fauna. Chinese settlers had to substitute traditional ingredients for those available locally.

Those who were close to the sea began to rely on the abundance of seafood; fish and oysters to supplement their diet. Food production and preservation methods needed to develop so that ingredients could travel across vast distances or be stored and preserved when they were seasonally available.

Let's talk

The colonists needed to understand the climate and soil conditions of Australia in order to grow their traditional crops.

Discuss the ways in which climate and soil conditions might have influenced the availability of a vegetable such as bok choy or a consistent supply of butter.

Let's talk

Until the early 1880s, tea was weighed at the grocers and packaged for customers. This was time-intensive, and changes needed to be made. What factors resulted in the ability over time for manufacturers to be able to sell pre-packaged tea?

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Activity **4.17** (Practical): Comparison taste test – tea time

High tea is usually served with English Earl Grey tea. Let's do a comparison of the teas that would have come to Australia during the early migration period.

Prepare a pot of billy tea and compare it with a Chinese oolong tea. Use the recipe opposite.

Figure 4.10: Billy tea is a traditional Australian black tea. It is boiled with a very Australian ingredient – gum leaves in a billy can.

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Billy tea

Ingredients

2 tablespoons
black tea leaves

2 gum leaves (washed)

Method

1. Place 1.25 L of water in a billy can or a saucepan. Bring to the boil.
2. Add tea and gum leaves, reduce the heat to low and simmer for 10 minutes.
3. Remove from the heat and allow to stand for 2 minutes.
4. Serve.

Native bush mint tea

Use the above method to prepare a native bush mint tea. You will need to replace the gum leaves with 2 tablespoons of native bush mint or river mint.

Native sarsaparilla tea

Use the method above to prepare a native sarsaparilla tea. You will need to replace the gum leaves with 2 tablespoons of native sarsaparilla.

Chinese oolong tea

Use the method above to prepare a quantity of Chinese oolong tea.

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Evaluation questions

1 Complete the comparison below.

Tea type	Taste	Aroma	Discussion of the availability of ingredients for the early settlers
Billy tea			
Native bush mint tea			
Native sarsaparilla tea			
Chinese oolong tea			

2 Which tea did you prefer? Explain the reasons for your preference.

3 Although Australia had a variety of native plants that were utilised by First Nations Peoples in making tea, tea continued to be imported from European countries. Explain factors that led to this importation.

4 Outline the factors that resulted in Australia being able to produce its own commercial tea varieties.

5 Billy tea is easy to prepare and cost-effective. Discuss the reasons why we don't drink this type of tea more often.

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World War I

During World War I, food supplies were rationed. Food grown and produced in Australia was used to ensure that the nation's troops in training and on ships were kept well fed. Food provision to the 'mother country' was vital for the Empire's defence. At this time, Australia became Britain's major supplier of wheat and a principal source of their meat supply.

From the beginning of the war, retail prices of food and groceries in Melbourne rose by 28.2 per cent and male wages by only 15.4 per cent. Unemployment was running at 10.6 per cent. By mid-1917, meat cost five shillings more per week than it had before the war, which was unaffordable on the average male wage of less than three pounds (one pound was equal to 20 shillings). Australians needed to think differently to ensure that the country's growing population had a sustainable food supply.

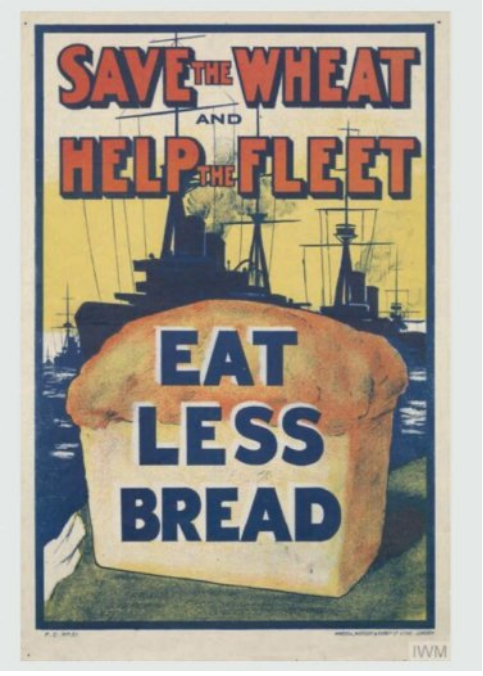

Figure 4.11: Rationing in Australia was intended to ensure the troops were well supplied with food.

Source: Poster: *Save the Wheat and Help the Fleet;* copyright Imperial War Museums

Let's talk

During World War II, the armed forces were buying Vegemite in bulk due to the product's nutritional value. Discuss why this spread was in such high demand among the troops.

Technology

Around the 1870s, new food manufacturing industries began to be established. They aimed to capitalise on the advances in technology and the growing need for a larger and more sustainable food supply for the growing Australian population.

Activity **4.18** (Inquiry): New and emerging food manufacturing industries

Investigate the new and emerging food manufacturing industries that were developing in Australia from the 1870s and beyond. Use the Australian Food Timeline at https://cambridge.edu.au/redirect/9985 to outline the importance of food manufacturing and the influence of the various cultures from early migration to Australia.

Let's talk

Explain why you think the Queen Victoria Market was such an important place for the women of Melbourne.

Figure 4.12: In 1878 the Queen Victoria Market opened in Melbourne.

Source: Upper Market, 1878; Queen Victoria Market

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The development of food industries in Australia

The development of food industries in Australia provided a reliable source of food for the country's growing population. We can attribute the range of factors to the change and growth in Australia's food industries. This included, but was not limited to, agriculture, horticulture and the dairy and canning industries.

Agriculture

Wheat

Wheat was one of the first crops planted by colonists upon their arrival in Australia in 1788. Different varieties of wheat were onboard the First Fleet and a small 9-acre farm was established at Farm Cove in order to grow and harvest the imported crops. This venture did not meet with early success: the climate and soils were significantly different from those in Europe, the crops did not fare well and the first harvests were very poor.

One convict from the First Fleet, James Ruse, was an experienced farmer. In 1789, at the end of his sentence, he asked Governor Arthur Phillip for his freedom and for a grant of land. Ruse was provided with a small piece of land near Parramatta. Within two years, Ruse had produced successful wheat harvests. With the success of his crop, Governor Phillip rewarded him with a 30-acre land grant, which Ruse named Experiment Farm. Ruse proved that wheat could be grown successfully in Australia; he is often considered the father of the Australian wheat industry. Agriculture spread across Australia, and wheat became the country's main crop, with shipments regularly being exported back to England.

An academic, William Farrer, migrated to Australia in 1870 as he was looking for a warmer, drier climate. Farrer worked as a tutor on a sheep station. He soon became interested in agricultural science and began to study the problems involved in growing wheat in Australia. Farrer began experimenting with wheat varieties from around the world, as well as selecting superior wheat specimens from successful farms within Australia. He began cross-breeding different wheats, undertaking some of the first plant hybridisation experiments in the world. By combining the best features of two different wheat varieties, Farrer was able to create a new wheat variety that was resistant to black rust, grew well in Australia's hot and dry climate and was able to be processed into a high-quality flour product. Farrer named this new variety Federation Wheat. Distribution of this wheat variety began in 1903, and from 1920 to 1925, Federation Wheat was the most popular variety of wheat in Australia.

Figure 4.13: William James Farrer was a leading Australian agronomist and plant breeder. Farrer is best remembered as the originator of the Federation strain of wheat, distributed in 1903.

Source: Portrait of William Farrer; courtesy NSW Department of Primary Industries

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The development of the wheat industry was not due to knowledge and skills alone. The advancements in new technology saw the growth of many agricultural industries across Australia, as well as wheat. Machinery and implements for wheat growing were modified for Australian conditions. Ploughs were used to prepare the soil before planting and seed drills were used for more accurate planting.

The invention of the stripper brought forth rapid mechanisation of wheat harvesting, enabling crops to be harvested at a faster and more successful rate. One technological development used on farms was the tractor. The first internal combustion tractor was sold in Australia in 1903, and by the mid-twentieth century, most farms had replaced horse-drawn wagons with tractors.

Activity **4.19** (Inquiry): The stump-jump plough

Figure 4.14: An early stump-jump plough invented by R.B. Smith of South Australia in 1876. This implement was especially useful in mallee country.

1 Describe the stump-jump plough.
2 Explain how the development of new technology advanced the growth of agricultural industries in Australia. Use examples to support your response.

Activity **4.20** (Inquiry): Wheat in Australia

The wheat industry was one of the first industries developed in Australia, and today contributes to the wealth of the country due to our farmers exporting wheat all over the world.

Figure 4.15: New South Wales did not grow enough wheat for its population until 1898. Between 1896 and 1906, the area of cultivated land more than doubled.

1 Brainstorm why there was not enough wheat grown for the population of the European settlement.
2 Examine the changes that occurred between 1896 and 1906 that enabled wheat cultivation to double.

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Sheep

Australia is the world's largest exporter of sheep meat, with Victoria alone exporting 220,000 tonnes in 2019–20. So how did this industry begin? Sheep landed in Australia with the First Fleet: settlers brought with them 29 fat-tailed sheep collected from the Cape of Good Hope in South Africa. This early flock struggled to adapt to Australia's harsh climate. New flocks arrived, with new breeds reaching Australian soil. The first 'merinos' were introduced in 1797; this Spanish variety was better suited to the Australian climate. The sheep industry began to develop, seeing successful meat and wool production in Australia.

By the end of the 1840s, it was estimated that Victoria had 70,000 people and six million sheep. Mutton was consumed almost daily, often as a staple with tea and damper cooked on the fire. Most mutton was consumed domestically, with little meat initially being exported compared with other livestock industries.

Livestock industries continued to grow in Australia, and production was soon exceeding local demand. Australia could only eat approximately one-fifth of its output of meat. Sheep were being slaughtered and boiled down for their rendered fat, which was used to make soap and candles, while meat was being used as fertiliser. The canning and refrigeration industry saw a rise in meat preservation and exportation. Canneries were established and mutton was exported to England and other nations. Developments in mechanical refrigeration saw frozen meat being exported, with the first successful shipment occurring in the 1870s.

Let's talk

How does mutton differ from lamb?

Activity 4.21 (Inquiry): Australia's agricultural industry

Australia's agricultural industry is diverse, including beef, pork and poultry industries which have grown substantially. Research these industries and complete the activities below.

1. Develop a timeline of Australia's beef, pork and poultry industries.
2. Discuss the factors that have contributed to the development of these industries.

Horticulture

Horticulture, the cultivation and management of gardens and orchards, can attribute its success in Australia to a number of early influential factors on the industry's growth. Advancements in technology combined with knowledge of the Australian landscape led to the development of irrigation.

Activity 4.22 (Inquiry): The development of irrigation

Investigate the history of irrigation in Australia. Present your findings to your class, highlighting how irrigation development contributed to the development of horticulture in Australia. Include a range of factors in your presentation that explain how the development of irrigation influenced the food production, processing and manufacturing industries in Australia.

Oranges

During a time of drought, Victorian parliamentarian Alfred Deakin invited Canadian brothers George and William Chaffey, who had worked on irrigation development in Canada, to Australia to introduce an irrigation scheme around the Murray Valley. They were influential in establishing the citrus industry. The centre of the irrigation scheme was Mildura, in northern Victoria. In the 1890s, depression hit; however, the region known as Sunraysia recovered to become the fruit bowl of Australia.

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Figure 4.16: The development of irrigation and the knowledge and skills of the Chaffey brothers influenced the growth and success of the Australian citrus industry.

Apples

Apples have been growing in Victoria since the early 1830s; indeed, to this day Victoria is the major growing area for apples and pears in Australia. Climate and soil are contributing factors to the success of the industry. The gold rushes were a large contributing factor to the growth of the apple industry as population and demand for the produce grew. Other triggers for the development of the industry included technologies such as irrigation and transport. Knowledge and skill development in farming apples also contributed to their success as climate and soil conditions were sought out to establish orchards in areas where there were optimal growing conditions.

Figure 4.17: Victoria is the major growing area for apples and pears in Australia, with the main varieties of apples grown being Pink Lady, Granny Smith and Royal Gala.

Let's talk

Potatoes, Australia's largest vegetable crop, are rich in history and success in the primary food production industry. Outline and discuss factors that would have contributed to the success of the potato industry in Australia.

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Activity **4.23** (Case study): Australia's sugar cane industry

Key dates in the history of the Australian sugar industry

1788 The First Fleet brings sugar cane to Australia.
1821 Unsuccessful attempts are made to grow sugar cane as a crop at Port Macquarie, New South Wales.
1842 The first sugar refinery is built in Sydney to refine imported sugar.
1862 Captain Louis Hope and John Buhot establish a sugar cane plantation near Brisbane in Queensland. Hope operates Australia's first commercial sugar mill.
1864 Cane growing spreads along the coast of Queensland and northern New South Wales.
1870 A system of large central sugar mills, supplied with cane by independent farmers, is introduced by the Colonial Sugar Refining Company (now CSR Limited) in northern New South Wales.
1885 Many small sugar mills close down due to the depressed state of the sugar industry.
1888 The first cooperative central mill opens at North Eton in Queensland.
1890 The first world's first mechanical cane harvester is built.
1893 The *Sugar Works Guarantee Act 1893* authorises the funding of central sugar mills with financial backing from the Queensland Government.
1901 Protective import duties are placed on sugar.
1907 The Australian Sugar Producers Association (ASPA) – forerunner of the Australian Cane Farmers Association – is formed at a conference in Townsville.
1909 The ASPA commences printing the *Australian Sugar Journal*.
1912 *Report of the Royal Commission on the Sugar Industry* (1911–12) is published.
1915 The *Sugar Acquisition Act 1915* and *Regulation of Sugar Cane Prices Act 1915* are passed by the Queensland Government. These legislate and establish regulatory controls over production levels, marketing and pricing. Although not to the same extent, regulatory controls are also imposed on wages and working conditions.
1922 Australia begins exporting raw sugar.
1923 The Commonwealth Government hands control of the sugar industry to the Queensland Government. The Sugar Board in Queensland, established under the *Sugar Acquisition Act 1915*, takes over the authority to acquire and market all raw sugar produced in Queensland. Australian raw sugar is first exported to New Zealand and the United Kingdom.
1924 Australian raw sugar is first exported to Canada.
1925 Queensland legislation establishes the basis for the future Queensland Canegrowers Council.
1929 The 'mill peak' scheme is introduced.
1937 The first International Sugar Agreement (ISA) is negotiated, but does not commence operation due to World War II.
1941 Australian raw sugar is first exported to the United States (regular supplier from 1961).
1945 Australian raw sugar is first exported to Malaysia (regular supplier from 1972).

Source: Australian Cane Farmers Association

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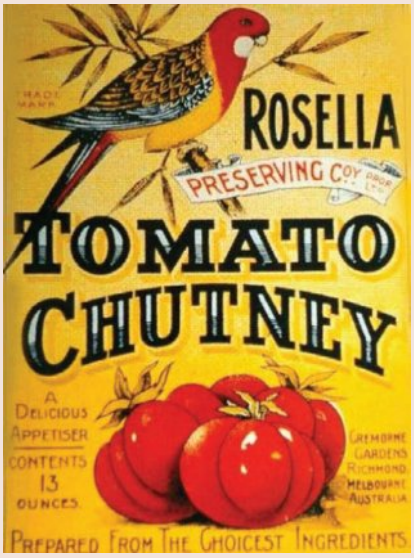
Complete the table by analysing the timeline of the history of cane sugar from 1788 to 1945 and considering factors that were influential in the development of this industry.

Year	Factor influencing the development of the industry	Explanation of how the factor influenced the growth of the industry

Activity **4.24** (Case study): The development of food manufacturing company Rosella Preserving Company

Read the extract from Jan O'Connell's 'Australian Food Timeline' and complete the evaluation questions using the case study example in your response.



Partners H.R. McCracken (a commission agent) and T.J. Press (a grocer) converted their backyard jam and fruit preserving operation into a larger concern with the financial backing of Frederick John Cato (of grocery chain Moran & Cato). Beginning with a small factory in Flinders Street, Melbourne, Rosella Preserving Company opened its Richmond, Victoria, factory in 1905. Tomato sauce was first produced in 1899.

In 1918, Rosella extended manufacturing operations to Adelaide, with a factory in Kent Town and in 1925 opened a factory in Rosebery, Sydney. In 1927, the company acquired a factory site in Hobart so Tasmanian soft fruits could be processed on the spot. From 1930, the Adelaide factory became the manufacturing centre for Rosella pickles.

The *Adelaide Mail* reported in 1931 that the Rosella Preserving Company had more than 1000 employees. At this point, the company was producing around 100 different product lines. Reporting on the Sydney Show in 1937, *The Farmer and Settler* wrote that: 'Prominently displayed were the famous Rosella tomato sauce, 14 varieties of soups, jams, canned fruits, beans, sausages

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and vegetables, spaghetti, pickles, puddings and a range of diabetic sugarless foods. Other products too numerous to mention combined to make a magnificent general exhibit.'

As well as sales within Australia, by the early 1930s the company was exporting to New Zealand, South Africa, Britain, Sweden and other countries.

When Rosella was sold to Lever & Kitchen (which later became Unilever) in 1963, there were six factories. Under Unilever's ownership, the range was rationalised and in 2003 the brand was sold to the privately owned import–export company Stuart Alexander. Unilever continued to own the manufacturing operation.

The brand was sold once more, in 2006, to Gourmet Food Holdings but the new owner was placed into receivership in 2012. When no buyer emerged for the brand, the remaining factory (in Sydney) closed down in March 2013. The Rosella brand was later acquired by another private family company, Sabrands Australia, which continues to manufacture sauces, soups, chutneys and relishes in Victoria.

Sources: Australian Food Timeline website, Jan O'Connell; Rosella website, Our story.

Case study questions

1. Map the timeline of the history of the Rosella Preserving Company.
2. Identify the factors that contributed to the growth of the Rosella Preserving Company.
3. Select two factors identified in Question 2 and explain their influence on the success of this Australian manufacturing company.

Dairy

Dairy cows first arrived in Australia in 1788, with two bulls and seven cows on board the First Fleet. Within six years, these nine animals had developed into a herd of 61. During the spring and summer periods, Australia's first dairy farmers would make butter and cheese from the cows' milk, as these seasonal periods were when milk production was at its highest. The products would then be preserved for the autumn and winter months when production rates were lower.

By 1800, through breeding and further imports, Australia's herd had grown to over 1000, resulting in a strong and thriving dairy industry. Australia's first commercial dairy was established in 1805, followed by the first commercial cheese factory in 1820. By 1891, there were almost one million dairy cows in Australia. As technology continued to develop, the dairy industry diversified. The production of powdered milk commenced in 1842; it soon became an important export product, especially as it was recommended for baby food.

Canning

The process of canning has contributed to the success of Australia's agricultural and horticultural industries. Canned foods are processed and sealed in airtight containers for preservation to extend the shelf life of the foods. Foods can be grown for canning purposes, and excess fruit and vegetables that would otherwise be wasted can be turned into new canned food products. This resulted in an increase in product range, a reduction in food waste and a new way to preserve foods.

As stated earlier, the first canning factory was established in 1846. The industry provided the growing population of Australia with a range of food products that could easily be transported across long distances without the risk of spoilage. The preserved food products were also sent overseas, and by 1870 the industry had grown substantially, with over a million kilograms of canned meat, fruit and vegetables being exported each year. Cookbooks from England, such as *Reeves Cookery*, began to

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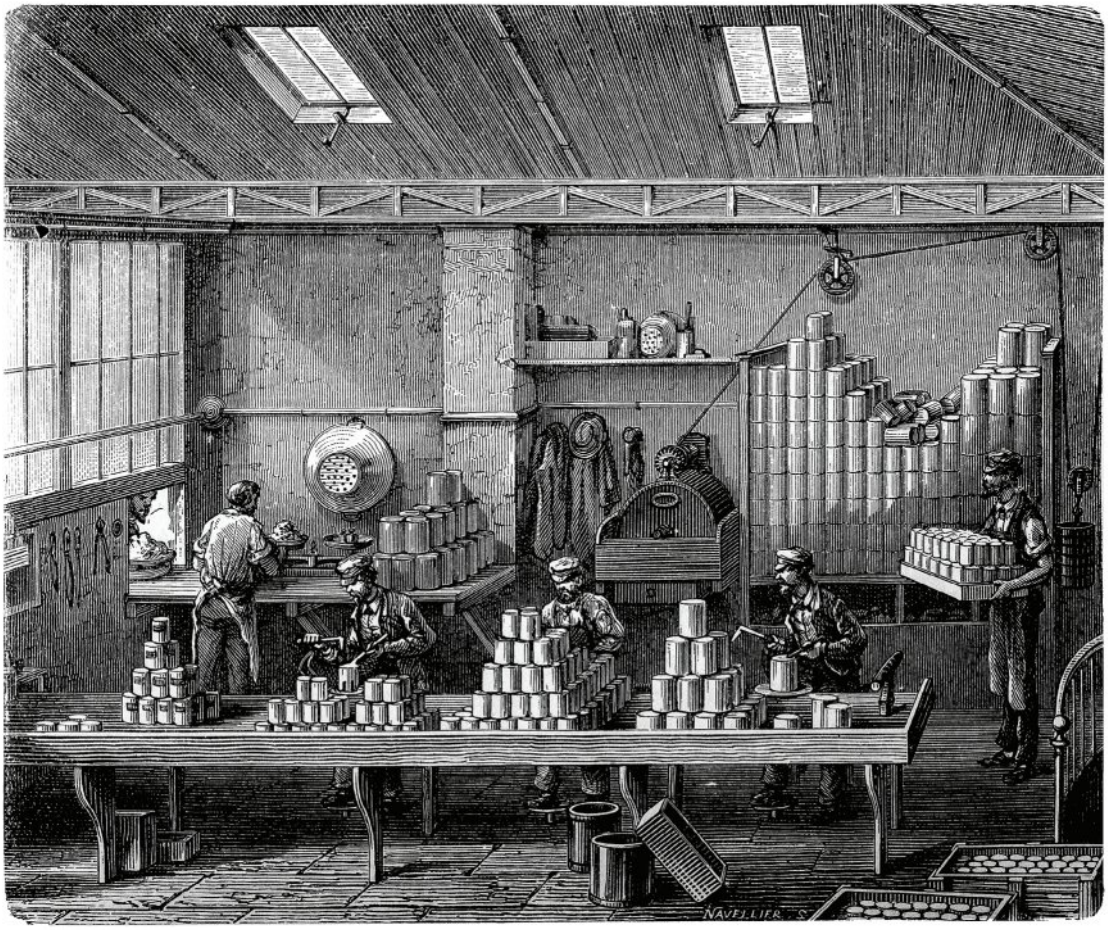

Figure 4.18: Filling and soldering cans of food in the early nineteenth century. Seasonal food products, such as stone fruits, are able to be canned, extending their shelf life and increasing food production and manufacturing practices.

include recipes specifically calling for Australian canned meat.

The Australian canned food industry expanded rapidly during both World Wars as goods were sent overseas for troops. SPC, one of Australia's oldest food manufacturers, was established in 1918. The company first began by canning pears, peaches and nectarines. This company, based in the Goulburn Valley region of Victoria, continues to sell canned goods to both Australian and international markets.

Let's talk

Discuss why canned foods continue to be an important part of Australia's food industry today.

Activity **4.25** (Practical): British Bakewell tart with an indigenous twist

This recipe originated in Bakewell, England. Many of the ingredients to prepare this tart for an English morning tea would need to have been shipped to Australia. Unfortunately, our early settlers did not see the benefit of our amazing indigenous ingredients and most certainly would not have included lemon myrtle!

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British Bakewell tart with an indigenous twist

Ingredients

For the pastry


2¼ cups plain flour


120 g unsalted butter, cubed


Pinch of salt

5 tablespoons cold water

For the filling


1 egg white, lightly beaten


2 tablespoons raspberry jam


150 g unsalted butter


3 medium eggs, beaten


1 egg yolk


1¾ cups almond flour


2 teaspoons lemon myrtle

Method

To make the pastry

1. Preheat oven to 180°C.
2. Sift the flour into a bowl.
3. Add the butter and salt, and rub into the flour with your fingertips until the mixture resembles breadcrumbs.

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4 Adding a little water at a time to the mixture, stir using a bread and butter knife until the dough binds together.

5 Wrap the dough in plastic wrap and chill in the fridge for 15–30 minutes.

To make the filling and prepare the tart

1 Roll out the pastry on a lightly floured board.

2 Grease and line an 20 cm deep tart tin with baking paper, then place the pastry into it.

3 Prick the base of the tart all over with a fork.

4 Chill in the refrigerator for 15 minutes.

5 Line the tart case with parchment paper and fill with baking beans or loading.

6 Cook for 15 minutes or until the pastry is a pale golden in colour.

7 Remove the baking beans or loading, lightly brush the inside of the pastry case with egg white and cook for a further 5 minutes.

8 Spread the raspberry jam onto the base of the pastry case. Leave to cool.

9 Cream the butter and sugar together using an electric beater until pale in colour.

10 Add the beaten eggs and egg yolk a little at a time.

11 Gently fold in the ground almonds and lemon myrtle.

12 Pour the mixture into the pastry case and gently level the surface to ensure the whole case is filled. Place the tart tin on a baking sheet.

13 Bake for 20 minutes, and leave to cool before serving.

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Evaluation questions

1. Outline the factors that would have influenced the ability of the British migrants to prepare this traditional British tart.
2. Explain why you think the lemon myrtle was not used during the 1700s and 1800s.
3. Preservation processes used to store ingredients for long periods of time have certainly changed over time. Explain how the jam in this recipe would have been made and preserved in the 1800s. Outline how this is different from the jam we purchase today.
4. The early settlers brought food to Australia via ship from Britain.
   a. Which ingredients in the Bakewell tart would have lasted the journey? Explain why.
   b. Which ingredients would not have lasted the journey? Explain why.
5. Discuss the reasons why the early settlers did not just grow the wheat required to make this tart.
6. What factors influenced the ability of the early settlers to rear their own animals – chickens and cows – so they could use the milk and eggs to make this tart?

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Chapter revision

- Aboriginal and Torres Strait Islander cultures are the oldest continuous cultures in human history. First Nations Australians have a long and continuous connection to Country and are regarded as traditional owners/custodians of the lands and waters.
- The range of foods and flavourings available to Aboriginal and Torres Strait Islander Peoples came from the land. First Nations Australian food and cooking knowledge, about growing, preparing and sharing food provides us with great insight into Aboriginal and Torres Strait Islander Peoples' ways of life.
- A range of hand-crafted and cleverly designed tools and technologies were used to provide a sustainable food source.
- Aboriginal and Torres Strait Islander Peoples have a deep understanding of the land and its natural resources, and knowledge of how to use climate and the seasons for an abundant and sustainable food supply.
- When the first European settlers arrived on Australian shores, they brought supplies of foods that were foreign to Australia. Their attempts to establish a secure and sustainable food supply were met with many challenges, including growing foods in the Australian soil using English methods.
- Migration to Australia greatly influenced the way food production, processing and manufacturing developed. The skills and knowledge that people from many different cultures have brought to Australia have played a large part in the Australian food production and agricultural industries as we know them today.
- Knowledge, skills, technology, machinery, population growth and World War I are all factors that influenced the development of food production, processing and manufacturing industries across Australia.
- The development of food industries in Australia provided a reliable source of food for the growing population. We can attribute the change and growth in Australia's food industries to the range of factors discussed in this chapter. These include the agriculture, horticulture, dairy and canning industries.

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Apply your knowledge

1 Brainstorm a list of words that reflect the characteristics of food production and consumption among Aboriginal and Torres Strait Islander Peoples.
2 Copy and complete the table below to list foods and flavourings that were available to Aboriginal and Torres Strait Islander Peoples prior to European settlement.

Fruits	Vegetables and legumes/beans	Grain (cereal) foods, mostly wholegrain and/or high cereal fibre varieties	Lean meats and poultry, fish, eggs, tofu, nuts and seeds and legumes/beans	Milk, yoghurt cheese and/or alternatives, mostly reduced fat

3 Outline how tools and technologies were used to hunt, gather and prepare foods.
4 Explain the specialist knowledge and practices of Aboriginal and Torres Strait Islander Peoples. How did they use this knowledge and natural resources to ensure a sustainable food supply?
5 State some of the health benefits of particular indigenous foods.
6 Evaluate the contribution of indigenous foods and flavourings in contemporary cuisine.
7 Identify challenges encountered by the first European settlers to establish a secure and sustainable food supply.
8 Describe a solution used by the first European settlers to help secure a sustainable food supply.
9 Explain one influence on the development of Australian food manufacturing industries using an example in your response.
10 Explain how canning contributed to the development of Australia's food manufacturing industry.

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Practice exam questions

Question 1

Fire, a natural resource, was important among Victoria's First Peoples because it:

A Was an important contributor to the health of individuals.
B Required little to no intervention and was easy to maintain.
C Regenerates plants and trees and aids in the creation of a landscape that sustains life.
D Contributed to a sustainable and abundant food supply for the local restaurants.

1 mark

Question 2

Describe a challenge of the first European settlers in securing a sustainable food supply.

3 marks

Question 3

Evaluate the contribution of modern restaurants in incorporating foods and flavourings indigenous to Australia on their menus.

4 marks

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Chapter 5
Australia's multicultural cuisine

Key knowledge

- Patterns of migration to Australia and the influence of immigrants on Australian food tastes and consumption.
- The characteristics of a selected cuisine of influence in Australia, including typical ingredients and meals; flavours and other sensory properties; methods of preparation and serving; and associated customs and celebrations.
- Trends in food practices and food subcultures in contemporary Australia, including the resurgence of interest in indigenous foods, and emerging food movements and changing social behaviours relating to food and their impact on health.
- Key points of debate on whether Australia has its own distinctive cuisine.

Key skills

- Describe historical patterns of Australian immigration and analyse effects on the nation's food tastes and behaviours.
- Describe a cuisine brought by migrants to Australia and through practical activities demonstrate, observe and draw conclusions about the influence of the selected cuisine in Australia.
- Analyse and summarise current trends in food practices and food subcultures in Australia.
- Construct and justify a point of view about the development of a distinctive Australian cuisine.
- Participate in and reflect on practical activities to explore the history and culture of food in Australia.

Immigration
Travelling to another country in order to take up permanent residence.

Meat pies, chicken parmigiana, lamb roast, chiko rolls and coffee culture: all of these are inherently Australian, but have been influenced by our rich and diverse multicultural society. Post-war **immigration** has resulted in millions of people migrating to our great nation, bringing with them the foods and customs from their homelands.

Australia's cuisine is multifaceted, celebrating diverse food cultures, crafting dishes that fuse assorted global flavours and techniques, and strengthening interest in and support for indigenous foods. There is great debate about whether Australia has its own distinctive cuisine. Although different views may arise on this topic, it is common consensus that Australian food is deliciously diverse.

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Get knowledge ready

1. Outline some factors that have influenced **migration** to Australia
2. Describe some international cuisines popular in Australia.
3. Name examples of some native Australian foods.

Migration
Movement of people from one place in the world to another.

Let's talk

From where does your family originate? How does this differ from your peers?

Video 5.1: Chapter Overview

Post-war immigration

1945–49

In World War II, Australia lost approximately 34,000 service personnel and over 31,000 people became prisoners-of-war. The war well and truly took a toll. There was growing concern over Australia's vulnerability to future invasion and the critical shortage of labour within the country. The Department of Immigration was formally established in July 1945 with the aim of increasing the population by establishing large immigration programs. The federal Immigration portfolio was created and the campaign 'populate or perish' was developed. This was used to promote Australia's post-war migration program.

The Empire and Allied Ex-servicemen Scheme was established, offering soldiers of Allied forces assisted migration to Australia. Australian Government departmental staff selected potential candidates from Britain and displaced persons' camps in Europe. Young, attractive and physically strong soldiers were selected to join the national workforce and promote the scheme in a positive light to the Australian public.

Figure 5.1: Ex-servicemen embarking on their route to Australia, 1947

Figure 5.2: British emigrants ready to set sail for Australia, 1949

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The first shipload of selected candidates arrived in 1947. A total of 839 migrants arrived by sea, coming from countries such as Estonia, Lithuania and Latvia.

The Assisted Passage Migration Scheme, colloquially referred to as the 'Ten Pound Pom' scheme, was established in 1945. This enabled people from the British Isles to migrate to Australia for £10 per adult, with children coming for free. In order to qualify for this scheme, migrants had to remain in Australia for a minimum of two years, be under the age of 45 and pass a basic health check.

Figure 5.3: Australian exhibit in England promoting the government assisted 'Ten Pound Pom' scheme.

1950s

Figure 5.4: Italian and Greek immigrants influenced Australian cuisine with the use of vegetables such as zucchini, artichokes, tomatoes, capsicums and eggplants.

Figure 5.5: Germans introduced foods such as pretzels, bratwurst and sauerkraut.

The ex-serviceman immigration program continued to thrive, and approximately 170,000 displaced persons arrived in Australia from countries across Eastern and Western Europe between 1947 and 1954.

The Snowy Mountains Hydro-Electric Scheme, which commenced in August 1949, employed thousands of newly arrived migrant workers. The scheme took 25 years to complete; over that time, 100,000 people were employed from 30 different countries, including Italy, Germany, Greece, Poland, Russia and Yugoslavia. The migrant workers brought with them their cultures and cuisines, and their wonderful foods soon began to be integrated into Australian meals, with souvlaki, zucchini, schnitzel, spaghetti, artichokes and cured meats becoming commonplace.

Also during this period, British migrants continued to flock to Australia, encouraged by campaigns such as 'Bring Out a Briton' and the 'Nest Egg' scheme.

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1960s

The post-war immigration drive was a success: by 1960, approximately 1.2 million people had migrated to Australia. Immigration and the nation's baby boom after the war saw the population grow by 2.7 per cent each year, reaching 10.5 million by 1961.

In the 1960s, the majority of Australian households were equipped with freestanding fridges and freezers. Consumers could now complete a weekly shop and keep all the food fresh until needed. To cater to this changing technology and equipment in the home, Coles and Safeway/Woolworths became nationwide food supermarkets, operating in a manner where all the items from the weekly household shopping list could be found within the one store. These major supermarket chains included staple food items adopted from Italian, Chinese and French cuisines.

Cookery the Australian Way was first released in 1966 and had a whole chapter devoted to 'international cookery'. The book included a range of recipes from Indonesia, China, Malaysia, Japan and Italy, to bring the world to the Australian home with an array of foreign food.

Margaret Fulton, a Scottish-born Australian food writer, was considered a pioneer for her progressive 1968 cookbook, which included an extensive range of international dishes that opened the doors for many Australians on how to integrate multicultural cuisine into their own cooking repertoire.

Figure 5.6: The fridge in the 1960s meant all food items could be stored in the home.

Figure 5.7: Large supermarkets started to operate around the country, with the first Woolworths supermarket opening in Warrawong, New South Wales in May 1960.

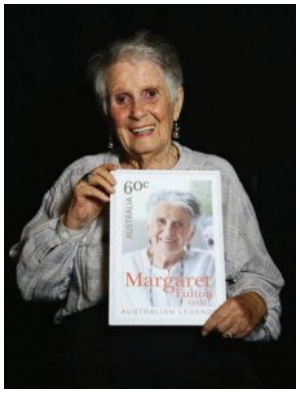

Figure 5.8: Margaret Fulton was a pioneer for her progressive cookbooks. In 1983 she was awarded the Medal of the Order of Australia (OAM) for her services to cookery. In 2014, Margaret Fulton OAM appeared on an Australian postage stamp as part of the 'Australia Post Legends Awards'.

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1970s

Figure 5.9: Hommus and tabbouleh have now become staples in many Australian households.

Figure 5.10: Halal certification of foods began in Australia in 1974 as our Muslim population continued to grow.

By 1971, one in three people residing in Australia was either a post-war migrant or a child of a migrant – multiculturalism was booming! Diversity continued to grow, with 12 per cent of the population being born outside of Australia and Britain, a dramatic rise from the 3 per cent reported in 1947.

The so-called White Australia Policy was abolished by the Whitlam government and the nation introduced polices such as the *Racial Discrimination Act 1975*. This made it illegal to discriminate against migrants based on their race, and began to increase the proportion of non-European people immigrating to Australia. The diversity of migrants and their distinct cultures contributed to the rich array of cuisines, art, literature, music, fashion and sport in Australia.

War and displacement continued to be an issue for many nations. Australia saw an influx of Chilean and Lebanese refugees due to conflicts in their home countries. From 1966 to 1976, the Lebanese-born community in Australia grew from 10,688 to 33,424 people. Restaurants and food vendors began to produce and sell items such as baba ghanoush, hommus, falafels, baklava and tabbouleh.

Activity 5.1 (Practical): Hommus sensory analysis

Hommus is a simple dip made from chickpeas, tahini, lemon juice, garlic and oil. There is often variation with the ratio of ingredients as well as the addition of other herbs and spices.

1. Find two different recipes for hommus to produce.
2. Select two brands of hommus dip from the supermarket.
3. Produce the two recipes and compare them with the store-bought varieties by conducting a star diagram sensory analysis. Ensure your diagram has at least five points.
4. Select your favourite dip from the four varieties and describe the characteristics that made it the most enjoyable to consume.
5. Explain how immigration has influenced the availability and popularity of hommus in Australia.

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The Vietnam War ended in 1975, resulting in millions of Indochinese refugees seeking asylum. This **asylum seeker** group consisted of people from Vietnam, Cambodia and Laos. In 1976, the first boat carrying five Indochinese men arrived in Australia and the term 'boat people' entered the Australian vernacular. The journey was a dangerous one, with unpredictable seas, overcrowding, unsafe boats and pirate attacks.

Over the next five years, 56 more boats arrived, carrying approximately 2100 people. Australia established various immigration detention processing centres, such as Westbridge (now Villawood) Migrant Centre in Sydney, to manage the arrival of people by boat.

Figure 5.11: The dangerous journey to seek asylum in Australia

Figure 5.12: Vietnamese refugees arriving at Sydney in 1977

Asylum seeker
A person who has fled their country and is seeking international protection from persecution and human rights violations, and whose claims for refugee status have not yet been determined.

1980s

Figure 5.13: Bao buns, pho and rice paper rolls are some of the delicious food items popularised in Australia by Vietnamese migrants.

By 1981, 22 per cent of the Australian population was born overseas. Australia's negotiations with the Vietnamese authorities saw the establishment of the Orderly Departures Program. People could now leave Vietnam without persecution and be reunited with their families who had fled to Australia.

Over 70,000 refugees from South-East Asia had settled in Australia by 1985. This saw the importation of traditional foods, establishment of specialist grocers and the growing popularity of Vietnamese food vendors. Victoria Street in Richmond is commonly known as 'Little Saigon' for its renowned abundance of Vietnamese cuisine.

The first KFL supermarket opened its doors in 1984. This Asian food specialist provides consumers with a diverse range of Asian specialist ingredients such as black garlic, soybean paste, durian and galangal.

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Figure 5.14: Saffron threads being harvested from saffron crocus

The Iran–Iraq war saw many people fleeing to Australia due to economic and political hardship. These Middle Eastern migrant groups brought with them their rich culture and colourful cuisines. Pomegranates, saffron and pistachio nuts are key Middle Eastern ingredients that have become commonplace in Australian supermarkets, and Halal certification of food products continues to grow alongside our Muslim population.

People from European nations continued to migrate to Australia for a variety of reasons, such as skilled worker migration, the family reunion stream and through humanitarian and refugee programs. With this, the diversity of food availability within Australia continued to grow.

Let's talk

How has migration influenced the diversity of food in your home town? Is there a wide range of specialist supermarkets, food vendors and supermarket aisles offering international food items? Is one cultural cuisine more predominant than others? How does this differ from other areas across Victoria?

Activity 5.2 (Inquiry): Muslim food practices and festivals

Muslim people have a wide variety of food practices.

1 Research what each of the following terms means:
   - Halal foods
   - Haram foods
   - Ramadan
   - Suhur
   - Iftar
   - Eid al-Fitr.
2 Discuss how patterns of migration to Australia have led to an increase in our Muslim population.
3 Describe how the rise in the number of Muslims has influenced the types of foods available in Australia.

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Rice paper rolls served with nuoc cham dipping sauce

Ingredients

Poached chicken


1 chicken stock cube


¼ brown onion


1 celery stick


1 bay leaf


¼ carrot


2 peppercorns


Water – enough to cover the chicken


1 chicken breast

Nuoc cham dipping sauce


1 tablespoon water


1 tablespoon fish sauce


2 teaspoons lime juice


2 teaspoons rice wine vinegar


1 teaspoon chopped palm sugar


1 teaspoon lemongrass, finely chopped


½ garlic clove, crushed


½ red chilli, deseeded and finely chopped

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Rice paper rolls


30 g rice vermicelli noodles


Poached chicken breast, shredded


¼ continental cucumber, julienned


¼ large carrot, julienned


½ cup red cabbage, shredded


20 g bean sprouts


¼ red capsicum


2 teaspoons sweet chilli sauce


1 teaspoon coriander, shredded


1 teaspoon mint


6 mint leaves


6 coriander leaves


6 rice paper wrappers

Method

Poached chicken

1. In a saucepan, add the chicken stock, onion, celery, bay leaf, carrot, peppercorns and water. Bring to the boil.
2. Add the chicken breast and cover with a lid. Reduce the heat to a simmer and cook for 8 minutes.
3. Turn off heat, allow chicken to cool and remove from liquid.

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Nuoc cham dipping sauce

1. Combine all ingredients and mix until the sugar has dissolved.

Rice paper rolls

1. Soak the noodles for 10 minutes in warm water. Drain and cut into 5 cm lengths.
2. Combine the chicken, noodles, vegetables, sweet chilli sauce and chopped herbs. Mix well and divide into 6 portions.
3. Dip 1 sheet of rice paper in hot water for about 30 seconds, or until soft. Lay paper out flat.
4. Place the noodle mixture in a bundle along the bottom third of the rice paper sheet. Fold edge of the rice paper over the filling. Fold in the sides to create a rectangular shape. Begin to roll away from you, then add a mint and coriander leaf to decorate. Continue rolling to close.
5. Repeat steps 3 and 4 until you have six rice paper rolls.
6. Serve with nuoc cham dipping sauce.

Evaluation questions

1. Explain the steps taken to avoid cross-contamination.
2. Outline the health benefits of poaching the chicken breast rather than frying it.
3. Describe the sensory properties of the recipe.
4. Suggest recipe modifications to alter the taste and texture of the rice paper rolls.
5. Identify other uses for nuoc cham.
6. Outline factors that have led to Vietnamese migration to Australia.

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1990s

Temporary and permanent migration continued to grow throughout the 1990s. From 1945 to 1995, Australia accepted more than five million migrants. Overseas students and temporary skilled migrants contributed to the largest proportion of migrant population growth in the 1990s due to Australia's attractive education system and good employment opportunities.

The *Australian Women's Weekly* published a wide variety of diverse cookbooks as international cuisine continued to become highly popularised. These included titles such as *Malaysian style Cookery, French Cooking Made Easy* and *Middle Eastern Easy Style Cookery.*

Multicultural cuisine continued to grow, and Australians were hungry for more.

Let's talk

What's on the menu in your household? Does your family cook a range of multicultural cuisines?

Figure 5.15: Sushi Train opened its first Australian restaurant in Queensland in 1993.

Twenty-first century

The diversity of the Australian population continues to grow, with almost every country from around the world representing a part of Australia's population. In 2020, there were over 7.6 million migrants with approximately 29.8 per cent of the population born overseas.

From 2001, there has been a significant increase in migrants from India, South Africa and the Philippines, adding further diversity to our great nation.

People continue to migrate to Australia for its educational and workforce opportunities. Over 232,000 student visa applications were granted in the 2020–21 financial year, with people travelling mainly from China, India, Nepal, Brazil and Colombia to study.

Figure 5.16: International student programs are popular in Australia.

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Although Australia continues to be a desired destination for many migrants, the COVID-19 pandemic will have a long-lasting impact on immigration, given the travel restrictions that were implemented. In 2020–21, immigration fell 71 per cent due to the impact of the pandemic.

Let's talk

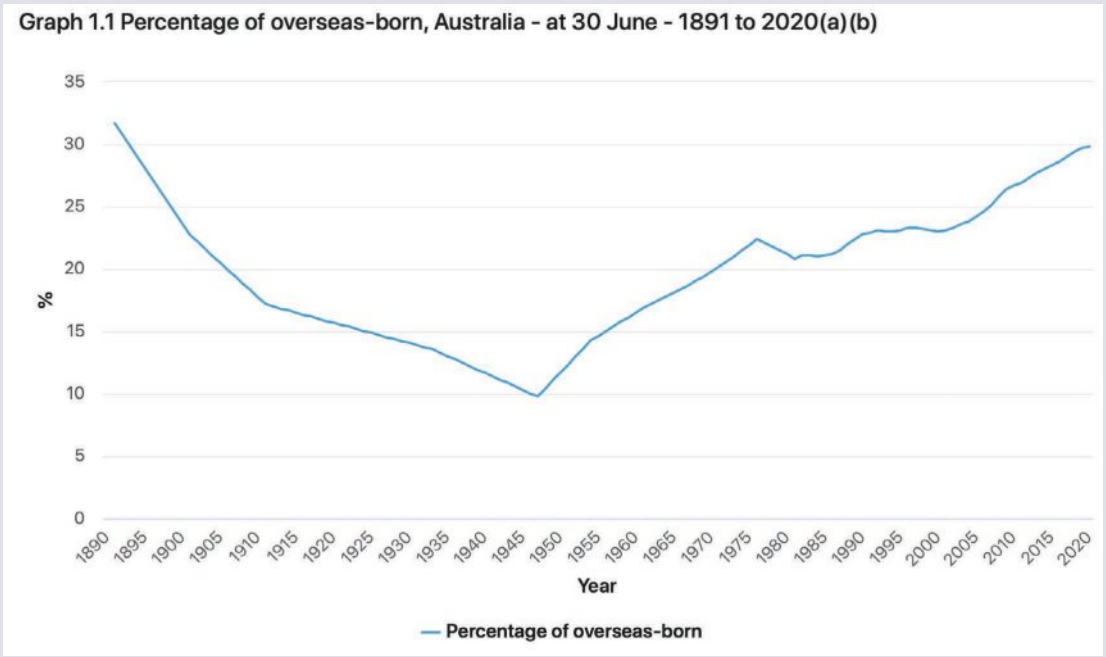
What do you think Australia's food landscape will look like over the next century?

Figure 5.17: Immigration from African nations has seen a rise in the popularity of African cuisine. Restaurants offering dishes such as fufu provide new taste and consumption experiences for diners.

Let's talk

Fufu is a staple across West Africa. Research how it is made and eaten.

Activity **5.3** (Data analysis): Percentage of overseas-born people in Australia



Source: 'Migration, Australia', Australian Bureau of Statistics, Released: 23/04/2021

1. Using the data in the above graph, identify a significant change and suggest a factor that would have contributed to this change.
2. Outline significant events that would have contributed to the change in data from 1945 to 1975.
3. Discuss how the graph may change beyond 2020 and identify factors contributing to this.

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Activity **5.4** (Inquiry): Cultural precincts

Migration to Australia has created a diverse range of cultural precincts across Melbourne. These provide a 'taste of home' for many ethnic groups, as well as showcasing international cuisine to Melburnians.

Select one of the following precincts:

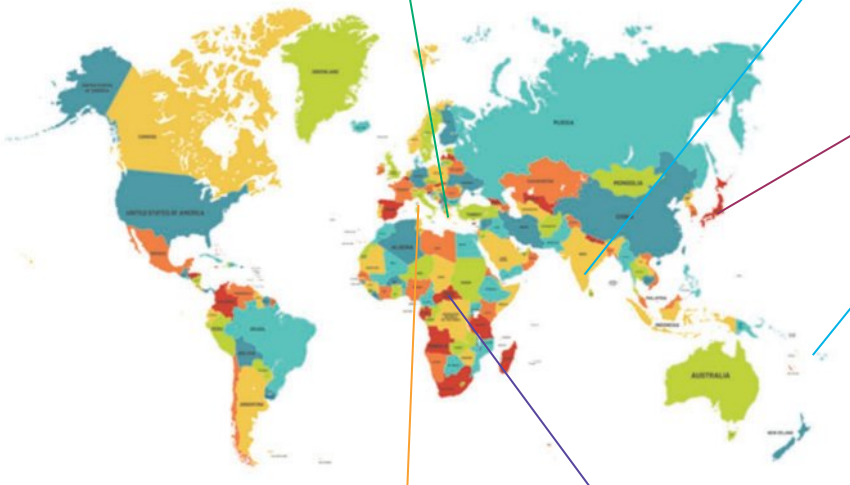
- Victoria Street, Richmond
- Lygon Street, Carlton
- Little Bourke Street, Melbourne CBD
- Lonsdale Street, Melbourne CBD
- Racecourse Road, Kensington
- Foster Street, Dandenong

1. Identify the culture represented within this precinct.
2. Create a map of this area and document the types of food outlets available.
3. Outline the history of this food precinct, discussing the history of migration of ethnic groups to the area.
4. Describe the cuisine brought by these migrant groups, including flavours, food products and traditional dishes.

Australia's multicultural cuisine

Australia's rich history of immigration has seen cultures and cuisines from around the globe take root in Australia. This has offered us all a wide variety of ingredients, flavours, preparations and practices.

Let's take a look at a snapshot of the characteristics of different food cultures from around the globe.



- Greece: tomato, eggplant, okra, zucchini, capsicum, lamb and goat
- India: curries, dhal, naan and tandoori chicken
- Japan: rice, sashimi, nigiri, and soba, udon and ramen noodles
- Pacific Islands: taro, breadfruit, papaya, mahi-mahi, kiwi fruit, feijoas and tamarillos
- Africa: fufu, ugali, injera, couscous, rice, slow-cooked and preserved meats
- Italy: pasta, pizza, and antipasto consisting of cured meats, olives, anchovies, artichoke hearts and various cheeses

Figure 5.18: Different food cultures from around the globe

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Pacific Islands cuisine

The Pacific region includes Australia and our many Pacific Island neighbours, including New Zealand, Vanuatu, Papua New Guinea, the Solomon Islands and Fiji.

Due to the island locations and climate, the diet in this part of the world is based on seafood, tropical fruits and starchy vegetables. Colonisation has introduced a range of food items to these island nations, further influencing their cuisines.

Taro, breadfruit, papaya, mahi-mahi, kiwi fruit, feijoas and tamarillos are some exotic foods you will find in these regions. Taro leaves and banana leaves are often used to wrap food for cooking, and ground ovens such as *lovos* and *hangis* are utilised.

Figure 5.19: A *hangi* cooks food using heated rocks in a buried pit. Food is placed in metal baskets and at times covered with wet cloth.

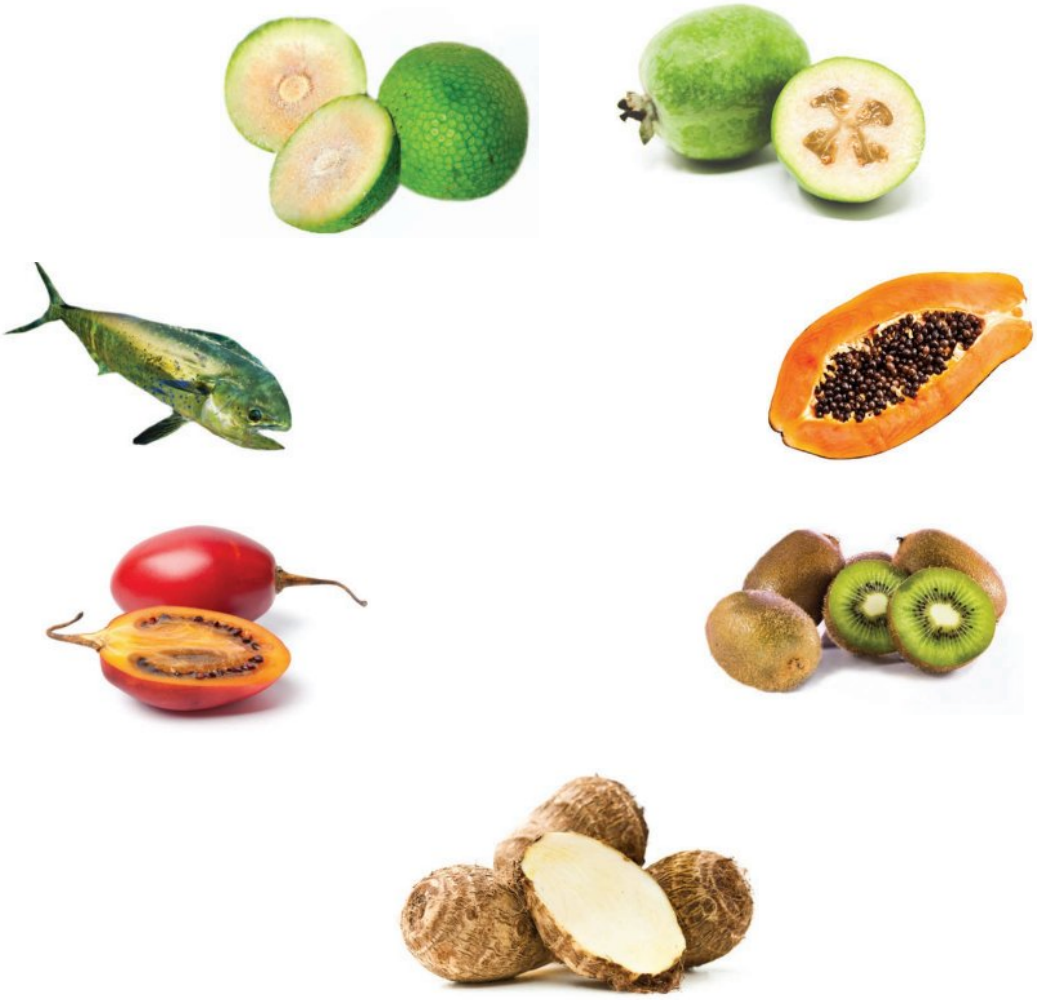

Figure 5.20: Taro, tamarillo, mahi-mahi, breadfruit, feijoas, papaya and kiwi fruit are some examples of native Pacific Islands foods.

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Greek cuisine

Greece and the Greek Islands are surrounded by the Mediterranean, Aegean and Ionian Seas. This has influenced the cuisine, with seafood considered an important ingredient on the Greek menu.

Greece's climate provides perfect conditions for olive and lemon trees, with these ingredients considered important elements of many dishes. Oregano, garlic, basil, thyme, dill, marjoram and cinnamon are used to flavour a variety of dishes, while tomatoes, eggplant, okra, zucchini and capsicum feature heavily. Lamb and goat are traditional meats; however, other meats and poultry are also consumed.

Greek dishes have become commonplace in Australian food stores and households. Greek salad, tzatziki, moussaka and feta cheese are traditional foods and ingredients common to Greek cuisine. The most popular Greek dish within Australia would have to be gyros, commonly referred to as souvlaki. Gyros is meat that has been slowly cooked on a spit; it is sliced thinly and placed in pita bread with tzatziki, often accompanied by tomatoes and red onion.

Figure 5.21: Gyros is a Greek dish where meat is cooked on a vertical rotisserie.

Figure 5.22: Oregano, garlic, basil, thyme, dill, marjoram and cinnamon are used to flavour a variety of dishes, while tomatoes, eggplant, okra, zucchini and capsicum are also used in traditional Greek cuisine.

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Greek Orthodox Easter is a significant celebration to many, and is considered a great feast. Prior to Easter celebrations, many believers spend 40 days fasting and praying during a period known as Lent. This period sees them practise abstinence from foods such as meat and dairy. To break the fast and celebrate Lent, many traditional foods are prepared. These include mayiritsa soup, tsoureki, Easter bread with red eggs, roasted lamb, koulurakia and dolmades.

Figure 5.23: Cracking the eggs represents the breaking of the tomb and Christ's resurrection from the dead. During Easter celebrations, many families compete to see whose egg outlasts the others, with the winner declared to have good luck for the forthcoming year.

Figure 5.24: Mayiritsa soup, tsoureki, koulurakia, Easter bread with red eggs, dolmades and roasted lamb are some examples of traditional foods people of the Greek orthodox faith eat to celebrate Easter.

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Indian cuisine

India can be considered 'the spice bowl of the world', with its vast array of aromatics that create spectacular colours and add flavours to foods. Most Australian cities and townships include an Indian restaurant as this cuisine has become highly popular. India is known for flavoursome curries, dhal and naan. The tandoor, an Indian clay oven, is used to create one of India's best-known foods, tandoori chicken. As many Indians follow the Hindu faith, beef tends not to be used as the cow is considered a sacred animal, and therefore forbidden from consumption. Food is often served on a thali, which is a large plate housing small bowls of various food items. Eating with one's hands is customary, as it is seen to feed the body, mind and spirit.

Figure 5.25: Indian cuisine utilises a wide variety of spices.

Figure 5.26: Thali style of eating

Diwali is the five-day Festival of Lights celebrated by Hindus. This religious event includes Hindu rituals and fireworks, and has also been referred to as a festival of flavours due to the variety of foods prepared and shared during the celebrations. It is customary to exchange decorated boxes of mithai, Indian sweets, with family and friends during Diwali.

Figure 5.27: Indian sweets, known as mithai, are a symbol of happiness and are shared during Diwali.

Let's talk

Did you know it is considered disrespectful to eat with your left hand in many cultures? What other food social blunders can you name?

Japanese cuisine

Rice is a staple in Japanese cuisine, and is heavily utilised in both sweet and savoury dishes. As Japan is surrounded by ocean, seafood is a predominant ingredient in Japanese cuisine. Sashimi and nigiri are delicacies consisting of thinly sliced fresh raw fish: sashimi is often paired with soy sauce while nigiri is served on top of rice. Soba, udon and ramen noodles form the basis of many soups. These are flavoured with various broths and seasonings such as miso, a fermented soybean product. Wasabi, mirin, sesame oil, panko breadcrumbs and nori are all staple ingredients in any Japanese household, as well as in most Australian supermarkets.

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Traditionally, food is consumed on low dining tables with people sitting on a cushion placed on a tatami floor. Japanese cuisine is enjoyed with chopsticks; in order to show good manners, it is essential that food is not passed between two sets of chopsticks. Moreover, they should never be placed down in an 'x' shape or be left sticking upright in a bowl of food. When eating from a small bowl, pick the bowl up and bring it closer to your mouth, consuming foods in one bite rather than biting into smaller pieces.

Figure 5.28: Bento boxes are Japanese-style packed lunches

Figure 5.29: Four essential cooking methods used in Japanese cuisine and associated dishes

Figure 5.30: Sashimi platter

African cuisine

The continent of Africa offers extremely diverse cuisines due to the various customs of the 54 African countries. A lot of cooking is done using one piece of cooking equipment such as a tagine. Meals are often served with a starchy side dish, such as fufu, ugali, injera, couscous or rice. Slow-cooked and preserved meats are found in many Southern African countries, while meat products are often absent from regions in East Africa.

Figure 5.31: Stews are a common dish among many African countries and often include vegetables and lentils with an array of herbs and spices.

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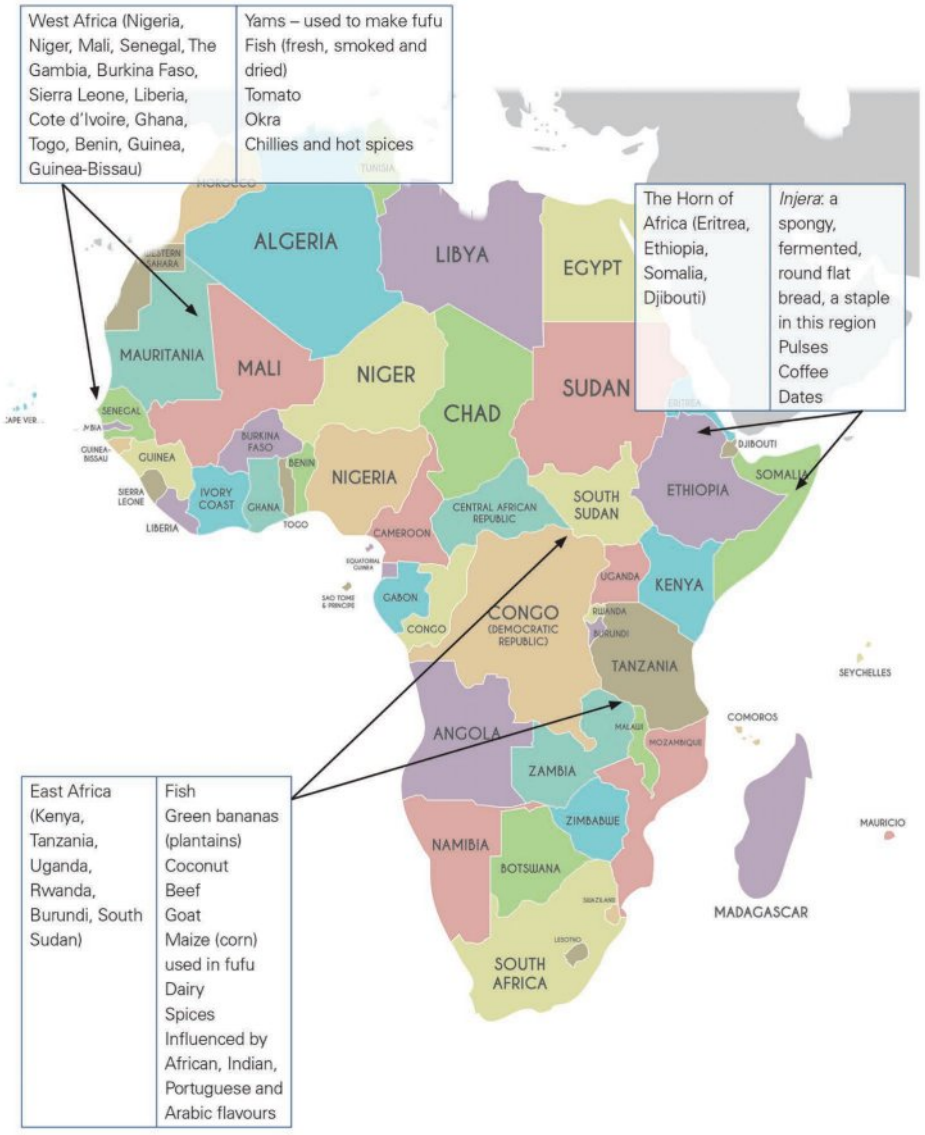

Figure 5.32: Africa offers a wide variety of food cultures and a diverse range of food products.

Italian cuisine

Italian foods have been very popular in Australia. Pasta is often a weeknight staple while pizza dominates the takeaway food industry. The variety of pasta options available on supermarket shelves is a true testament to how much Australians love this cuisine. Italian food isn't all pizza and pasta, though: each region in Italy brings its own specialities and flavours.

Activity 5.5 (Practical): Gnocchi comparison

Work in pairs to prepare your own fresh gnocchi and compare your product to a commercial variety. After comparing the products, you may wish to serve your gnocchi with a Napoli or pesto sauce.

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Gnocchi

Ingredients

2 large desiree potatoes, unpeeled

¼ tsp salt

100 g plain flour, allow for extra depending on the size of your potatoes

1 packet store-bought gnocchi

Method

1. Place potatoes in a saucepan. Cover with cold water and bring to the boil over medium heat. Cook for approximately 20–25 minutes.
2. Remove potatoes from the stove when they are just tender. To determine this, test with a metal skewer (don't test too much as potatoes will become waterlogged). Drain well.
3. Set aside until just cool enough to handle. Don't allow them to become cold. Peel by hand and discard skins.
4. Using a mouli, purée potatoes into a bowl. Season to taste with salt. Cool slightly.
5. Add flour to potatoes. Knead until a soft dough forms. If mixture is still sticky, add a little more flour (the amount of flour added is crucial – too much flour will make the cooked gnocchi heavy and tough, while too little flour will cause the gnocchi to disintegrate during cooking). Turn dough onto a lightly floured surface.
6. Cut dough into 4 pieces. Gently roll each piece out to form a long log about as wide as your little finger.
7. Using a lightly floured knife, cut each log into 1 cm pieces.
8. Roll each piece of gnocchi over the end of a lightly floured fork, pressing gently with your index finger or thumb underneath as you go, to form a dent in the back of each one and fork marks on the other side. Alternatively, use a gnocchi board for rolling.
9. Bring two large saucepans of water to the boil. Dedicate one saucepan to the homemade gnocchi and the other to the commercial product.
10. Add a small quantity of the gnocchi – be sure not to overcrowd the saucepan. When cooked, the gnocchi will rise to the surface of the water. Remove with a large slotted spoon and drain well.
11. Repeat with remaining gnocchi.

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Evaluation questions

1. Name which gnocchi you preferred and explain why.
2. List the ingredients used to make the commercial gnocchi as stated on the packet.
3. Describe the advantages and limitations of making the homemade gnocchi.
4. Suggest sauces you could pair with gnocchi.
5. Use the table below to complete a product analysis comparing the homemade and commercial gnocchi.

	Homemade gnocchi	Commercial gnocchi
Time taken to prepare		
Appearance		
Aroma		
Flavour		
Texture		
Rating out of 5		
Cost of product		

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Italians enjoy a variety of courses within a meal, beginning with antipasto, consisting of cured meats, olives, anchovies, artichoke hearts and various cheeses. This is followed by primi, the second course of pasta or rice. Secondi is the third dish, usually high in protein such as fish, chicken or eggs served with sides of vegetables and salads. A formaggi, or cheese, platter is served before dessert, with the last course of the meal being dolce, or sweet. Classic Italian desserts are gelati, tiramisu or affogato.

Let's talk

Do you add oil to your pasta water? This is considered a big no-no among Italians. What are some other golden rules when cooking pasta? Can you name any other traditional Italian methods of food preparation?

Figure 5.33: Italians traditionally serve coffee after the meal, not before or during it. A cappuccino or caffe latte is enjoyed in the morning; however, drinking coffee with milk after 11 am is a faux pas among Italians. Espresso, a small shot of black coffee, can be enjoyed throughout the day, as a pick-me-up or after a meal. Consider how this differs from Australian coffee culture.

Figure 5.34: An Italian grocer offering a variety of cured meats, cheese, olives, sausages, pasta and breads

Let's talk

There are many unique food customs around the world. Do you know their origins?

- Slurp your food to show appreciation.
- Do not use a fork to place food into the mouth.
- Kiss bread if it is dropped on the floor.
- Show your appreciation for the food by belching.
- Do not flip a whole fish when eating.

Activity 5.6 (Inquiry): Characteristics of a selected cuisine

Select another cuisine that has not been covered in this chapter.

1. Identify typical ingredients and meals.
2. Describe flavours and other sensory properties of foods within the cuisine.
3. Explain traditional methods of preparation and serving.
4. Describe associated customs and celebrations.
5. Discuss how the cuisine has influenced food availability in Australia.

Australian food subcultures

Australia's food landscape is influenced by a number of factors. People are becoming more concerned about their food choices and how they impact individual health. A resurgence of interest in indigenous foods shines a light on the abundance of the native ingredients and flavours we have on our doorstep. These food trends are reflected in Australian supermarkets, cafes, restaurants, family households, social media, cookbooks and television programs.

Let's talk

What are the current food trends that exist? How have they influenced your food consumption?

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Indigenous foods

Australia's unique and varied countryside and climate provides a wide variety of native fauna and flora. Colonisation had a major impact on native foods and indigenous food systems due to the destruction of native lands and waterways, lack of knowledge of Indigenous culture and racial prejudice. Times have changed, and non-Indigenous people are increasing their interest in, and understanding and use of, native foods as well as their respect for Aboriginal and Torres Strait Islander Peoples' knowledge of the land and food systems.

Native ingredients are now being produced for commercial use, with many items exported around the world. Indigenous ingredients are utilised in restaurants, commercial products, cookbooks and Australian households. International markets have a growing interest in the use of wattle seed, Kakadu plum, lemon myrtle and macadamia nuts, alongside the export of kangaroo and crocodile meat. The Australian climate produces a wide variety of bush foods: some flora and fauna thrive in our hot and dry conditions, while others prefer colder climates or high rainfall. Therefore, depending on where you are in Australia, the native food availability can look very different.

Figure 5.35: Crusted kangaroo fillet with indigenous spices

Activity **5.7** (Inquiry): Guide to Australian bush tucker

Create a 'Guide to Australian Bush Tucker' by providing examples of at least 10 forms of native flora and fauna used in contemporary Australian cuisine. Describe how each food item can be utilised in cooking, and provide a range of sweet and savoury recipe examples.

Native foods are not only flavoursome but also highly nutritious. Kangaroo meat is a healthy red meat due to its low saturated fat and high protein composition. It is also a good source of omega 3 fatty acids, iron, zinc and B-vitamins, making this meat a nutrient-dense food source. Native plant foods are high in antioxidants, which prevent or slow damage to cells caused by free radicals (molecules that cause damage to body cells). Quandong, a native wild peach, is used in both food and medicine due to its nutritional profile. This fruit contains twice as much vitamin C as an orange.

Figure 5.36: Quandong – Australia's 'wild peach'

Mark Olive, also known as 'The Black Olive', is a renowned Aboriginal chef who has become a household name with the popularity of his television series *The Outback Cafe* alongside his appearances in many cooking, travel and lifestyle programs such as *MasterChef* and *The Circle*. He has helped to shine a light on the versatility of bush foods, with dishes such as macadamia baklava, saltbush and mountain pepper squid, and clam pasta flavoured with bush tomato and lemon myrtle.

Figure 5.37: Aboriginal chef Mark Olive receiving a Deadly Award for Outstanding Achievement in Entertainment to recognise the contribution he has made to Australian society.

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Activity **5.8** (Inquiry): Indigenous food businesses

The best way to purchase indigenous foods is to support Aboriginal and Torres Strait Islander-owned businesses. Research Indigenous businesses and food vendors in your local area and provide a brief overview of the types of foods and services they offer.

Activity **5.9** (Practical): NAIDOC Week

NAIDOC Week celebrates the history, culture and achievements of Aboriginal and Torres Strait Islander Peoples in a week-long observance occurring in July. In order to spread knowledge and awareness of Australian indigenous foods, your class has decided to make recipe cards for native food items.

Each card should include:

- a description of the native ingredient, including its sensory properties and nutritional benefits
- where it can be found in Australia
- a list of recipes that showcase the ingredient, from traditional use in cooking to fine dining. Describe how this can be paired with other cultural cuisines to create an interesting **food fusion** dish.

Food for health

Food movements, trends and social behaviours are constantly evolving. As we continue to develop our **food literacy**, new food subcultures arise. Increasingly, people are caring about where their food comes from and how this impacts not just them, but the world around them. The impact our food choices have on the environment and animal welfare will be explored in Unit 2. Here we will focus on the influence food movements have on our health.

Let's talk

Health is more than just our physical wellbeing and absence of disease; it is multifaceted, encompassing physical, emotional, mental, social and spiritual dimensions. Consider how food influences these.

Social behaviours

Food plays a social role in our society: it brings people together and helps to define who we are. Food is central to social gatherings and celebrations, and builds connections between people. Our social behaviours relating to food are constantly evolving. Australians utilise food in almost all social interactions, from coffee culture to sporting events, celebrations and festivals. Food is at the heart of our culture.

Figure 5.38: Australia's love of coffee provides the perfect environment for social interactions.

Our engagement with food has now gone digital, with the use of social media enabling food business and consumers to share their meals and recipes, as well as shaping the food information of their followers. This can have an impact on a person's beliefs, values and behaviours, ultimately guiding their food choices. Digital communities connect like-minded people and provide a forum in which trends, diets and issues can be shared and debated. The messages we share and read online have the potential to influence our health, both positively and negatively. This can relate to the type of message, our **body image** and our level of food literacy.

Food fusion
A form of cooking combining cuisines that have originated in different countries, regions or cultures.

Food literacy
A set of knowledge, skills and attitudes that impact food behaviours.

Body image
Refers to how you perceive, think and feel about your body as well as how you think others see you. This can refer to your general appearance, size, weight and shape.

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Figure 5.39: Social media are often used to capture and share our food experiences.

Let's talk

Discuss how sharing food information online can influence the food knowledge and behaviours of others.

Activity 5.10 (Inquiry): Social events and over-consumption

Social events and celebrations such as birthday parties can often lead to the over-consumption of food.

Discuss factors that may cause this and how these behaviours impact health.

Plant-based foods

Driven by environmental, ethical and health concerns, plant-based diets and the reduction of meat consumption are becoming increasing popular. Consuming a wide variety of plant-based foods of different types and colours provides the body with a range of phytochemicals and nutrients such as fibre that help prevent weight gain and associated lifestyle diseases. High-fibre foods provide a feeling of fullness, which can assist in appetite and hunger management.

Let's talk

A wide variety of subcultures focus on the avoidance or reduction of meat; they include vegans, vegetarians, pescatarians and flexitarians. Explain the difference between each of these.

Figure 5.40: Aim to eat a wide variety of plant foods of different colours and types.

The versatility of vegetables continues to grow as food manufactures and consumers develop new ways to use ingredients. Over the past 10 years, we have seen the use of vegetables over grain alternatives such as rice and pasta become more popular.

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Figure 5.41: Zoodles, lettuce wraps and cauliflower pizza. Can you think of any other vegetable substitutes for grain-based foods?

Food and mood

The growing body of evidence linking our digestive and mental health have many food consumers focusing on their gut **microbiota**. This relates to the microbial life in our gastrointestinal system, which includes the stomach, small intestine and colon, making up the **microbiome**. The gut microbiota influences how a person fights disease, digests food and contributes to their physical and mental health.

Figure 5.42: A healthy gut microbiota improves our physical and mental health.

Our body produces 'good' and 'bad' bacteria. With a healthy diet we can increase the amount of good bacteria in our gut. A diet high in plant-based foods, including a variety of fruits and vegetables, legumes, nuts, seeds and wholegrains, will enhance the good bacteria due to these foods' high fibre properties. You can also promote a healthy gut by consuming bacteria in the form of fermented foods such as yoghurt, kimchi and sauerkraut. Research shows that there is a link between poor gut health and depression; conversely, the healthier our diet is, the more likely we are to have positive mental health.

Microbiota
The wide variety of microorganisms, including fungi, yeast and bacteria, that live in the gut.

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

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Good food = good mood

Food manufacturers, chefs and restaurant owners are all taking keen interest in this food movement. In 2019, Australia's first gut health food vendor opened its doors in Noosa. Jungle & Co aims to provide consumers with fresh, simple and gut-healing foods. There is a plethora of food literature on the subject, spanning academic journal articles, recipe books, social media posts and news reports.

Convenience foods

Takeaway foods, home delivery services, drive-through restaurants and convenience food products offer time-poor consumers quick and easy access to foods without the need for cooking. However, their convenience can come at a cost. Often these are considered **discretionary foods** due to their nutrient-poor and energy-dense composition.

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

Healthy meal subscription boxes are a convenient and growing trend in Australia. Companies offer a wide variety of recipes and ingredients delivered straight to your door. Consumers can select their desired weekly meals and are provided with the nutritional information for each recipe option.

Supermarkets, convenience stores and service stations are including a wider variety of ready-to-eat meal options. These grab-and-go options range from microwave-meals to meat pies, salads, sandwiches and sushi.

Activity **5.11** (Inquiry): Convenience foods

With the wide variety of convenience foods available, it can be hard to navigate which is the best option for time-poor, health-conscious consumers. Complete a SWOT analysis for each of the following options:

- drive-through foods
- home-delivery services
- meal-subscription boxes
- ready-to-eat meals.

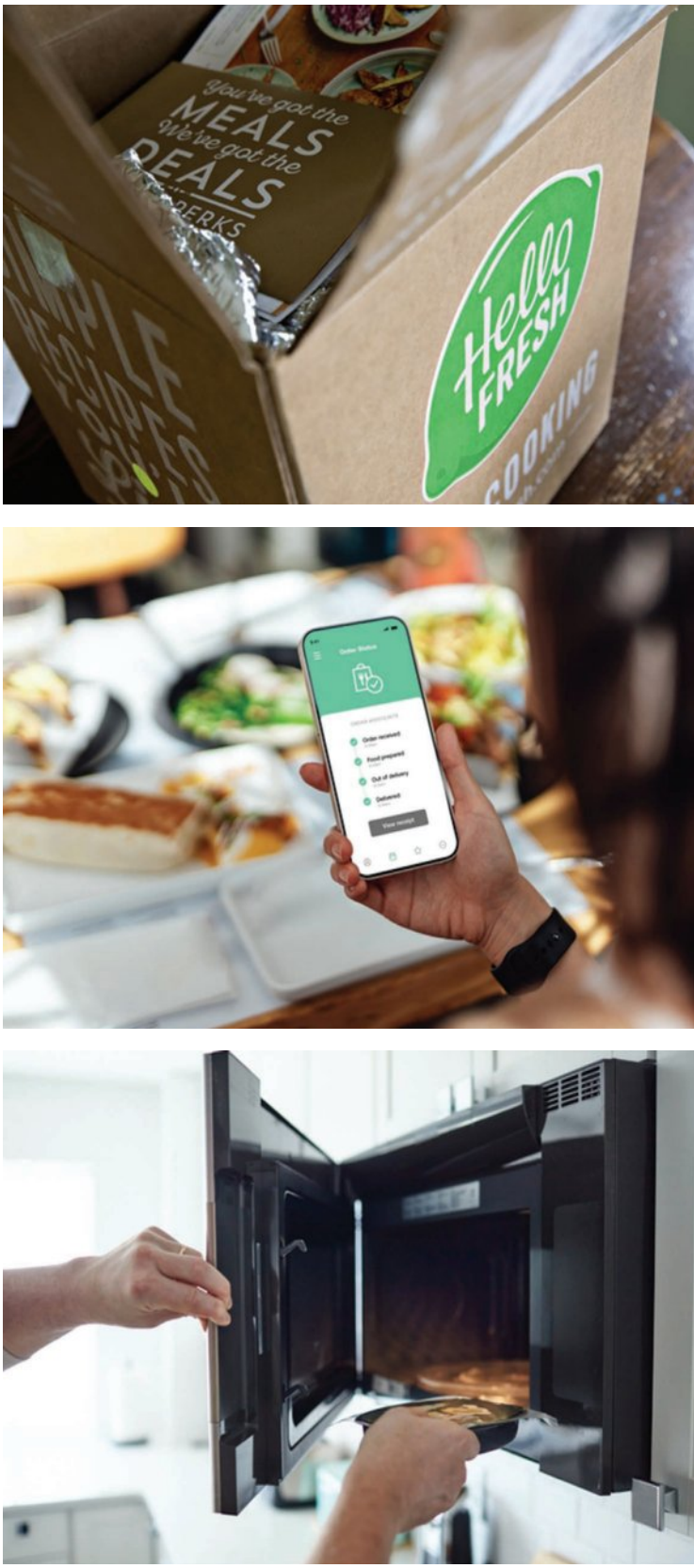

Figure 5.43: Meal-box kits, food-delivery services and heat-and-serve meals are a quick and easy option for time-poor consumers.

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Australian cuisine

So what is Australian cuisine? Is it the foods and flavourings native to Australia? Cultural dishes we have adopted from migrant populations? Food fusion, encompassing multicultural cuisine? Adaptations of traditional meals with an Aussie twist? There is considerable debate about what represents distinctive Australian cuisine. Depending on your culture, heritage, location, experience and customs, Australian cuisine can mean different things to different people.

Let's talk

Finger limes, a Bunnings snag and fairy bread. These foods can be considered quintessentially Australian. List other food items you can think of.

Australian bush foods have been consumed for over 60,000 years by Aboriginal and Torres Strait Islander Peoples, although it is only recently that a resurgence of interest among non-Indigenous Australians has occurred. The kangaroo and emu are not only our nation's national animals, but also bush food staples. Crocodile meat can also be found on many northern Australian menus. Lemon myrtle, wattle seed and macadamia nuts are commonly used native ingredients that are used in modern-day Australian cuisine, as well as food fusion dishes.

Figure 5.44: Australia is one of the few countries where people eat the animals pictured on their national coat of arms.

Australia is surrounded by ocean, so seafood features heavily on many menus. Yabbies, prawns, mussels, abalone, oysters and barramundi can be found along Australia's coastline. These delicacies pair beautifully with native herbs and spices to create fresh and flavoursome meals.

Let's talk

'Shrimp on the barbie' is a classic phrase that was used in a 1980s Australian tourism advertisement featuring Paul Hogan. Why does this phrase spark controversy among Australians?

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Activity **5.12** (Inquiry): Aussie foods

Anzac biscuits, yo-yos, lamingtons, Tim Tams and pavlova – these sweet treats are found in many Australian households. Provide a description of each product and explain how they became a classic Australian item. There has been controversy about the origins of some of these food items. Research the history of these sweet treats to form your own opinion about whether or not they are truly Australian.

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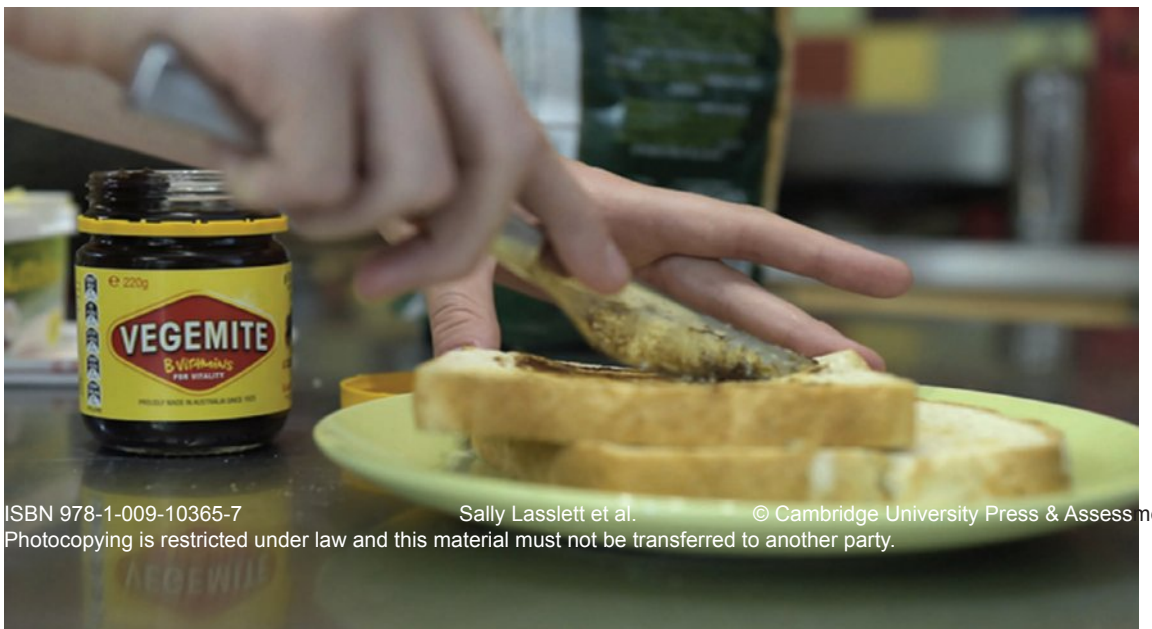
Figure 5.45: 'Hot pies, cold drinks'. Rival football fans can't agree on much, but no one will argue that meat pies go hand in hand with the AFL.

Vegemite, Milo and Twisties are classic Australian tastes, each coming with their own way of eating. Many are judged on their vegemite-to-butter ratio when making toast, or how many scoops of Milo are appropriate in a glass of milk. Twisties are not only eaten straight out of the packet, but many Australians like to enjoy a 'Twistie buttie', where Twisties are placed in a buttered bread sandwich.

The migration of European and Asian people has had a long-lasting impact on Australian foods. Inspiration has come from these multicultural cuisines in the adaption of various food items to create the Aussie burger, dim sims and chiko rolls. Many nations are shocked that we enjoy our burgers with the addition of beetroot, pineapple and egg.

Figure 5.46: What are your golden rules when making Vegemite toast?



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Chicken parmigiana

Whether you call it a parma or a parmi, Australia has adopted the chicken parmigiana as one of its favourite pub meals.

Ingredients


1 chicken breast


2 tablespoons plain flour


1 egg


½ cup breadcrumbs


1 tablespoon tomato paste


1 slice of ham


2 tablespoons mozzarella cheese


2 potatoes


2 tablespoons oil


1 cup loosely packed spinach leaves


3 cherry tomatoes, halved


⅛ red onion, thinly sliced


¼ carrot, julienned


¼ cucumber, thinly sliced


1 teaspoon balsamic vinegar


1 teaspoon extra virgin olive oil


¼ teaspoon Dijon mustard

Method

Potato chips

1. Preheat oven to 220°C.
2. Cut potatoes into 1 cm thick chips.
3. Soak in cold water, rinse, drain and dry.
4. Toss the potatoes with half of the oil and selected seasonings.
5. Spread evenly on baking tray. Bake for 20 minutes, then turn and bake for an additional 15 minutes or until cooked.

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Chicken schnitzel

1. Place the chicken breast inside two sheets of baking paper and use a meat mallet or rolling pin to flatten slightly.
2. Place the flour and breadcrumbs on two separate plates. In a medium bowl whisk the egg with a splash of water.
3. Crumb the chicken. First toss in the flour, then dip in the egg and finish by pressing into the breadcrumbs. Transfer to plate and cover.
4. Heat oil in a frypan and cook the chicken for 4–5 minutes each side or until golden. Transfer to lined baking tray.
5. Top with tomato paste, ham and mozzarella cheese before placing under the grill. Grill until cheese is golden brown.
6. Serve with salad and chips.

Salad and dressing

1. Combine the balsamic vinegar, extra virgin olive oil and Dijon mustard in a small jar. Shake to form a vinaigrette.
2. Combine spinach, tomatoes, onion, carrot and cucumber with the dressing in a bowl immediately before serving.

Evaluation questions

1. Describe the sensory properties of the completed dish.
2. Identify the origin of this dish.
3. Discuss the factors that have led to this dish becoming an Australian pub classic.
4. Suggest modifications to the recipe to incorporate native flavours.
5. Identify other Australian pub classics and outline their heritage.
6. Do you think meals that have originated in other countries can form part of a distinctive Australian cuisine? Justify your response.

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Chapter revision

- The Department of Immigration was established to increase the Australian population after the devastating losses of World War II. The program targeted young, physically strong and skilled migrants to immigrate to Australia and help support our local workforce.
- Immigration of European migrants saw Australia's food culture and cuisine diversify. New food items and recipes started to reach our shores. Italian and Greek cuisines utilised vegetables such as zucchinis, tomatoes, capsicums, artichokes and eggplants.
- The abolition of the White Australia Policy in the 1970s increased the proportion of non-European people immigrating to Australia. This grew the Asian population within Australia and saw the importation of traditional foods, the establishment of specialist grocers and the growing popularity of Asian cuisine among Australians.
- Characteristics of international food cultures and cuisines vary greatly. Ingredients and flavours are utilised differently, and many areas use specialist cooking equipment to produce traditional meals. Food practices that are deemed polite in one country can be seen as disrespectful in another.
- The popularity of native foods is growing among non-Indigenous Australians. Some food items are now being produced on a commercial scale. These foods are being utilised in modern Australian cuisine as well as adding diversity to multicultural dishes such as pairing lemon myrtle with Asian flavours like ginger and lemongrass.
- Food trends, subcultures and social behaviours can have a direct impact on individual health. This can relate to the food we consume, with high-fibre and fermented foods promoting good gut health; as well as relating to the ways in which we interact with food through social media platforms and food posts.
- There is considerable debate over what is classified as Australian cuisine. Native foods, colonisation and immigration have all influenced the variety of meals available today.

Apply your knowledge

1. Describe what was meant by the slogan 'populate or perish'.
2. Identify factors that have led to people immigrating to Australia.
3. Outline how cookbooks such as *Cookery the Australian Way* influenced Australia's multicultural cuisine.
4. Explain the importance of international food aisles in supermarkets and specialist cultural supermarkets.
5. Describe the different ways food is served and consumed in different cultures.
6. Identify a food movement and explain its impact on health.
7. Discuss how immigration has influenced the culture of food in Australia.
8. Outline factors that have led to the resurgence of interest in indigenous foods.
9. Describe the impact of indigenous foods on health.

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Practice exam questions

Question 1
Which of the following food sources provides the gut with healthy bacteria?
A Wholegrains
B Kimchi
C Meat
D Apples

1 mark

Question 2
Select a cuisine brought to Australia by migrants and discuss its traditional flavours, ingredients, recipes and customs. **4 marks**

Question 3
'Australian cuisine is due to European immigration.'
Analyse this statement.

6 marks

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Area of Study 2: Extended Response Question

'Australia has a distinctive cuisine of its own.'

State your opinion and justify your point of view. Discuss why there is great debate over this statement.

8 marks

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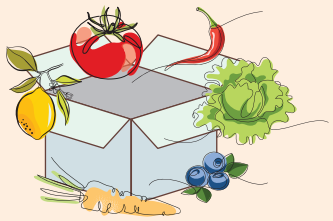
Let's unpack it



Refer to the **How to unpack exam questions** section on page xvi as a guide to the question breakdown below.

Question 1
Australia has a distinctive cuisine of its own.
State your opinion and justify your point of view. Discuss why there is great debate over this statement.

8 marks

A Annotate the command word
Justify: Show, prove or defend, with reasoning and evidence, an argument, decision and/or point of view using given data and/or other information.
Discuss: Provide a clear, considered and balanced argument or prose that identifies issues and shows the strengths and weaknesses of, or points for and against one or more arguments, concepts, factors, hypotheses, narratives and/or opinions.

B Parts of question
State your opinion and justify your point of view. Discuss why there is great debate over this statement.

C Count the marks – holistically marked
8 marks.
Include opinion and examples of both sides, final judgement or conclusion.

D Determine key words to use
Australia: What is Australian?
Believe
Opinion
Distinctive cuisine
Indigenous, multicultural, both?

E Evidence
Use your knowledge to provide evidence to support your statements made.
Provide opinion with in-depth examples to demonstrate a deeper understanding.
Show both sides with a final judgement/conclusion.

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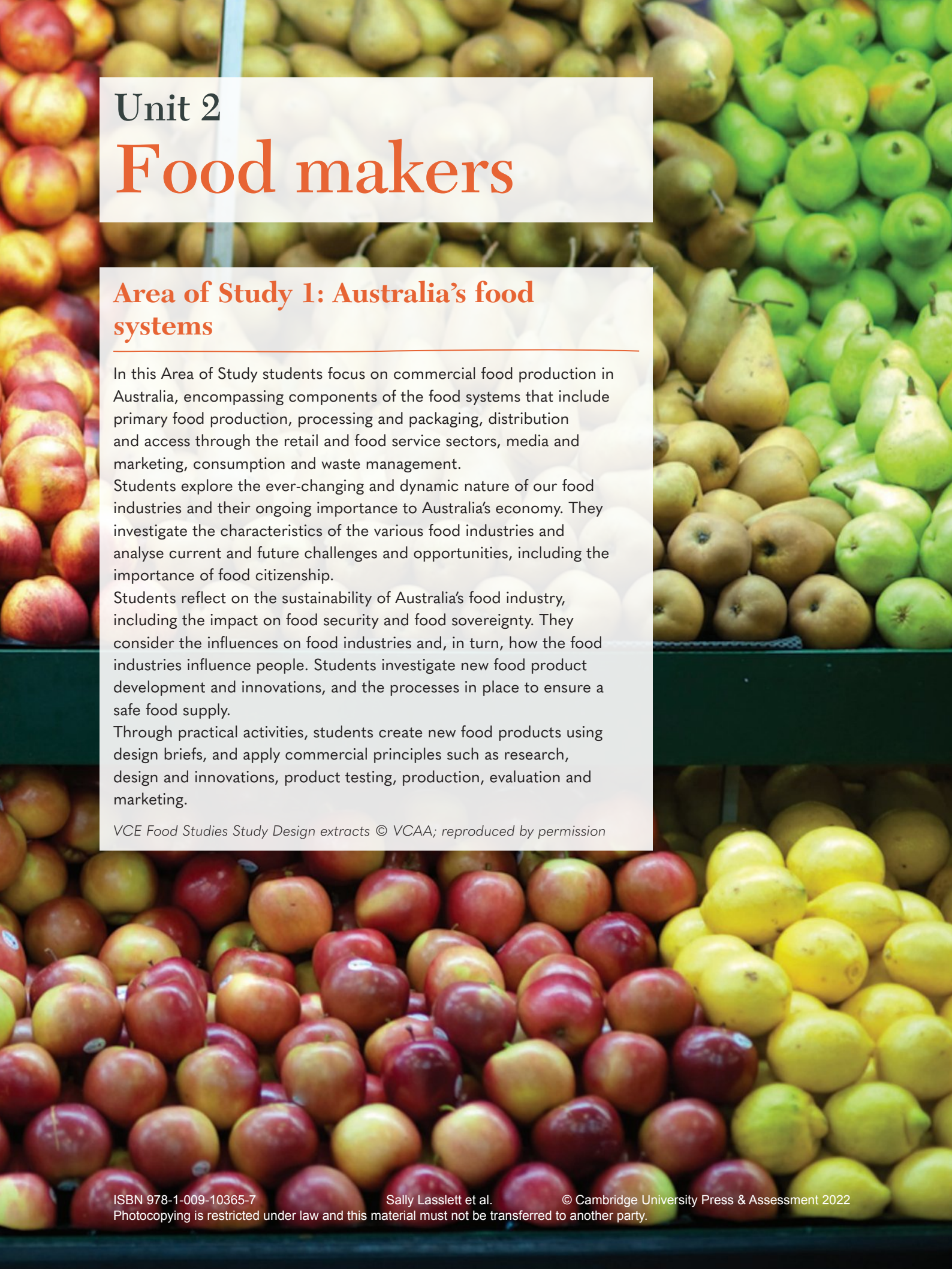

Unit 2
Food makers

Area of Study 1: Australia's food systems

In this Area of Study students focus on commercial food production in Australia, encompassing components of the food systems that include primary food production, processing and packaging, distribution and access through the retail and food service sectors, media and marketing, consumption and waste management.

Students explore the ever-changing and dynamic nature of our food industries and their ongoing importance to Australia's economy. They investigate the characteristics of the various food industries and analyse current and future challenges and opportunities, including the importance of food citizenship.

Students reflect on the sustainability of Australia's food industry, including the impact on food security and food sovereignty. They consider the influences on food industries and, in turn, how the food industries influence people. Students investigate new food product development and innovations, and the processes in place to ensure a safe food supply.

Through practical activities, students create new food products using design briefs, and apply commercial principles such as research, design and innovations, product testing, production, evaluation and marketing.

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Chapter 6
Food industries

Key knowledge

- The components and activities that comprise Australian food systems.
- Current environmental and economic sustainability and social trends, issues and influences in Australian food industry sectors, and the impact on food security and food sovereignty.
- The key elements of primary production of food in Australia, including the leading agricultural and horticultural industries, and major food-growing regions and products for local and export markets.
- The characteristics of leading food processing and manufacturing industries in Australia.

Key skills

- Describe major sectors and explain current developments in Australian food systems.
- Describe Australia's leading industries in primary food production, processing, manufacturing and marketing.
- Analyse opportunities and challenges and relationships within the Australian food service and food retailing industries, and through practical activities demonstrate, observe and evaluate the influence on food patterns in Australia.
- Undertake practical activities to analyse commercial food production in Australia.

Agricultural industries Production of crops and livestock such as grains, fruits and vegetables, nuts, meat and dairy.

Horticultural industries Sub-components of the agricultural industry comprising fruit, vegetables, nuts, flowers, turf and nursery products.

Australians love their food, and this is reflected in the strength and diversity of our food systems. Our varied climate and topography enable a wide range of foods produced through **agricultural** and **horticultural industries**. Processing and manufacturing industries work to create new food products for local and international markets.

Australia produces an abundance of food, with the vast majority being exported to international markets as we are renowned for our premium, safe food supply. In order to remain successful, the Australian food industry must continue to develop to meet the demands of consumers, as well as adapt to environmental, social and economic influences and issues.

Get knowledge ready

1. **Name foods that are produced through Australia's agricultural industries.**
2. **Identify food waste-management strategies used in food industry sectors.**
3. **Provide examples of environmental and social issues that influence food systems.**

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Australia's food systems

Food systems refer to many components and activities involving **primary production**, processing and packaging, distribution and access, **media** and **marketing**, consumption and waste management of food. Each of these can affect food accessibility in different ways, and subsequently impact health.

Primary production

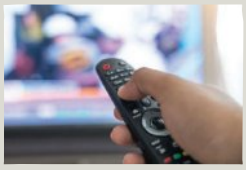
- Agricultural, horticultural and fishery industries cultivate plants and animals
- Key industries include:
  - livestock: beef, sheep, dairy and pork
  - grains: wheat, barley, rice, canola, legumes and pulses

Processing and packaging

- Secondary processing to turn primary processed food into other food products, either on their own or mixed with other ingredients
- Food is packaged ready for distribution and sale

Distribution and access

- Transportation of food by road, air and sea to food retailers
  Large amounts of food is exported for international sale
- Food access:
  - grocery stores, fresh food markets, supermarkets
  - specialist and convenience stores



Media and marketing

- Print, broadcast and digital media
- Marketing campaigns produced by businesses
- Government and non-government organisations promoting the consumption of healthy foods

Consumption

- Domestic and commercial settings
- At home
- Cafes, restaurants and food vendors

Waste management

- Collection, transportation, handling and disposal of food and food by-products
- Occurs through all stages of Australia's food systems, from farm to consumer

Figure 6.1: Many components and activities make up Australia's food systems.

Primary production
Agricultural and horticultural industries that cultivate plants and animals.

Media
Mass communication such as broadcast, print and online media.

Marketing
The action or business of promoting and selling products or services, including market research and advertising.

Video 6.1: Chapter Overview

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Beef

Primary production

- Farmed throughout Australia and does not rely on specific weather conditions.
- Predominantly pasture fed (grass fed). Some cattle are sent to **feedlots** before slaughter.
- Over 50 different breeds farmed throughout Australia, such as Brahman, Angus and Murray Grey.

Figure 6.2: New South Wales beef farm

Processing and packaging

- Sent to **abattoirs** for **primary processing**, resulting in individual cuts of beef.
- Air-tight packaging often utilised to minimise exposure to oxygen.
- Food commodities such as pies, canned soup and sausages are produced through **secondary processing**.

Figure 6.3: Primary processing of beef results in many different cuts of meat.

Distribution and access

- Around 75 per cent of beef is exported to international markets. This includes beef cuts and **live exports** of cattle.
- Beef and beef products are sold throughout Australia in hospitality and retail sectors.

Figure 6.4: Australian cattle arriving in Indonesia

Feedlot
A location where livestock are confined and fed high-energy grain to maximise growth for the purpose of slaughter.

Abattoir
A processing centre where livestock are slaughtered for food.

Primary processing
Involves a range of processes to make food safe to eat so it can be consumed individually or used to make other food products. Examples include harvesting, slaughtering, washing, grading, sorting, transporting, blending, milling, packaging and distribution. Primary processing involves minimal impact on the food's physical properties.

Secondary processing
Methods of turning primary processed food into other food products, either on their own or mixed with other ingredients. The physical form of the original food can change quite significantly as a result of secondary processing.

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Bananas

Primary production

- Predominantly farmed in Queensland as they prefer hot tropical climates.
- **Fertilisers** are used to promote plant growth.
- The two main varieties are Cavendish and Lady Finger, with the Cavendish variety accounting for 95 per cent of production.
- Harvested when green and ripened off the tree.

Figure 6.5: Banana plantation in Queensland

Processing and packaging

- Harvested green and graded based on length and circumference.
- Packed as whole hands, part hands or clusters in cardboard cartons lined with plastic.
- Secondary processing can include dehydrating to make banana chips and factory processing to produce muffins, bread, cakes and purée.

Figure 6.6: Production of banana chips during secondary processing

Distribution and access

- Banana production is distributed to local markets, with under 1 per cent of production exported internationally.
- Bananas and banana products are sold throughout Australia in hospitality and retail sectors.

Figure 6.7: Bananas are sold predominantly in domestic markets.

Live exports
Livestock that are shipped internationally.

Fertilisers
Substances that provide nutrients to help plants grow or improve soil; used to produce more crops.

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Environmental sustainability
Protecting and maintaining environmental resources for future generations.

Compost
Decaying organic material that can be used as fertiliser for growing plants.

Feedstock
Raw material that can be used in the production of fuel.

Biogas
Fuel, predominantly composed of methane and carbon dioxide, that is produced from raw materials such as agricultural waste.

Beef

Media and marketing

- Meat & Livestock Australia (MLA) has produced a range of integrated campaigns such as 'The BBQ Beef Squad' and 'Australian Beef. The Greatest' appearing on TV, digital and social media.
- Secondary processing of meat to make new food commodities are heavily marketed across all media platforms by their respective companies.
- Representation of the beef industry and the consumption of red meat is often scrutinised in the media due to issues regarding **environmental sustainability** and lifestyle diseases.

Figure 6.8: Media advertisements focus on the quality of Australian beef in their products.

Consumption

- Beef is considered a high-risk food for food poisoning, so precautions need to be taken to mitigate risk during preparation and consumption.
- Depending on the cut of beef or secondary food product, different internal cooking temperatures should be adhered to.
- On average, Australians consume around 20 kg of beef annually.

Figure 6.9: There are many ways to enjoy beef: spaghetti bolognese, tacos and steak are some household favourites.

Waste management

- Cattle manure is a major contributor of waste during beef production, this can be repurposed as **compost** or used as **feedstock** or in **biogas** production.
- Manufacturing and processing centres can repurpose off-cuts into animal feed and soaps.
- Commercial and domestic settings can reduce beef waste by ensuring safe food handling and storage practices are followed.

Figure 6.10: Organic material such as manure can be used in the production of biogas.

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Bananas

Media and marketing

- An integrated Australian bananas marketing strategy across all media platforms encourages consumers to choose the fruit over discretionary products.
- Media campaigns such as billboards, social media posts and TV commercials continue to use the classic slogan 'make your body sing'.
- Advertisements can be seen across social media platforms such as TikTok, Instagram and Facebook.

Figure 6.11: Australian bananas marketing strategy uses the catchy slogan 'make your body sing' across its media campaigns.

Consumption

- Bananas are consumed predominantly in their raw state as a healthy snack.
- Popular cooking methods utilised in domestic and commercial settings include smoothies, banana bread, banoffee pie and banana muffins.
- On average, Australians consume around 16 kg of bananas annually.

Figure 6.12: Brown bananas are perfect in baked products or smoothies as the fruit becomes sweeter during ripening.

Waste management

- Aesthetic standards set by supermarkets have seen tonnes of bananas discarded during primary food production due to cosmetic imperfections.
- Changing supermarket standards and consumer attitudes are key to waste reduction.
- Repurposing over-ripe bananas in baked goods avoids excess waste.
- Banana peel can be composted rather than sent to **landfill**.

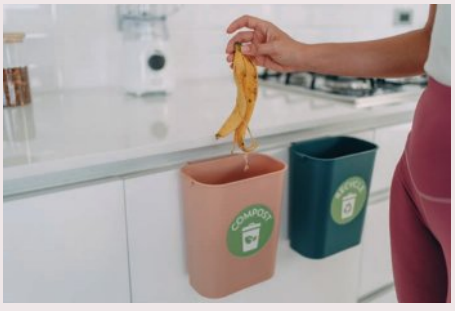

Figure 6.13: Composting bananas reduces food waste being sent to landfill.

Landfill
A tip or rubbish dump where waste is sent.

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A food system analyses raw commodities, from farm to consumer, and includes supply of agricultural inputs, primary food production, processing and manufacturing sectors, packaging, distribution, retailing and marketing, catering and domestic food use. Consumers actively engage in food systems through activities such as purchasing, preparing, consuming, disposing of and **recycling** food.

Recycling
Converting waste into new materials for use in new products.

Let's talk

Discuss ways in which you engage with food systems.

Components and activities within Australian food systems will vary, depending on the food in question. The production, processing, distribution, marketing, consumption and waste management of beef will be considerably different from those processes for bananas.

Activity **6.1** (Inquiry): Pathway through the food system

Aside from beef and bananas, select two other foods produced in Australia's agricultural industry and describe their pathway through the food system.

1. Construct a table to describe the pathway of each food through Australia's food systems. Include primary production, processing and packaging, distribution and access, media and marketing, consumption and waste management.
2. Discuss the similarities and differences between the two foods.
3. Suggest trends in food purchasing and consumption that may influence secondary processing of and marketing campaigns for the two foods.

Activity **6.2** (Practical): Product analysis

Select three commercial food products that have undergone secondary processing from either the beef or the banana industry.
For each product:

1. Outline the secondary food processing that has occurred to create the product.
2. State the price of the product.
3. Describe media campaigns used to market the product.
4. Describe the sensory properties of the product.
5. Referring to the nutrition information panel on the food label, state the nutritional content of the product per 100 g.

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Banana bread

Ingredients


125 g butter, softened


1 cup brown sugar


¼ cup golden syrup


2 eggs, whisked


3 bananas, mashed


1¾ cups plain flour


1 teaspoon baking powder


1 teaspoon bicarbonate of soda


1 teaspoon ground cinnamon


½ cup walnuts, chopped

Method

1. Preheat oven to 160°C fan-forced. Grease and line a 6 cm deep, 10 cm × 21 cm (base) loaf tin.
2. Cream the butter, sugar and golden syrup with electric mixer until pale and creamy. Slowly add the eggs and beat well to combine. Stir in the banana.
3. Sift in the flour, baking powder, bicarbonate of soda and cinnamon over the banana mixture and fold to combine. Stir in the walnuts.
4. Spoon the mixture into prepared loaf tin. Bake for 60–65 minutes or until cooked when tested with a skewer. Cool in the pan for 10 minutes before turning out onto a wire rack to cool completely.
5. Banana bread can be sliced and served as is, or toasted with butter sliced banana and drizzle of maple syrup.

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Evaluation questions

1. Explain the role of enzymes in the ripening of bananas.
2. Suggest toppings or accompaniments that could be served with the banana bread.
3. Explain the purpose of baking powder and bicarbonate of soda.
4. Suggest ways in which the egg shells and banana peel can be disposed of, or repurposed in an environmentally friendly manner.
5. Create a media campaign, either print or video, to market Australian bananas to consumers.

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Leading food industries in Australia

Australia's primary production, processing and manufacturing industries are renowned for their wide range of quality 'clean and green' foods. These industries are major contributors to the economy, through both their financial influence and the growth of trade and employment.

Figure 6.14: Primary food production in Australia has an international reputation of being 'clean and green' due to our safety regulations and farming practices.

Export markets

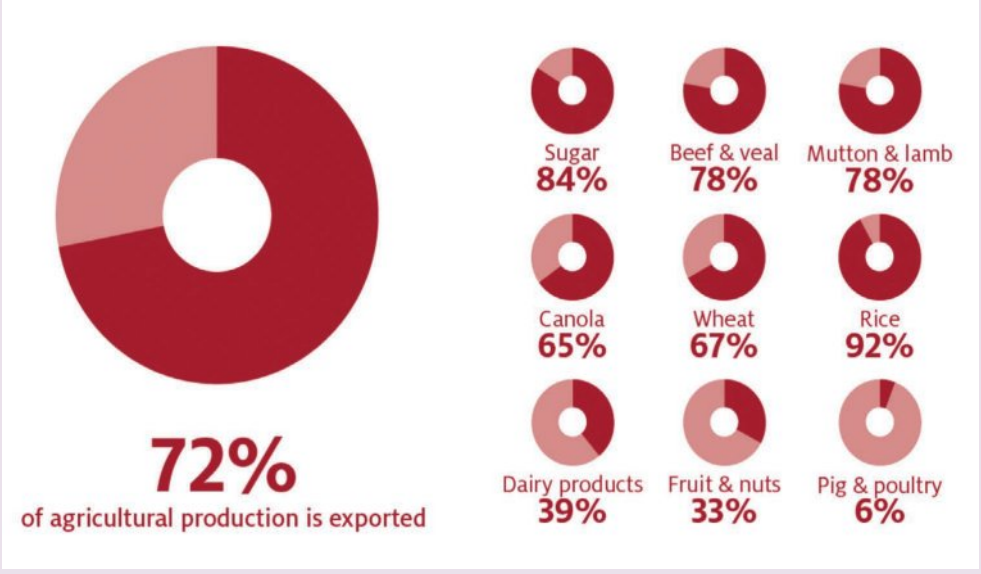
Australia's primary food production produces an abundance of quality affordable food, making us one of the highest-ranking nations for **food security** and building strong international export markets. Production far outweighs local demand, resulting in around 70 per cent of food being exported to international markets, with an annual value of approximately $49 billion. Australia also imports a range of food products, representing around 16 per cent of household food consumption. **Free trade agreements** between Australia and other countries reduce or eliminate **tariffs**, furthering trade and increasing profitability.

Food security
'When all people at all times have physical and economic access to sufficient, safe and nutritious food to meet dietary needs and food preferences for an active and healthy life.' (The Prime Minister's Science, Engineering and Innovation Council (2010), *Australia and Food Security in a Changing World*, p. 1).

Free trade agreements
International agreements between countries that reduce or eliminate barriers to trade and investment such as tariffs.

Tariffs
Taxation imposed by a country on imported and exported goods.

Activity **6.3** (Data analysis): Exportation of Australian agriculture



Source: Share of agricultural production exported by sector, 3 year average, 2017–18 to 2019–20, Department of Agriculture, Fisheries and Forestry

1. Referring to the data, identify Australia's top five exported agricultural products.
2. Research and identify Australia's largest export market and suggest reasons why this country imports a large proportion of its food.
3. Australia has a reputation for producing 'clean and green' food. Explain what this term means and how this reputation influences the exportation of Australian food products.
4. Describe the benefits of free trade agreements for consumers.
5. Research foods that are imported into Australia and discuss factors that influence the importation of food products.
6. Live exportation is a controversial issue. Debate reasons for and against live animal exports.

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Let's talk

Do you know where your food comes from? Consider your weekly diet and identify foods grown in Australia compared with products imported from international markets.

Primary food production

Australia's primary food production, encompassing the agriculture and horticulture industries, is a major contributor to the local economy and workforce. The gross value of agriculture production in 2021–22 was approximately $78 billion, with exports reaching over $61 billion.

Agricultural industries relate to the farming of plants and animals, such as large-scale rice, wheat and sugar cane crops, livestock, dairy, fisheries and horticulture. Horticultural industries are a subcomponent of agriculture, with food production focusing on fruits, vegetables and nuts. Our varied climate and topography support a diverse range of food production regions, from tropical fruit grown in Queensland to wild abalone harvested in Tasmania (Figure 6.15).

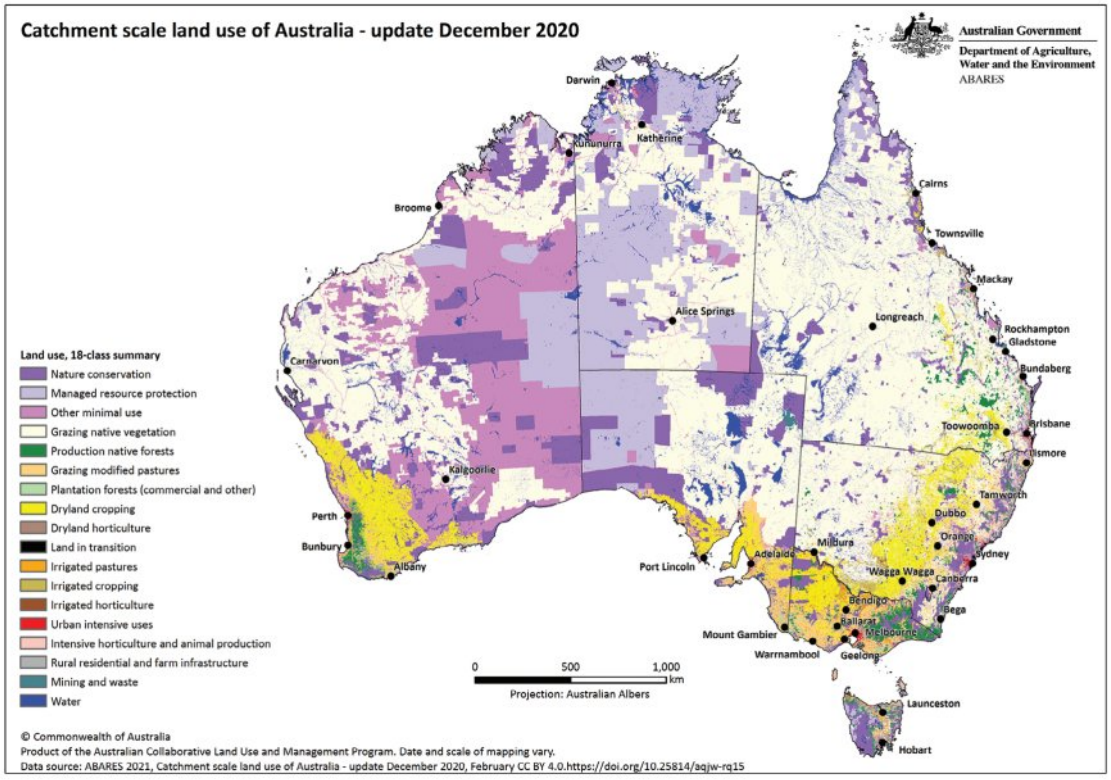

Figure 6.15: Land use in Australia
Source: Department of Agriculture, Fisheries and Forestry

Let's talk

Referring to Figure 6.15, discuss the similarities and differences between the states and territories. Suggest reasons for these.

Livestock

Livestock farming is widespread across Australia, ranging from outback cattle stations to coastal farming areas. Beef, sheep, pork and poultry are the leading livestock industries, producing meat, milk and eggs for local consumption and export to international markets.

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Figure 6.16: Each year, Meat & Livestock Australia (MLA) produces an advertisement promoting Australian lamb featuring former AFL star Sam Kekovich. These advertisements often take a satirical look at the country or current issues. Have you seen this year's advertisement?

Drought conditions impact the herd and flock size of livestock as farmers decrease numbers to ensure they have enough resources to adequately support their animals. Farming regions for livestock production exist across all states and territories, with density of farms highest across the eastern states of Australia.

Over the past 20 years, consumption of meat in Australia has fluctuated. There has been a steady decline in the consumption of red meat, while chicken consumption has grown substantially. Although local consumption of red meat is declining, Australia remains one of the largest exporters of beef, veal and sheep meat in the world.

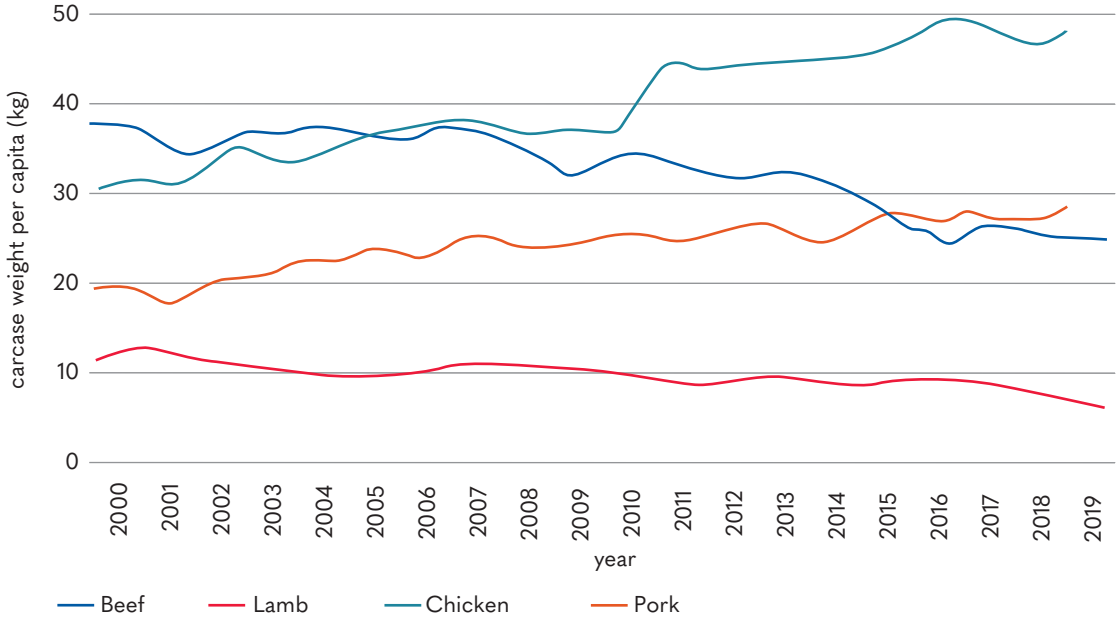

Figure 6.17: Australian meat consumption per capita – fresh and processed.
Source: Meat & Livestock Australia Limited

Let's talk

Consider your own household's meat consumption. If you are not vegetarian or vegan, how often do you eat meat and what types of meat do you mainly consume?

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Activity **6.4** (Inquiry): Livestock industries

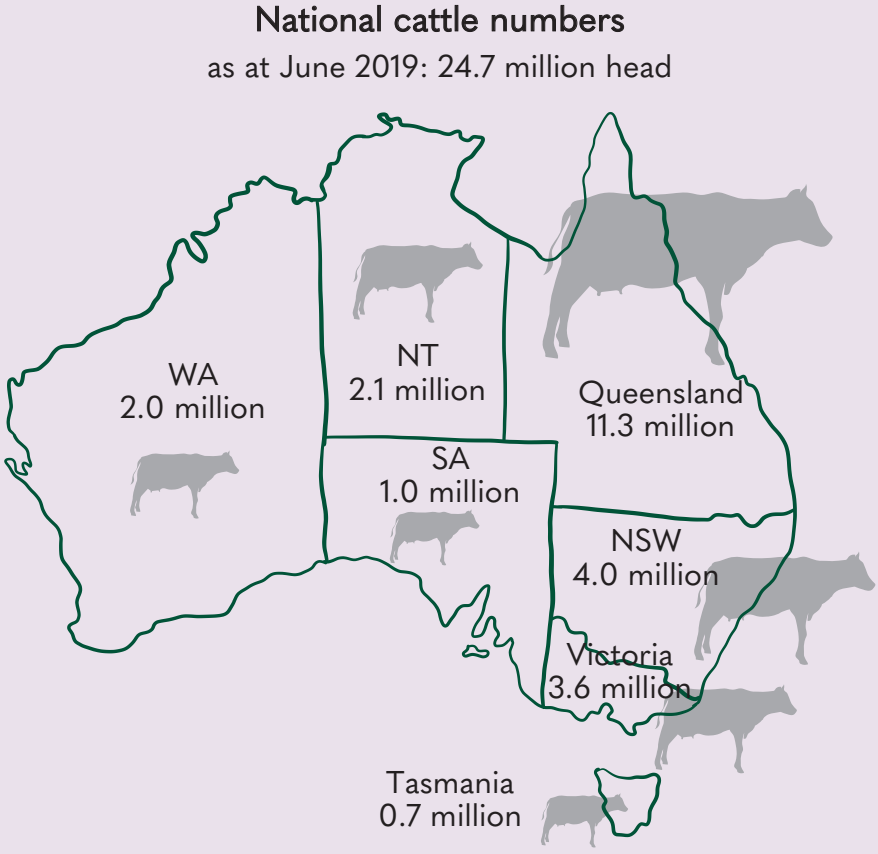

Figure 6.18: National cattle numbers
Source: Meat & Livestock Australia Limited

Create an infographic for one of Australia's main livestock industries. Include the following information:

- production regions
- tonnes of meat produced per annum
- Australian consumption rates
- export value and volume per annum.

Dairy

The dairy industry is a major contributor to the local economy and rural workforce, employing approximately 46,200 people. Milk is the most popular dairy product consumed by Australians; however, consumption rates have decreased over the past decade.

Cheese, butter and yoghurt are also widely enjoyed by Australian consumers, taking a variety of forms and flavour profiles. There is high demand in international markets for Australian dairy, especially milk, milk powder and cheese.

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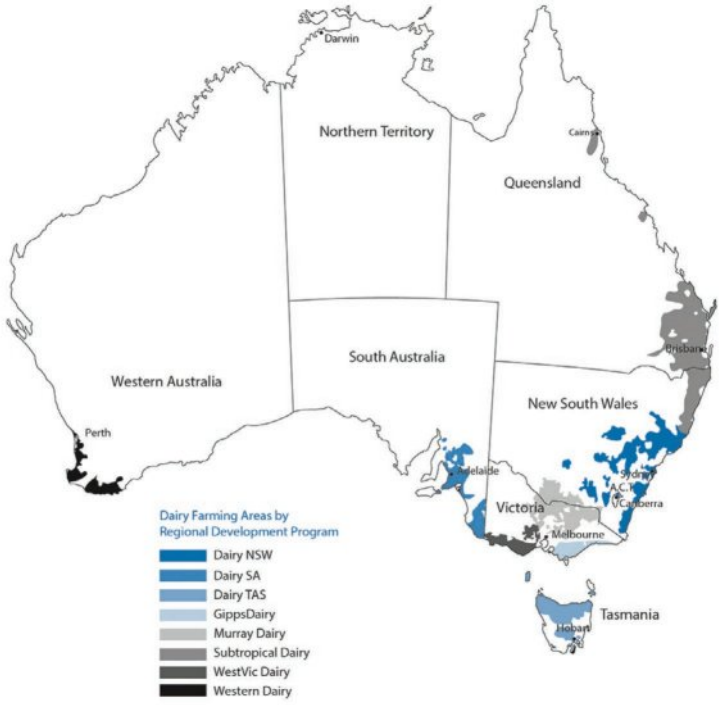

Figure 6.19: There are eight dairy regions spread across Australia.
Source: Dairy Australia

Activity 6.5 (Practical): Product analysis

Select three commercial dairy products that have undergone different secondary processing, such as cheese, yoghurt and cream.
For each product, complete the table below by comparing commercial dairy products from each of the four categories.

	Describe the food processing that has occurred to create the product	Describe the sensory properties of the product	State the nutritional content of the product per 100 g
Milk			
Cream			
Plain yoghurt			
Tasty cheese			

Figure 6.20: A wide variety of dairy products can be made with milk.

Fisheries

Australian commercial fisheries and **aquaculture** industries produce a diverse range of seafood for both local and international markets. Seafood consumption outweighs sheep and lamb among Australians, ranking fourth behind poultry, pig meat and beef. It is estimated that around 70 per cent of seafood consumed by Australians is imported, predominantly consisting of canned and frozen fish. Australian fisheries exports are predominantly high-value seafoods such as rock lobster, tuna and abalone.

Aquaculture
Farming of aquatic organisms, including fish, molluscs, crustaceans and aquatic plants.

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Let's talk

How often do you eat seafood each week? Does your household mirror the nation's seafood intake? What varieties do you consume? Are they predominantly canned, frozen or fresh?

Figure 6.21: Australian abalone is a high-value seafood item that is exported to many international markets.

Activity **6.6** (Inquiry): The Australian abalone market

Search online for 'A video case study on Ausab' about the Australian abalone export market.

1. Discuss how free trade agreements with China, Japan and Korea have supported the abalone export market in Australia.
2. Abalone farms are situated in the southern part of the country, including Western Australia, South Australia, Victoria and Tasmania. Suggest a reason for this.

Cropping industries

Australian crop industries, including wheat, rice, barley, oilseeds and sugar, make a significant contribution to the national economy. There are three broad growing regions, each with its own distinct climate, cropping and characteristics. The northern region encompasses parts of Queensland and New South Wales, and provides the highest diversity of crop production in Australia. The southern region includes Tasmania, Victoria and South Australia, while the western region is located in southern Western Australia. Climate, topography and soil fertility in each region are significantly different, resulting in varied crop diversity and density.

Irrigation
The application of water to land in a controlled way to produce crops.

Activity **6.7** (Inquiry): Rice growing and irrigation

Rice is grown predominantly in the Murrumbidgee River valley of New South Wales and the Murray River valley of New South Wales and Victoria. Rice is a thirsty crop and is dependent on water from **irrigation**. A number of strategies have been implemented by the Australian rice industry to increase water use efficiency. From farm to consumer, rice grown in Australia uses 50 per cent less water than the global average.

1. On a map, indicate the rice-growing regions of Australia. Describe how the characteristics of these regions support rice farming.
2. Name the varieties of rice grown in Australia and describe how they best suit our land and climate.
3. Explain government regulations and rice farming strategies that work to manage water resources in the growing of rice.
4. There is debate over the viability of rice production in Australia, given our climate. Discuss points for and against this issue.

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Figure 6.22: Canola is Australia's predominant oilseed crop.

Horticulture industries

Australia's horticulture industries comprise fruits, vegetables, nuts, turf, flowers and nursery products. The diverse range of food products produced in Australia's horticulture industries has a local and international reputation for being 'clean and green' due to the quality of our produce and the farming methods undertaken to produce them. The country's diverse climate and soils enable a wide range of horticulture products to be produced all year round.

Figure 6.23: The largest crops from each horticulture food industry include oranges, bananas, apples, potatoes, tomatoes, carrots, almonds, macadamias and walnuts.

Major horticulture growing regions in Australia include:

- northern Tasmania
- the Goulburn Valley of Victoria
- the Sunraysia district of Victoria and New South Wales
- the Murrumbidgee Irrigation Area of New South Wales
- the coastal strip of both northern New South Wales and Queensland.
- the Riverland region of South Australia
- southwest Western Australia.

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Activity **6.8** (Inquiry): Horticulture growing regions

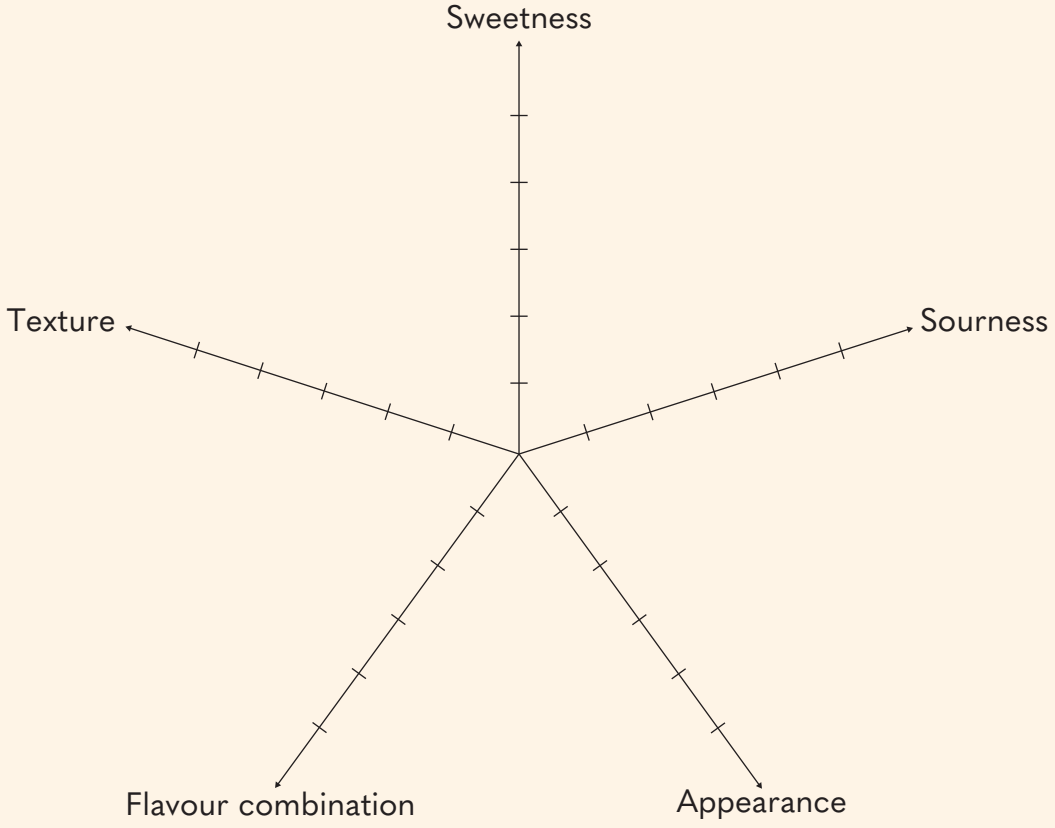
Select a horticulture growing region from page 195.

1. Provide a map of the region.
2. Describe the climate and topography of the area and explain how this supports crop growth.
3. Identify the produce grown in the region.
4. Research the market value of horticulture production in the area.
5. Select a fruit, vegetable or nut that is grown in the region and design a recipe showcasing this food.

Activity **6.9** (Practical): All about apples

Australia produces a range of apple varieties, each offering a unique flavour.

1. Select five different red and green apple varieties to taste test.
2. Analyse the sensory properties of each variety.
3. Select your favourite and justify your choice.
4. Some varieties of apples are better suited to cooking, as opposed to eating raw. Describe the characteristics of cooking apples.
5. Working with a partner, individually produce the apple crumble recipe on the next page. One person should produce the recipe using a green apple, while the other person uses a red apple. Once cooked, compare the sensory properties of the two dishes on a star diagram.



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Apple crumble

Ingredients

Filling

1 apple, peeled, cored and diced

2 teaspoons brown sugar

1 teaspoon water

¼ teaspoon ground cinnamon

Topping

4 tablespoons flour

2 tablespoons brown sugar

2 tablespoons butter, melted

2 tablespoons oats

Method

1. Preheat oven to 180°C.
2. To make the filling: In a small bowl, combine the apple, sugar, water and cinnamon. Divide mixture into two individual ramekins.
3. To make the topping: Combine flour and sugar, then add the melted butter and oats. Mix with a fork, until mixture clumps together into crumbly balls. Sprinkle crumble evenly on top of the apple mixture.
4. Bake for around 30 minutes until topping is golden brown and apples are tender.

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Food processing and manufacturing industries in Australia

Food and beverage processing is the largest manufacturing sector in Australia, producing a comprehensive range of foods for multinational, international and local food companies.

Many raw food commodities go through secondary processing to produce new food products. Think about visiting the supermarket: there is a wide range of fresh produce and cuts of meat, but the vast majority of the store is filled with processed food items. In order for food manufacturing industries to thrive, they must be forward-thinking, adaptive and responsive to consumer demand.

As society changes, so do our demands for new food products. Health and sustainability are major concerns for Australian consumers. Successful companies need to consider these issues when developing their food products, while still ensuring that their items deliver on taste and provide value for money.

Functional foods
Foods that provide health benefits beyond basic nutrition – for example, adding omega 3 to a food that does not normally contain this nutrient, or decreasing the fat content of a traditional food, such as milk.

Let's talk

A number of different processing and manufacturing techniques are used to increase the nutritional profile of food products. Discuss examples you have seen and/or consume.

Health

Australians are becoming increasingly health-conscious, which has seen the growth of new manufacturing methods and the production of **functional foods**. Saputo Dairy Australia is the largest dairy processor in the country, producing brands such as Devondale, Liddells, Cheer and Cracker Barrel. Liddells has produced a range of lactose-free milks with added prebiotics to promote gut health, while Devondale enriches milks in its 'Vital+' range with nutrients such as iron and vitamins C and D.

Figure 6.24: The vast majority of supermarket food items are processed.

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Figure 6.25: Lactose-free dairy labels

Sustainability

Sustainable solutions to food production continue to develop as companies aim to reduce the environmental impact of food processing and manufacturing. Consumer demand for more sustainable products is a key driving force behind this. Sustainable manufacturing works to optimise production techniques, conserve energy and natural resources, increase efficiency, reduce emissions and waste, and utilise environmentally sound materials.

Figure 6.26: Installing solar panels on factory rooftops is one strategy implemented by food processing and manufacturing industries to reduce their environmental impact.

Sanitarium Health Food Company produces a range of breakfast cereals, spreads and plant-based meat alternatives and milk. It strives to promote healthy plant-based foods that not only provide good nutrition, but are also good for the environment. The company reduces its environmental impact by using local ingredients, converting water waste to energy, reducing waste to landfill by recycling waste products and using sustainable packaging. Its approach to plant-based foods aims to make a positive impact on consumer health and the environment.

Figure 6.27: Sustainable packaging is an environmentally friendly initiative undertaken by leading food processing and manufacturing industries.
Source: Courtesy of Sanitarium

Let's talk

Identify different types of sustainable food packaging and ways in which packaging can be reused, recycled or composted.

Marketing

Standing out in a crowd can be difficult for food manufactures, as the food industry is saturated with new products and promotions each week. Successful food manufacturers take an integrated approach to marketing, spreading their campaign across all channels. This can involve television advertisements, billboards, sponsorship, giveaways and social media campaigns.

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Technology

The growth of technology provides new and exciting pathways for food manufacturers. Food processing is more automated than ever, with equipment and machinery producing high volumes of food in short periods of time, increasing productivity and reducing costs.

Online developments such as the **Internet of Things (IoT)** have increased food safety and accountability due to food and products being monitored as they travel through the food systems. For example, real-time temperature tracking of high-risk foods reduces the risk of food-borne illness.

Internet of Things (IoT)
A network of physical objects (things) that are embedded with sensors and/or software in order to gather data. This information is interconnected with other systems and devices via the internet.

Activity **6.10** (Inquiry): New technology

New technology is revolutionising the food industry. The IoT, shockwaves and ultrasounds are some examples of new technologies being utilised in food manufacturing and processing.

Describe each of these new technologies and provide examples of how they are being utilised by food manufacturers.

Food safety

A safe food supply is integral to food processing and manufacturing industries. Food Standards Australia and New Zealand (FSANZ) is a statutory authority that develops food standards to protect public health and safety. These are documented in the Food Standards Code, which sets legal requirements for the production, composition, safety, handling, processing and labelling of food in Australia.

Food processing and manufacturing industries must apply the Hazard Analysis Critical Control Points (HACCP) system to ensure all food is produced in a safe manner. This system will be described in Chapter 8. If the HACCP system is not adhered to, or if a food recall occurs, food production will be discontinued until the problem is rectified. This can negatively affect production rates, decrease revenue and impact the company's reputation.

Let's talk

Have you ever seen a food recall? Why do you think food recalls negatively impact the reputation of a food manufacturer? Would a food recall change your future purchasing behaviour?

Figure 6.28: Specialised equipment and machinery enable biscuits to be produced at a rapid rate, all uniform in colour, shape and size.

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Figure 6.29: Regular temperature checks are an important practice in maintaining food safety.

Responding to consumer demand

Leading food processing and manufacturing industries are forward-thinking, actively engaging in market research to ensure their products meet consumers' needs, preferences and demands. Aside from health and sustainability concerns, consumers want food products that are convenient, affordable and flavoursome.

Uncle Tobys has been manufacturing oats since 1861. The company's ability to adapt to consumer needs over the years highlights its ingenuity. In the 1970s, more women started to enter the workforce, spending less time at home preparing food for their families. The company recognised this increased demand for convenience foods and launched its first muesli bar in 1976. Uncle Tobys continues to look to the future, now producing a wide range of products targeting time-poor, health-conscious consumers, such as its quick oats sachets, protein balls and breakfast bakes.

Figure 6.30: Uncle Tobys produces nutritious and delicious products for time-poor consumers.

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Activity **6.11** (Inquiry): An industry report card

Select one Australian food processing and manufacturing company and create an industry report card. Include the following:

- name of company
- food products the company produces
- company values
- food safety practices
- examples of products produced to meet specific consumer demands.

Trends, issues and influences

Food systems are a complex interplay of various components and activities, affecting environmental and economic sustainability, food accessibility and consumer health. This relationship is not one-sided, as food trends and issues have a direct influence on food systems. In order to support sustainability and increase food security, we must work together to develop democratic, and socially and economically fair systems.

Food insecurity
A lack of regular access to enough safe and nutritious food for normal growth and development and an active and healthy life. This may be due to unavailability of food and/or lack of resources to obtain food. Food insecurity can be experienced at different levels of severity.

Food security

Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy lifestyle. In order to achieve this, five dimensions must be met:

- *availability* – a sufficient supply of food
- *accessibility* – physical and economic access to food
- *acceptability* – culturally acceptable food produced in a manner that respects human rights
- *adequacy* – safe and nutritious foods produced in environmentally sustainable ways
- *stability* – reliability of the food supply.

Figure 6.31: The ability to access food vendors and afford safe and nutritious foods is key to achieving food security.

Australia's ability to produce a wide variety of nutritious and affordable foods ranks us as one of the most food secure nations in the world. The surplus of food produced in the country and our strong international trade help to support food security in other nations as well.

Although Australia is considered a food-secure country, **food insecurity** is still a major concern for a number of at-risk groups, including geographically isolated people, low income earners, Aboriginal and Torres Strait Islander Peoples, homeless populations, culturally and linguistically diverse groups and our ageing population.

In order to address food insecurity, all key stakeholders – including primary producers, food manufacturers, importers and retailers, businesses, industry bodies, organisations, government, community groups and consumers – must work together to acknowledge and address issues within food systems.

Activity **6.12** (Inquiry): Challenges to achieve food security

Research each of the at-risk groups listed above and describe and compare the challenges they may face in achieving food security.

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Figure 6.32: In rural and remote Australia, food vendors and public transport are scarce.

As a society, if we support food sovereignty systems we can improve the health of both the people and the planet. In order to do so, we must work to ensure food is produced through ecologically sound and sustainable methods and address the power inequalities that exist within food systems.

Food sovereignty

Food sovereignty is a food system that supports traditional land-owners, small-scale farmers and citizens. These food systems produce food through **ecologically** sound and sustainable methods. Food sovereignty works to address the causes of food insecurity by placing greater control in the hands of the people, rather than large-scale corporations.

Let's talk

Discuss how each of the six pillars of food sovereignty (Figure 6.33) works to promote food security.

Food sovereignty
The right of people to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems.

Ecologically
Relating to the study of the relationship between living organisms and their interaction with their environment.

Focuses on food for people	• Puts people's need for food at the centre of policies • Insists food is more than just a commodity
Values food providers	• Supports sustainable agricultural industries • Respects the work of all food providers • Policies support farmers rather than corporations
Localises the food systems	• Reduces the distance between food producers and consumers • Puts providers and consumers at the centre of decision-making on food issues
Puts control locally	• Places control in the hands of local food providers • Rejects the privatisation of natural resources
Builds knowledge and skills	• Builds on traditional knowledge and skills of local communities and Indigenous Peoples • Passes down generational knowledge • Rejects technological advancement that undermines or threatens local food systems
Works with nature	• Maximises the contributions of ecosystems • Improves resilience and adaptation in the face of climate change • Rejects methods that damage ecosystems or depend on energy-intensive monocultures and intensive farming practices

Figure 6.33: Six pillars of food sovereignty

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Let's talk

Power and control over the means of production are unevenly distributed in food systems. Power is often concentrated in the hands of large-scale multinational corporations, with small-scale producers having little control over decision-making. Suggest ways in which you can engage with food systems that support traditional landowners and farmers.

Figure 6.34: Food sovereignty is a grassroots movement, supporting local enterprises. Farmers' markets, food hubs and food cooperatives are all examples.

Environmental and economic sustainability

By focusing on environmental and economic sustainability in the food industry, we can work towards creating systems that support food security and food sovereignty.

Primary food production relies on artificial chemicals such as **pesticides** and fertilisers, and irrigation methods for crops to grow. Overuse of these chemicals and excessive application of water can have long-term detrimental impacts. **Soil acidification** and **salinity** can occur, leading to declining crop production and poor soil health. Primary producers need to monitor the use of resources and implement sustainable farming practices to ensure their food production doesn't compromise the environment for future generations.

Pesticides
Chemical substances used in agriculture to kill pests.

Soil acidification
A process whereby soil pH decreases.

Salinity
The presence of salt in soil due to a rising water table, bringing natural salts to the surface of the land.

Figure 6.35: Australia is prone to drought, so irrigation use needs to be monitored due to limited water resources.

The choice of animals for farming can have implications for the environment, as some require greater resources and produce higher amounts of methane emissions, contributing in a major way to climate change. The choice of feed can reduce methane production, therefore providing a sustainable pathway forward.

Consumers' food choices can work to support environmental and economic sustainability and food sovereignty systems. Supporting local enterprises provides a greater connection between food producers and consumers, grows the local economy and empowers primary producers and consumers.

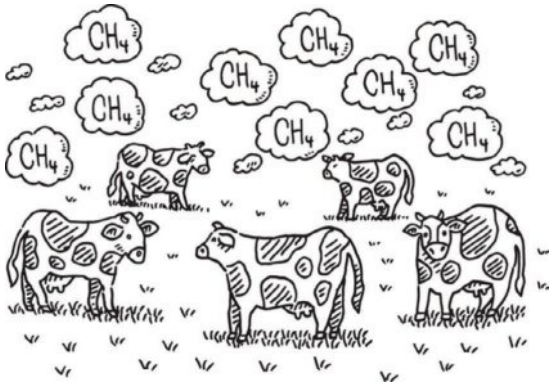

Figure 6.36: Cattle produce large amounts of methane during digestion.

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Connecting with farmers releases the stranglehold multinational corporations have on small-scale business owners. Consumers can grow their knowledge about where their food comes from by engaging in these relationships with primary producers. Prices of fresh produce are often cheaper for the consumer, while trade in local markets is more profitable for farmers.

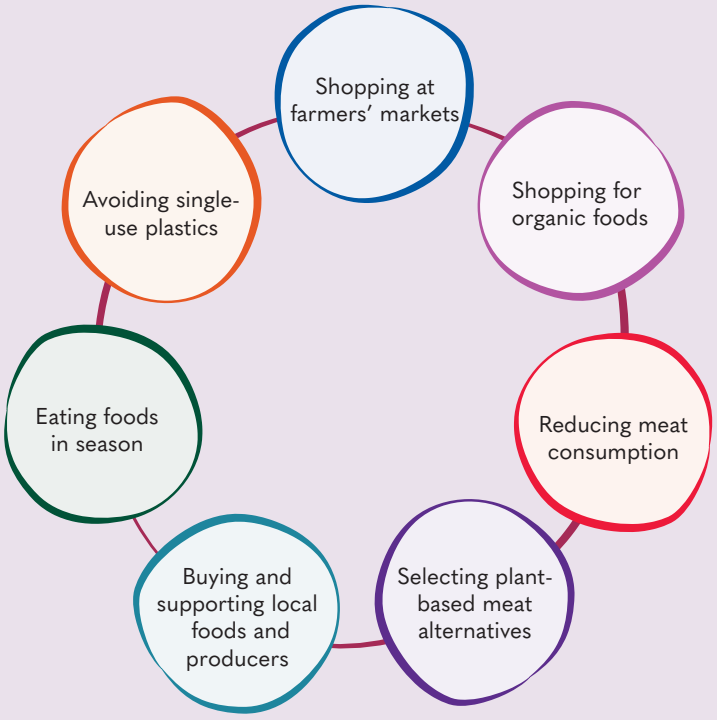
Let's talk

Not all farmed produce can be sold at local farmers' markets if it requires further processing in order to generate an edible food product. Suggest examples of this.

Let's talk

Discuss ways in which farmers' markets help to boost the local economy and build community relationships. Do you frequent a local farmers' market? Why or why not? Complete a SWOT analysis of farmers' markets.

Activity **6.13** (Inquiry): Sustainable shopping strategies



Consumers can follow a number of sustainable shopping strategies to reduce the environmental impact of their food choices:

1. Describe the considerations listed in the diagram above and explain how each supports sustainable food production.
2. Select three strategies and discuss how they promote food sovereignty.
3. Explain how environmentally sound food choices support economic sustainability.

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Ethical food production

Ethical food production considers the welfare of the people and animals within food systems. Due to growing demand pressures on the livestock industry, **intensive farming practices** have increased over the past 20 years. Cheap meat and faster outputs result in poor living conditions for animals. Intensive farming systems are characterised by high-density stocking, accelerated growth and reliance on antibiotic use.

Intensive farming practices
Removing animals from their natural habitats and social structures and confining them to small, restrictive environments.

Figure 6.37: Chickens in battery cages

The food industry and consumers must work together to make positive changes across food systems in order to progress towards a more ethical supply chain. Consumers can support ethical food systems through their purchasing and consumption behaviours.

Figure 6.38: Plant-based meat alternatives are popular options for consumers who want to enjoy the taste of meat but do not want to consume animal products.

Activity **6.14** (Inquiry): Methods of farming

Food labels can indicate the type of farming used to produce the animal product. Each style of production means different living conditions for animals. Explain what each of the following terms mean, and rank them on a continuum from most ethical to least ethical.

- caged
- barn-laid
- free-range
- organic
- feedlot.

Let's talk

Consumer behaviour is important, but consumers are not the only key stakeholders in creating an ethical food supply. Discuss ways in which food manufacturers and the food service industry can modify their actions to better support ethical food production and consumption.

Food trends, purchasing power and societal issues all have a significant influence on food systems. Food industry sectors need to acknowledge these influences and adapt accordingly; however, this can be incredibly difficult, depending on the circumstances.

COVID-19

The COVID-19 pandemic had a dramatic impact on food systems, and subsequently food security. Food industry sectors faced rolling lockdowns and capacity limits. In some areas, such as hospitality, businesses stopped all food production, while others were able to remain open by removing dine-in options and serving only takeaway food. Over 815,000 people work in the food services industry, many of whom faced job losses and financial difficulties during lockdowns.

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Let's talk

Closing a food business such as a restaurant or a cafe impacts a multitude of people throughout the food supply chain. Discuss ways in which farmers, manufacturers, distributors, businesses, workers and consumers are impacted by these closures.

Figure 6.39: Businesses had to close their doors to customers due to COVID-19 lockdowns.

Workforce shortages across all areas of the food system resulted in supply chain issues. A large proportion of the seasonal agricultural workforce usually comes from international travellers such as backpackers. Border closures meant many farms were left understaffed, and found it difficult to harvest their crops. Crops were left unpicked, with food going to waste. This created financial loss for farmers and resulted in large amounts of food sent to landfill. The result was a reduced food supply and an increased cost of food for the Australian public.

Figure 6.40: Fruit was left to rot on trees due to workforce shortages.

Disruptions to the food supply chain left supermarket shelves empty. This was not due to a lack of food, but rather a shortage of staff. Workforce capacity limits and staff absences due to sickness or isolation orders created a distribution problem. These logistical disruptions led some consumers to panic-buy, stocking their homes with an excess of food items beyond their average consumption rates. In order to tackle this, supermarkets set purchasing limits on food items.

In 2020, some retailers established measures to support vulnerable customers, such as the elderly and Health Care Card holders. For the first hour of their trading day, supermarkets opened exclusively to these customers. Home delivery of groceries was prioritised to vulnerable community groups to help address issues of food security.

Figure 6.41: Disruptions to food supply chains resulted in empty supermarket shelves.

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Food security issues among vulnerable community groups were exacerbated due to the pandemic. Previously food-secure people also experienced food insecurity due to a lack of financial resources. Charitable food relief organisations such as OzHarvest and Foodbank worked to secure food donations and provide nutritious foods to community groups in order to reduce the burden of food insecurity.

Food delivery services and meal kits reported a dramatic increase in sales during 2020. Hello Fresh and Marley Spoon reported a 60 per cent increase in sales, offering a healthy alternative to takeaway foods and encouraging consumers to prepare meals at home. Online food delivery platforms such as Uber Eats, Menulog and Deliveroo experienced an increased demand. Uber Eats introduced grocery delivery as part of its services, which increased convenience orders by 184 per cent.

Social media influencers
Online content creators who have built a large following across their social media platforms. Their wide reach, reputation, knowledge and relationships enable them to persuade others to act on the basis of their recommendations.

Figure 6.42: Establishing measures to protect vulnerable community groups such as the elderly works to protect food security.

Figure 6.43: Food relief organisations provide goods and meals to people facing food insecurity.

Let's talk

Discuss ways in which your household's food shopping and consumption changed during COVID-19 lockdowns.

Figure 6.44: Food delivery services increased their profitability during lockdowns.

Health-conscious consumers

The health food industry continues to develop as more people are prioritising their health and wellbeing. The media play a major role in influencing people's perceptions about healthy eating, from the publication of new academic studies to blog posts by **social media influencers**.

The various food industry sectors are adapting to meet consumer demands by developing new food products, changing menus and restocking shelves with nutrient-dense foods. Convenience health foods are a rapidly growing market sector as consumers look for a quick and easy product that aligns with their health concerns.

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Activity **6.15** (Practical): Healthy convenience products

Complete a product comparison by researching the cost and nutritional properties of four healthy convenience products found within the frozen section of a supermarket.

1 Copy and complete the table below

	Product name	Cost	Nutrient content per 100 g
1			
2			
3			
4			
5			

2 Explain the influence of consumer demand in the formation of these products.

Figure 6.45: Companies are jumping on board the health trend and are producing healthy convenience products without compromising on taste.
Source: Courtesy of Super Nature Foods

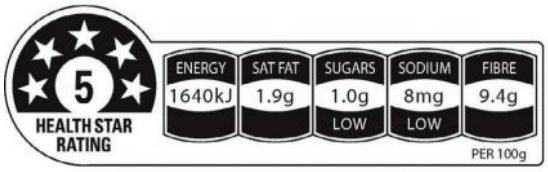

Figure 6.46: The Health Star Rating System is used on packaged foods to rate their nutritional profile from half a star to five stars.

Activity **6.16** (Inquiry): Health food trends

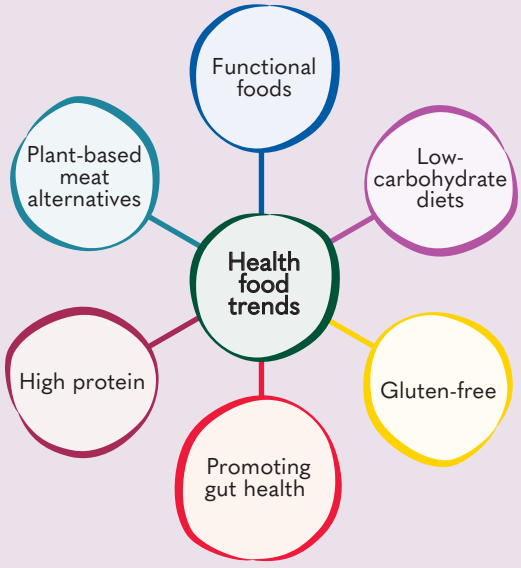

Figure 6.47: Health food trends

1 Discuss ways in which each of the trends pictured in Figure 6.47 have influenced the food industry.

2 Identify other health food trends that are influencing food systems.

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Chapter revision

- Food systems are a complex interplay of components and activities that take food from farm to consumer. This involves primary production, processing and packaging, distribution and access, media and marketing, consumption and waste management of food.
- The type of raw food commodity and its intended use will determine what primary and secondary processing will occur. Primary processing ensures the food is safe to eat and involves minimal impact to the food's physical properties, while secondary processing will significantly change the form of the original food to make new food products.
- Australia is renowned for its abundance of clean and green food. The majority of our primary produced food products are exported to international markets. Free trade agreements with partnering countries work to eliminate barriers to trade and facilitate stronger commercial ties.
- The diverse climate and topography of Australia promotes a wide variety of agriculture and horticulture industries, with different growing regions specialising in specific raw food commodities.
- Leading food processing and manufacturing industries are forward-thinking and adaptive to food trends, and consumers' needs, preferences and demands. Health concerns, environmental sustainability, use of new technology, food safety and hygiene, convenience and cost are all key considerations in food processing and manufacturing.
- A number of factors impact Australian food industry sectors, food security and food sovereignty. In order to achieve food security and support food sovereignty systems, all key stakeholders must address environmental, economic and social issues.

Apply your knowledge

1. Identify the components and activities that comprise the Australian food system.
2. Using examples to support your response, explain the difference between primary and secondary food processing.
3. Discuss the benefits of free trade agreements for food producers and consumers.
4. Explain the relationship between Australia's climate and major food-growing regions.
5. Describe characteristics of leading food processing and manufacturing industries in Australia.
6. Describe food sovereignty.
7. Identify a social issue and describe how it has impacted food security within Australia.
8. Suggest strategies consumers can follow to support environmentally and economically sustainable food systems.

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Practice exam questions

Question 1

Which of the following actions best supports an ethical food supply?

A Selecting functional foods for additional nutritional benefits.
B Consuming a diverse range of cultural foods.
C Purchasing from small-scale local farms.
D Selecting unprocessed foods.

1 mark

Question 2

Explain ways in which food processing and manufacturing industries are adapting to meet consumer health and sustainability concerns.

4 marks

Question 3

Discuss strategies consumers can use to promote food sovereignty systems.

4 marks

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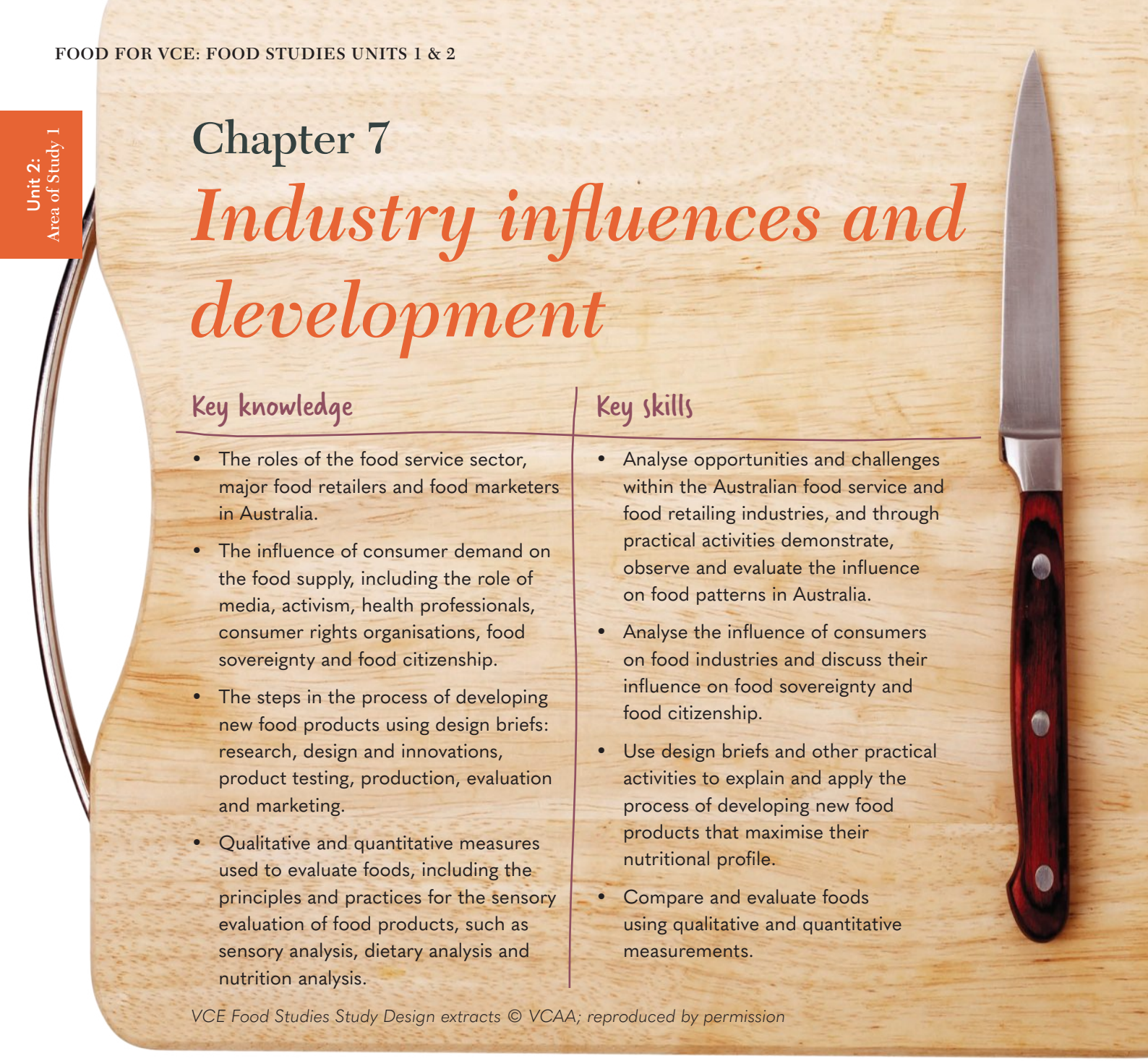
Chapter 7
Industry influences and development



Key knowledge

- The roles of the food service sector, major food retailers and food marketers in Australia.
- The influence of consumer demand on the food supply, including the role of media, activism, health professionals, consumer rights organisations, food sovereignty and food citizenship.
- The steps in the process of developing new food products using design briefs: research, design and innovations, product testing, production, evaluation and marketing.
- Qualitative and quantitative measures used to evaluate foods, including the principles and practices for the sensory evaluation of food products, such as sensory analysis, dietary analysis and nutrition analysis.

Key skills

- Analyse opportunities and challenges within the Australian food service and food retailing industries, and through practical activities demonstrate, observe and evaluate the influence on food patterns in Australia.
- Analyse the influence of consumers on food industries and discuss their influence on food sovereignty and food citizenship.
- Use design briefs and other practical activities to explain and apply the process of developing new food products that maximise their nutritional profile.
- Compare and evaluate foods using qualitative and quantitative measurements.

Australia's food industries provide consumers with safe, high-quality, green food products that have been developed to meet consumer demands. Food patterns continue to evolve, with consumers generating more influence on the food supply. With greater knowledge of how our food choices impact health and environmental sustainability, there is increased demand on products to meet our concerns. New food products are developed through the design process and rigorous testing is undertaken to ensure they meet consumers' needs.

Video 7.1: Chapter Overview

Get knowledge ready

1. **List different ways in which consumer demand may influence our food supply.**
2. **Describe the steps involved in the development of a new food product.**
3. **Explain one measure or analysis that can be used to evaluate foods.**

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The role of food industries in Australia

The food industry is integral to Australia's economic and social success. We have a reputation around the word for producing safe, reliable, sustainable, high-quality, green food products that are sought after internationally.

Let's talk

What is the difference between food service, major food retailers and food marketers? Can you provide examples of each?

Commercial food production, selling and marketing are not only big business for the Australian economy, but also play a significant role in the foods available to consumers. This industry works hard to ensure the provision of safe, high-quality, green food that not only meets the demands of consumers but can also influence their needs. These industries also provide employment opportunities, contributing to the economy.

Food service

The **food service industry** is a significant industry in Australia and one in which we all regularly engage. Consider when you went to the supermarket and ordered a meal at a cafe or purchased a drink from the school canteen. On each occasion, you engaged with the food service industry.

Food service industry
A sector that encompasses all the activities, services and business involved in preparing and serving food to people eating away from home.

Let's talk

How many different examples can you think of for each of the food service categories listed in Figure 7.1?

Figure 7.1: Many different components make up our food service industry.

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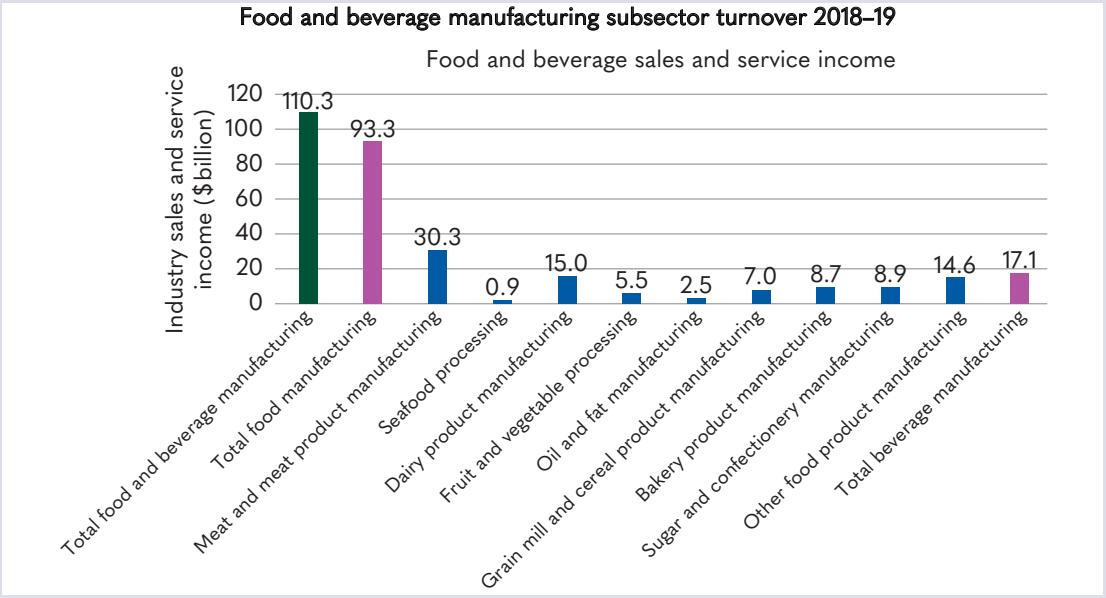
Activity 7.1 (Practical): Adapting for industry

1 Find the recipe for a popular restaurant-style meal.
2 Adapt this meal so it is suitable for a different food service industry, such as aged care, hospital or home delivery. Consider the demands and requirements of consumers in these settings, as well as the perspective of the food service industry.

Figure 7.2: How many times a week do you use the food service industry?

Figure 7.3: These industries also provide employment opportunities, contributing to the economy.

Activity 7.2 (Data analysis): Food and beverage sales and service in Australia



Source: ABS, Catalogue 8155.0 Australian Industry by Subdivision

1 Identify which sub-sector contributed the most to the Australian economy.
2 Suggest why you think this is so.
3 Name the sub-sectors with which you have engaged.
4 Suggest some of the challenges that might be faced by the food service industry.
5 Suggest some of the opportunities within the food service industry.
6 Discuss how you think the food service industry meets the needs of consumers.
7 Research current data available showing the economic impact of the food service industry for Australia. Compare it with the data provided here.
8 Identify the number of butchers, fishmongers, fruit and vegetable stores and bakeries you have in your local area. Plot your data on a map or develop your own graph.

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Activity **7.3** (Practical): Copycat meal

1 Select your favourite meal from a food service retailer.
2 Recreate this meal.
3 Discuss the advantages and limitations of producing this meal rather than purchasing it from the retailer.

Activity **7.4** (Inquiry): Food court observation

1 Visit your closest food court, cafe or local shopping strip.
2 Sit for an hour and observe the most frequently used food service businesses.
3 Describe what they are selling.
4 Suggest what you think has been the most popular item sold during your observation hour.
5 Outline how consumer needs have influenced the food services and types of foods in a food court.

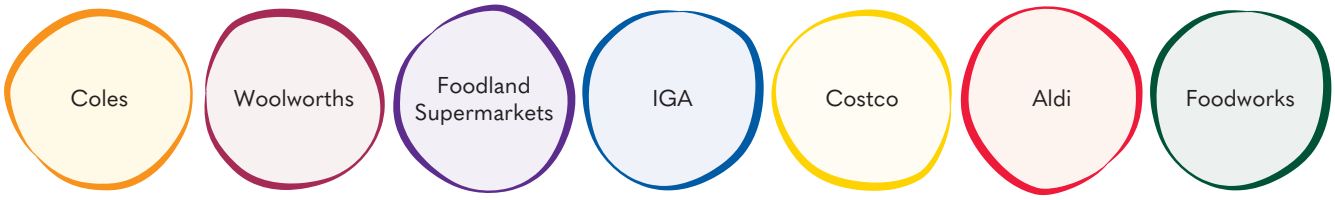

Figure 7.4: Some of the biggest food retailers in Australia – Woolworths, Coles and Aldi – hold the largest market share in the industry. Where does your family do its regular grocery shopping? Are there any other large food retailers in your local area?

Major food retailers

In 2020, the major food retailers' sector annual turnover was approximately $125.27 billion, making this industry integral to Australia's economic success. Some people shop at the supermarket every day. While farmers' markets are growing in popularity, major food retailers such as Coles and Woolworths have the majority of the Australian market share and are visited by most Australians weekly.

Activity **7.5** (inquiry): Cost analysis

A bag of pre-prepared salad is significantly more expensive than the equivalent fresh vegetables used to make a salad.

1 Complete a cost analysis to compare the cost of the ready-to-go prepared salad compared with the same salad made from fresh ingredients.
2 Describe which is the better value for money. Justify your response.

Let's talk

Consider how the availability of click-and-collect and grocery home-delivery services have changed the way Australians interact with major food retailers.

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Figure 7.5: Pre-prepared salad – a time-saver for busy consumers, but is it worth the cost?

Let's talk

A large proportion of products for sale at a supermarket are convenience foods, such as pre-prepared vegetables, frozen meals, fast-cook rice and ready-prepared sauces. What is the advantage to consumers? What is the advantage to manufacturers? Why are the sales growing?

Let's talk

Have you heard of product placement? A major food retailer's store is designed to encourage you to walk through the store for your everyday items and entice you with last-minute purchases or items you didn't have on your list.

Identify the types of foods you often find at the checkout. Discuss why this may be the case.

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Activity 7.6 (Inquiry): Your local food retailer

Visit your local food retailer.

1. Draw a rough map of the aisles and categories of the items in each aisle.
2. Observe where the daily staples are located compared with discretionary foods. Suggest why that might be the case.
3. Outline the foods that are located near the checkout. Suggest why these might be located where they are.
4. Now think about what is at eye level. Outline why companies might pay extra to have their products shelved in these visually accessible and easy-to-reach locations in the supermarket.
5. Consider the role consumer demands have on what is available for purchase. Ask your parents or grandparents about any items or categories that may not have been available here in the last year, five years or 10 years. Suggest what has influenced the availability of these products and why.
6. Discuss how food availability influences food consumption patterns.

Activity 7.7 (Inquiry): Food safety

Thinking about safe, high-quality food, where do you think the most issues around food safety occur? Now research the answer to test your prediction. You might be surprised! Discuss how major food retailers and the food service sector ensure they are providing consumers with safe, high-quality food.

Food marketers

Our exposure to food marketing is increasing. Previously radio, newspapers, magazines, catalogues and television advertisements were the main sources of marketing to consumers, but now we have product placements, incentives and endorsements, social media with hashtags, TikTok and pop-ups. Food marketing can now even be personalised based on your online habits and data. Food marketing is everywhere, and you might be influenced by this more than you realise.

The aim of food marketers is to get you to purchase what they are marketing. It is important to be aware of how food marketers are affecting your food choices and patterns. Maybe your choice has been influenced and is not entirely your own.

Let's talk

Identify the types of food marketing you have seen in the last 24 hours.

Activity 7.8 (Inquiry): Got a jingle?

1. List all the different food marketing slogans or jingles you can recall.
2. What types of food are predominantly represented? Suggest why you think this is the case.
3. Discuss how food marketers influence your food patterns.

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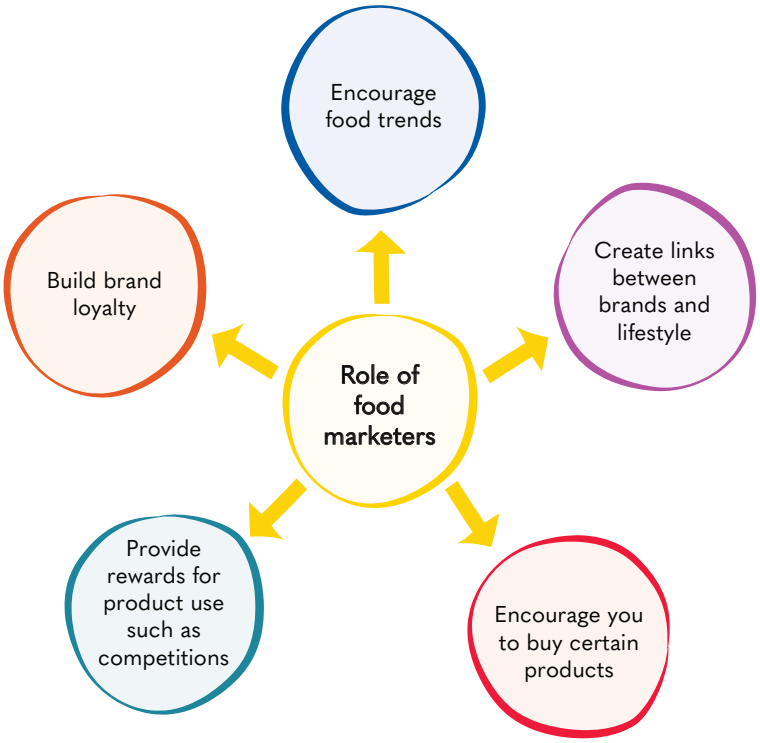

Figure 7.6: Ways food marketing can affect your food choices

Activity 7.9 (Inquiry): Food campaigns

1. Research two different food campaigns: one for a fruit or vegetable, and one for a discretionary food item.
2. Outline the aim of each campaign.
3. Compare the differences in approach. Describe what you believe are the strengths and weaknesses of each campaign.
4. Determine which campaign is more effective and justify your response.
5. Draw a conclusion about the role of food marketers in influencing food patterns in Australia.

Figure 7.7: Food marketers influence the foods we desire, purchase and consume. How have you been influenced by marketing campaigns?

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Activity **7.10** (Inquiry): SWOT analysis

Complete a SWOT analysis on the role of the food service sector, major food retailers and food marketers in Australia.

Strengths	Weaknesses
Opportunities	**Threats**

Let's talk

There is a lot of discussion about the ethics of advertising aimed at children, as they are not old enough to make informed nutritional decisions. Can you list some examples of advertising aimed at children and explain why there is a strong campaign trying to change advertising regulations?

The influence of consumers

Many of the foods available have been influenced by consumer demand. As consumers become more aware of the relationship between diet and good health, and the ethical and environmental impact of their food choices, they desire different food products that align with their values. This generates the formation of new products, as companies work to meet the needs and concerns of consumers.

Role of media

Have you ever watched a cooking show and then made what the contestants cooked or wanted to do so? The term 'foodie' used to describe oneself has become more than a trend, with media such as Instagram, blogs, podcasts and cook-alongs encouraging this.

Figure 7.8: Cooking shows such as *MasterChef* have influenced what people are cooking at home and their understanding of food and ingredients. Many 'home cooks' have won this contest, starting a career in the food industry and encouraging others to get involved in the kitchen.

Figure 7.9: Are food pictures the new selfie? Has the role of media influenced the type of foods consumers demand as it needs to be Instaworthy?

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Activism
The action of using vigorous campaigning to bring about social or political change.

Figure 7.10: Examples of the different types of media

Activism

Food **activism** is a growing trend, both locally and globally, focusing attention on the food we consume, how it is produced and the consequences of this. Activism is the action of using vigorous campaigning to bring about social or political change. The food demands of consumers match their ethical and moral practices, which differ between people for a variety of reasons. Food production and consumption are not designed to be controversial, but there are a number of food campaigns that have influenced the products available for consumption. Because of food activism, a greater awareness and understanding of our food systems has grown among everyday consumers.

Activity 7.11 (Inquiry): Media matters

1 Name six to eight different examples of media.
2 Explain how each example of media identified has influenced consumer demand on food supply.

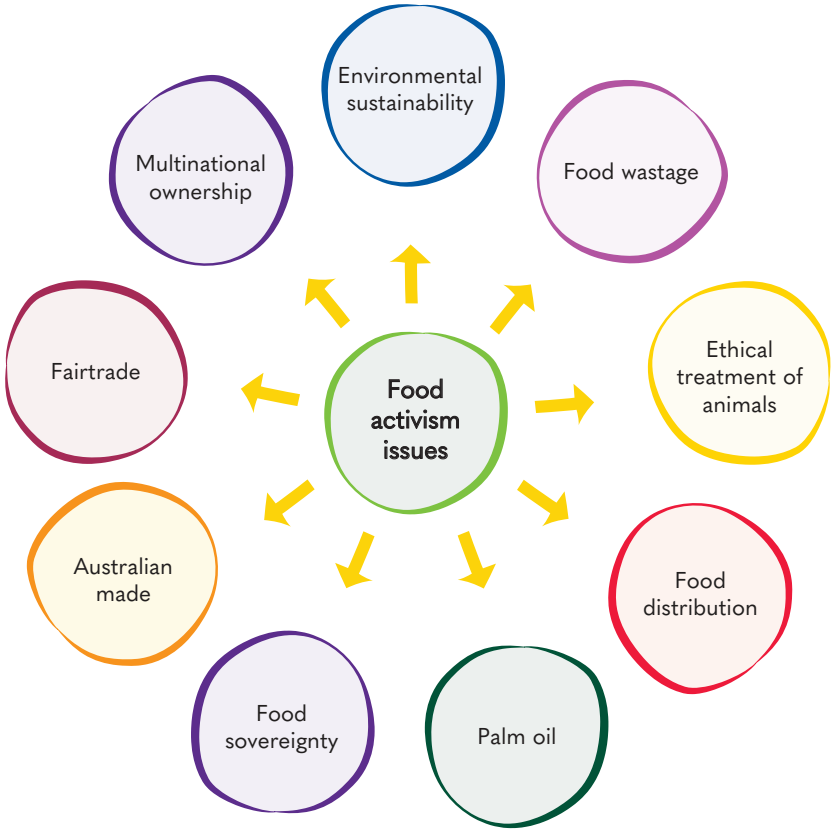

Figure 7.11: Food activism examples

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Figure 7.12: In the 1980s, consumers became aware that dolphins were being caught in the nets of tuna fisherman and dying. A tuna boycott occurred until a change to fishing practices resulted, accompanied by standard for dolphin-safe practices. Many tuna products are now labelled 'Dolphin Safe'. Since then, there has continued to be activism in the seafood industry, with a campaign for certified sustainable seafood.

Let's talk

Consider the tuna boycott discussed above. Come up with a list of ways you could advocate for change as a food consumer.

Figure 7.13: OzHarvest's 'Use it Up' tape is a simple initiative focusing on changing food behaviours so consumers waste less food at home.

Figure 7.14: Understanding of the ethical treatment of chickens by consumers has resulted in the increased production and consumption of free-range eggs and a reduction in their price.

Let's talk

How has the role of the media assisted food activism?

Activity 7.12 (Inquiry): Campaigning for change

1. Investigate one food issue on which consumers have been campaigning to bring about change.
2. Include in your research:
   - the food issues
   - activism activities
   - desired or achieved change or changes
   - how this issue has influenced food industries.
3. Complete a 'I used to think, now I think' exercise
4. Record a short podcast to share your findings.

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Health professionals

Health professionals are considered reliable and trustworthy due to their qualifications in nutrition and health. With Australians understanding the links between diet and health, demand for better nutrition and healthier foods has increased. This has also been supported by health professionals, such as Dr Sandro Demaio, CEO of VicHealth, and popular nutritionist Catherine Saxelby, who have advocated for change and influenced our food supply. Accredited health professionals aim to support and inform the food choices and behaviours of Australians. They also focus on building strong, sustainable and nutritious food systems.

Figure 7.15: Health professionals not only provide consumers with reliable and trustworthy information to help shape their food choices, but also advocate within the food systems for safe, reliable and nutritious food.

Let's talk

Health professionals are more than simply doctors, dieticians and nutritionists. Brainstorm other examples of health professionals. Discuss how these health professionals influence consumer demand.

Activity 7.13 (Practical): Cook like a health professional

1. Visit the recipe section of a qualified health professional, such as those on the Foodwatch website (Recipes) and the AIS website (Recipes).
2. Choose a recipe to produce in class. Make sure it meets the requirements of your specific lesson, such as time taken to cook and equipment available.
3. Check the serving size of your chosen recipe. Many recipes are written to serve four. Modify the recipe quantities to serve one and prepare a food order for your teacher.
4. Produce your recipe in class.
5. Prepare a review of the recipe. Comment on the sensory and chemical properties of the recipe.
6. Discuss the health benefits of consuming this recipe.

Consumer rights organisations

In Australia, it is the Australian Competition and Consumer Commission (ACCC) that protects consumers' rights. It is an independent Commonwealth statutory authority that promotes competition and fair trade in markets (including food supply) to benefit consumers, business and the community.

Activity 7.14 (Case study): ACCC media analysis

Court finds Heinz made a misleading health claim

19 March 2018

The Federal Court today has found that food manufacturer H.J. Heinz Company Australia Ltd (Heinz) made a misleading health claim that its Little Kids Shredz products were beneficial for young children.

The ACCC alleged that images and statements on Shredz products represented to consumers that they were a healthy and nutritious food for young children, when this was not the case.

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The Court found that Heinz had represented that its Shredz products were beneficial to the health of children aged 1–3 years, when this was not the case. Further, the Court found that Heinz nutritionists ought to have known that a representation that a product containing approximately two-thirds sugar was beneficial to health of children was misleading.

'We welcome the Court's decision today which shows that businesses that make false or misleading claims about the health benefits of products face serious consequences,' ACCC Acting Chair Delia Rickard said.

The Court found that the combination of imagery and words on the packaging, including prominent pictures of wholesome fresh fruit and vegetables and statements such as '99% fruit and veg', conjured up the impressions of nutritiousness and health.

'We were particularly concerned by Heinz's conduct because the Shredz products were marketed as being beneficial for young children,' Ms Rickard said.

'Heinz's Shredz products consisted of over 60 per cent sugar, significantly higher than that of natural fruit and vegetables. An apple in comparison contains around 10 per cent sugar.'

The Court found that the ACCC had not established that the Shredz products represented to consumers on packaging that they were of equivalent nutritional value to fruit and vegetables, or that the products encouraged the development of healthy eating habits in children.

The ACCC's action followed a complaint by the Obesity Policy Coalition about food products for toddlers that make fruit and vegetable claims but are predominantly made from fruit juice concentrate and pastes, which have a very high sugar content.

The World Health Organisation recommends limiting the intake of foods containing fruit juice concentrate to reduce the risk of obesity and tooth decay.

The Shredz product range included three varieties; 'peach apple and veg', 'berries apple and veg' and 'strawberry & apple with chia seeds' which were available in major supermarkets nationally from 2013 until at least May 2016. The products are no longer on sale.

A hearing on penalties and other orders sought by the ACCC will be held on a date to be fixed by the Court.

Background

The ACCC instituted proceedings against H.J. Heinz Company Australia Ltd (Heinz) in June 2016.

Source: 'Court Finds Heinz Made a Misleading Claim', ACCC Media release, 2018

Case study questions

1. Research the 'Heinz Little Kids' labels and state the claims made and any other concerning factors.
2. Outline what the ACCC alleged Heinz had done.
3. State the outcome of this case.
4. Explain how this outcome was reached.
5. Explain the role of the ACCC in this situation.
6. Discuss the influence of the ACCC on food supply.
7. Suggest why consumers need an organisation such as the ACCC, particularly in relation to food.

Food sovereignty

In Australia, many multinational organisations impact our food supply, yet this is changing.

There is a growing understanding of food sovereignty in Australia, and the power people can have in shaping their own food systems.

Food sovereignty promotes everyone's right to access culturally appropriate and nutritional food, supporting environmentally sustainable food systems and considering one's food choices, creating food citizens rather than food consumers.

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Food sovereignty focuses on ensuring that the health of people and the health of the planet are considered in the food systems, with an emphasis on supporting local farmers and Indigenous enterprises.

Figure 7.16: Australians have embraced elements of food sovereignty, including farmers' markets and community gardens, both of which continue to grow in popularity and availability.

Activity 7.15 (Case study): CERES Environmental Park

CERES Environmental Park is a not-for-profit educational organisation located on Wurundjeri Country in Melbourne. The central park in Brunswick East was established on 4 hectares of rehabilitated landfill. Research the history and activities of CERES on its website.

1. What does CERES stand for?
2. Outline CERES's social enterprises, education and training and community engagement strategies.
3. Suggest how CERES may have been influenced by consumer demand.
4. Explain how consumers are benefiting from CERES.

Activity 7.16 (Inquiry): Consumer demand

PMI – Use the internet to conduct an inquiry to find out how consumer demand has influenced food sovereignty in Australia.

Plus	Minus	Interesting

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Food citizenship

Food citizenship is an emerging movement that encourages individuals to not just think about themselves as consumers of food but also take a more active role of being a food citizen. We all make food choices on a regular basis, with eating not only a requirement of everyday life but also a joy of everyday life. So what is the difference between a food consumer and a food citizen?

Figure 7.17: As food citizens, we all have the right to adequate nutrition, a safe food supply and accurate product information.

Food citizenship
The practice of encouraging food-related behaviours that support the development of democratic, socially and economically just, and environmentally sustainable food systems.

Figure 7.18: Food citizenship

Being a food citizen involves understanding and applying these responsibilities when considering the impact of actions on the food systems. This includes making informed and ethical decisions about food choices and behaviours.

Food citizens are consciously aware of the consequences of their food choices. They are not only knowledgeable about the social injustices and environmental harm inherent in current food systems, but they also act in a way to help mitigate these issues. Food citizens support systems that are democratic, socially and economically just and environmentally sustainable. They acknowledge their responsibility within the system and modify

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their food behaviours accordingly. This includes making informed and ethical decisions about food choices and behaviours such as buying local, free-range or Fairtrade foods.

Food citizenship involves supporting sustainable, environmentally friendly and socially just food systems. By taking an active role in food systems and thinking beyond themselves, food citizens promote food sovereignty systems, which work towards achieving food security in an ecologically sound, sustainable and socially just manner.

Let's talk

How does being a food citizen differ from being a food consumer?

Figure 7.19: Food citizenship involves supporting the human rights of food producers.

Activity 7.17 (Inquiry): Food citizenship influences food availability

1. Visit your local or online supermarket.
2. Find examples of foods where food citizenship demand has influenced food availability. You might like to begin with a focus on sustainability.
3. Using AutoCollage or another app, create a collage of these products to demonstrate the influence of food citizenship on our food supply.

Activity 7.18 (Practical): Responsible food citizenship

Your task is to be a responsible food citizen. You are required to design a meal that considers the impact of your food choices.

Your recipe must include:

- only seasonal produce
- ingredients that are Australian made/grown
- animal products from ethical sources.

Produce your recipe in class.

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Developing new food products: The design process

Consumer demands and changes in trends all create the need for new product development. New products go through a series of design stages before being released onto the market. New products are being released every week – product development is clearly big business.

All new products available on the market are the result of a **design process**. A design brief is generated, an idea is formed and a problem is presented, which is then solved by working through the process, with the end result being a new food product available on the market.

Let's talk

The design process can include a series of steps that are followed by the designer. Depending on the product or service that is to be developed, these stages can differ. Do you think that the design process for play dough would have been the same as the design process for instant noodles?

Design process Problem-solving that draws on experience, research, invitation, imagination and creativity.

Figure 7.20: The design process

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Market research
The activity of gathering information about consumers' needs and preferences.

Design brief
A vital step in transforming ideas into creative, practical and commercial realities. Design optimises the value of products and systems, and is therefore an important key to economic and social development.

Specifications
Constraints and considerations or issues that will need to be thought about when coming up with a solution.

Constraints
Restrictions or fixed factors that are non-negotiable and affect the development of a new product. The designer has little control over these – for example, allergens, legislation and food safety requirements. Constraints are included in design brief specifications.

Table 7.1: The design process

Step 1	**Market research** Companies conduct **market research** by collecting information about consumer demands and then analyse the opportunities available for new products in the market.
Step 2	**Design brief developed** A new product represents a problem to be solved or a challenge – the challenge is explained or developed as a result of market research. The challenge may simply be that consumers are wanting healthier meal options, there is a lack of lactose-free products on the market, or consumer demand for one of our products is high so how can we expand the market with the new, similar product? The challenge is developed into a **design brief** that needs to be solved. It clearly defines the aims and intentions of the product required. The brief includes some guidelines for solving the problem.
Step 3	**Specifications** The **specifications** of the task: **constraints** and **considerations** are identified and need to be considered.
Step 4	**Criteria for success** Developed from the design brief, the **criteria for success** are questions that are used during the evaluation process to ensure the specifications of the design brief have been met.
Step 5	**Research** The specifications set out in the design brief must be considered. A number of design elements must also be considered and investigated, such as flavour, colour, aroma, texture and price. The resources required to prepare, store or package and market the products or food items also need to be investigated. Possible solutions begin to be developed.
Step 6	**Designing and innovating solutions** Development of design options – a number of different options can be designed during this process. The most suitable option for meeting the needs of the brief is selected.
Step 7	**Product testing** A prototype (small-scale trial run) is produced as a trial to confirm it can be manufactured and to test consumer response before upscaling production.
Step 8	**Production** Full-scale production of the new product occurs, ready for release onto the market.
Step 9	**Evaluation** Analysis of the product and processes – the product or food item is evaluated and the processes for production are analysed. The process of evaluation will include the answering of the criteria for success questions alongside other commercial viability evaluation.
Step 10	**Marketing** The advertising of the product to entice consumers to purchase the new product that has been developed.

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Activity 7.19 (Inquiry): New food products

1 Find two new food products.
2 Outline the design process that has been followed for each of these products.
3 Discuss why it is considered a risk for companies when they develop and market new food products.

Market research

Market research is a very important stage in new product development because it helps food manufacturers and producers ensure a market exists for a new product. Companies collect information about consumer demands and then analyse the opportunities available for new products in the market. Target markets are studied, market trends are analysed and this information is used to inform a design brief, which is established from the collected data. Data can be collected through primary and secondary data sources, including:

- surveying customers about likes and dislikes, and products they want available for purchase
- looking at gaps in the market for new products
- understanding trends and desires in the market
- analysing competitors' products
- research related to new ingredients, flavours, packaging technology, processing techniques or new combinations of old ingredients.

Market research is done to ensure a place exists in the market for a new product before development begins. If the product will not be purchased by consumers, it is not viable for development and production.

Design brief

After gathering data through market research, a design brief is formulated. This clearly states the aims and intentions of the new product to be developed and includes the constraints and considerations that need to be addressed.

Constraints and considerations may relate to issues identified through market research – such as the product needing to be high in protein or environmentally sustainable. It may be determined by the resources and abilities of the company – for example, the equipment the manufacturer has available to produce and store the product. There may be no refrigeration space, so the product will need to be shelf stable.

Developing your design brief: the important first step

A design brief is a written explanation of a problem that needs to be overcome. It should outline the aims and objectives of a project. A well-written design brief is critical to the whole design process. When used in industry, the design brief helps to develop an understanding and level of trust between the client and the designer. A good design brief can have a huge influence on the success of the development of a new product. An effective design brief is the single most critical factor in ensuring that this new product will be satisfactory and meet the needs of the client and consumers.

Considerations
Issues or aspects to be considered when designing options for a product – for example, the weather or equipment available. They provide some restrictions, but have some flexibility. Considerations are included in design brief specifications.

Criteria for success
Questions developed from the design brief that are used during the evaluation process to ensure the specifications of the brief have been met.

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Activity **7.20** (Inquiry): Insects for food

Write a design brief that would result in cricket protein powder, a new product innovation and protein solution in Australia, becoming available on the market.

Writing a design brief

A design brief is a statement of intent that includes a written explanation of the challenge and the specifications. To write an effective design brief, it is important to provide as much detail as possible about the problem facing you. For each challenge, the barriers that will limit possible solutions are also outlined. A design brief should help you to clarify your thoughts and can help to define the specifications, or considerations and constraints, of an initial idea. All this information should be presented in an ordered and detailed fashion.

Each design brief is a statement that contains:

- a challenge, problem or need – this is what needs to be solved
- background to the challenge or problem, usually written as a scenario
- specifications of the problem
- constraints (aspects that are fixed)
- considerations (aspects that have some flexibility).

Target market
A group of customers or consumers who are considered likely to buy a particular product.

Develop your own design brief: A pastry without butter

The community is concerned about the saturated fat intake linked to excessive consumption of pastry. The key ingredient in pastry is butter. There is a desire to replace butter and margarine, but still maintain a satisfying product that can be used in place of pastry.

Pastry is often used as a wrapping around other ingredients. The wrapping serves a purpose as well as adding another dimension to a dish. A food company has already created the wrapping or dough; you are to create the recipe to promote the dough.

The final product must incorporate vegetables and be suitable to sell in the food service industry.

1. Explain the thought process or the reasoning behind the design brief.
2. What is the aim of this design brief?
3. Who constitutes the **target market**?
4. Further information has been provided with this design brief to help the producer better understand the needs of the client. Explain why this further information is useful to the designer.

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5 List the specifications within the brief. Identify which of these are considerations and which are constraints.
6 Has a timeframe or budget been indicated in this design brief? Why is this useful information?

Criteria for success

Evaluation occurs at all stages of the design process, but it is important to develop a set of criteria for success questions before progressing any further. Using the design brief, you identify the most important parts or components of the task to meet the brief. These parts or components of the task should form the basis for the evaluation criteria. It is important that all criteria for success questions come directly from information contained within the design brief. These questions are then used at the end of the development process to determine whether the product has met the requirements of the brief and to evaluate the product.

Activity 7.21 (Inquiry): Get designing

1 Reread the design brief on page 230.
2 Use a highlighter to show the important elements of the components or the task.
3 Use a different coloured highlighter to identify the specifications of the task. Divide these into the considerations and the constraints.
4 Develop a range of four to six criteria for success that could be used after the design process and product development has been completed.

Research and design

Criteria for success have been established and now it is time to research ideas and begin generating possible solutions in response to the design brief.

Ideas are generated in response to the brief. Ideas can result from company brainstorming, surveying customers, analysing products already established in the market, researching new innovations and understanding current food trends.

It is also important during this stage of the design process to be sure that you fully understand the target market for the product – this is, who the product is for. Research helps product developers to answer the following questions regarding the target market, nutritional requirements and time available for the product:

- What are the likes of the target market?
- What are the dislikes of the target market?
- What ingredients do they have access to?
- What are their nutritional requirements?
- Do they have any food allergies or intolerances?
- What level of food knowledge and skills do they have?
- What equipment do they have available for food preparation?
- How much money do they have to spend?
- What is the meal occasion?
- How many people are you preparing for?
- Does the target market have any cultural or religious requirements?
- How much time is available for production?

Figure 7.21: When investigating the design options, it is important to consult many different sources of information.

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Figure 7.22: There are many options that can be found to meet a design brief.

After all the research has been carried out and answers have been sought for the important questions that help to clarify the brief, it is time to choose the most suitable option. The option you choose will best 'fit' the design brief, will take the specifications of the task into consideration and will be suitable for the target market.

Activity 7.22 (Inquiry): Design the solution

1. Refer to the design brief on page 230. Consider how the results of your research can inform the design process.
2. A number of issues need to be taken into account with regard to the functions of fat (butter, oil or margarine):
   - Fat contributes to shelf life.
   - Fat adds moisture, thereby helping to prevent the drying out of products.
   - Fat greatly enhances mouthfeel.
   - Fat adds flavour.
3. Form a list of possible recipes that can meet the requirements of this brief.
4. Choose one of these options. Justify your choice.
5. Design your final product solution. Use the information, knowledge and skills you have gained to do this.
6. Prepare a food order for your teacher.

Development of a prototype and product testing

Once all the research is completed and the decision has been made about the product or food item that is to be produced, a prototype or sample food item is prepared.

During the production process – whether it be in a factory, in your kitchen at school or at home – it is important to use the safe and hygienic application of a range of food preparation and food-processing techniques.

This is also the time where the producer needs to be able to make links between their theoretical understanding of food and the actual practical application of ingredients, processes and preparation techniques.

Figure 7.23: Small product runs during the prototype stages allow manufacturers to analyse the viability of the product.

This is an important step because it enables the manufacturer to produce a small-scale trial run of the proposed product, allowing companies to determine:

- what final ingredients will be required
- the correct proportions of the ingredients
- the best physical, sensory and nutritional properties of the product using qualitative and quantitative analysis (explained further in this chapter) – for example, testing the chemical properties to ensure a product is low in fat if a low-fat product was a constraint of the brief
- whether the product is an acceptable colour for consumers

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- whether the skills and equipment needed to produce the product on a large scale have been determined and planned for
- whether expensive new equipment is needed to produce the product – a manufacturer may decide that they do not have the infrastructure to be able to make this product, or may be unwilling to spend money on new equipment
- packaging requirements and packaging design
- testing of food safety of the product and determining product shelf-life
- estimation of total product costs: product price point can be set, and final decisions made regarding whether the product is economically viable for the consumer – if the company is going to have to charge too high a price in order to make a profit, it may decide not to continue with product development or make further changes
- the exact recipe, equipment, ingredients, cost, skills and knowledge needed to produce at full-scale production
- market testing to evaluate consumer response before full-scale production is set and make any necessary changes to the product.

Products can go through a number of prototype tests and runs before the final product is determined and decided upon. For some new food products, this is the end of development, because if the prototype cannot be formulated to meet the design brief, economic or consumer requirements, then the product is not worth producing.

Production

This stage sees the full-scale production of the new product ready for release onto the market and then keeping up with market demand once released.

Figure 7.24: Production usually involves producing the new product in large quantities.

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Activity 7.23 (Practical): Produce the product

1. Produce your product in response to the design brief on p. 230.
2. Evaluate this product according to the criteria for success that you established earlier.
3. Ask one of your friends to carry out a 'peer evaluation', evaluating your product in terms of appearance, aroma, taste, texture and whether it fits the design brief.

Packaging and labelling

While packaging has a functional role to play in the safety and storage of a food product, packaging is often the first impression a consumer has of a product, so is an important component in the development of a new product. Manufacturers need to consider the packaging needs of the product to maintain its safety and shelf-life, as well as the overall look of how the product will be presented. There have been many developments in packaging and the range of systems and materials available has increased.

Figure 7.25: In the past, many products were packaged in glass, plastic or metal, but with such a range of choices now available, packaging needs to be considered carefully.

Figure 7.26: Packaging is also used as a communication point to consumers, providing extra information that is not legally required and the chance to market the product. Think about chips – the colour of the packaging is associated with their flavour: blue is original, green is chicken and pink is often salt and vinegar.

Manufacturers also need to make sure that the final packaging meets the needs of the company, as packaging adds cost to the product, so the material chosen and the number of colours used on the label may be determined by the amount available to spend in this area.

Let's talk

Packaging has great consumer appeal and often creates the first impression of a product before purchase or consumption. Why do you think home brand or cheaper products are usually presented simply using a minimal number of colours?

Evaluation

Evaluation is a key step in the development process. This stage involves answering the previously established criteria for success questions to ensure the product has met all the requirements of the brief.

Evaluation can also include:

- analysis of the final product, including physical, sensory and nutritional properties using quantitative and qualitative analysis
- final cost analysis to ensure the product is economically viable and making a profit, and evaluation of production processes
- ongoing monitoring to ensure the product remains a success and is bringing in a profit for the company. If sales drop, a product may be reworked, including new packaging design or a new marketing campaign, or a product may be removed from the market by the manufacturer.

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Marketing

Market advertising is used to promote the new product to consumers. The aim of the marketing campaign is to encourage consumers to try the product, with the hope that they will then continue to purchase it. A number of different marketing strategies could be used to encourage new and repeat product sales. Typically, the product will be marketed at the target group for whom the product is intended. When a product is first launched onto the market, the marketing campaign is usually very intense in trying to create a high profile for the product. Once the product has been released and sales figures analysed, marketing strategies are often scaled down or changed, continuing the promotion of the product in the marketplace to remind consumers that the product is available.

Marketing strategies can include:

- giveaways or free tastings at supermarkets where the product can be bought
- media campaigns using television, newspaper, radio or the internet
- sponsorship of key events such as football matches
- a discounted price at the supermarket to encourage people to try the product.

Activity 7.24 (Inquiry): Recipes to riches

1. Watch an episode of the reality product development show *Recipes to Riches*. Episodes can be found on ClickView, 10 Play and YouTube.
2. While you are watching, create a flow chart of the product development process you see in the episode, including:
   - the name and definition of each stage of the process
   - annotations to your chart detailing what happens at each stage with an actual example (the product's journey).

Measures used to evaluate food

We all make judgements about the food we are eating. If it smells good and it is enticing, you will be more inclined to eat it. If it tastes particularly good, you might go back for a second helping. Food development involves using a number of tests to ensure that the product being produced will appeal to customers in both its sensory and chemical properties.

Sensory testing takes place to ensure all sensory properties are optimal; physical and chemical testing takes place to ensure the requirements of the design brief have been met and the product is the best it can be. A lot of time and money can be spent on analysing products because it is important to get them right before product launch. Companies exist that contact everyday consumers from different target markets to test products and provide information to manufacturers.

Sensory testing
Tests carried out to determine the sensory qualities of a product, such as appearance and aroma.

Objective
Something that can easily be measured on the basis of facts and is not emotionally based or determined.

Quantitative analysis

Quantitative analysis measures the physical and chemical properties of foods. This type of analysis is **objective**, measurable and based on information or facts gathered by the test carried out. Because this type of analysis is factual, the test should provide a consistent result. These types of tests measure physical and chemical properties. There are a number of different tests that can be carried out to analyse the features of a product. Some tests are easier to conduct than others, which rely on specific equipment to provide a result.

Other components measured may include shelf-life (to provide a product 'best before' or 'use by' date), pH level, volume, or density and clarity.

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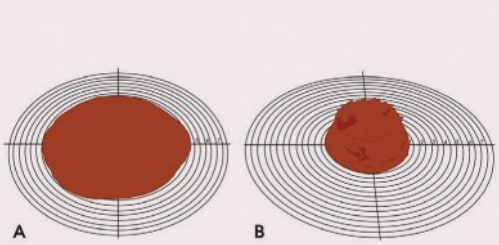
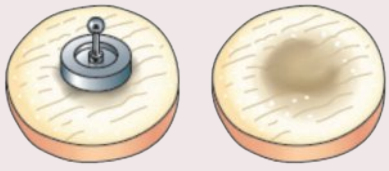
Table 7.2: Quantitative analysis

Quantitative measure	Description of the test carried out	
Height or size	A ruler or set of callipers is used to measure the height or circumference of a product.	
Weight	This is the simplest of tests to conduct. A product's weight is measured using a set of scales and an exact weight is determined.	
Colour	Testing colour is important because the appearance of a product is where consumers form their first opinion of the product. A piece of machinery such as a colorimeter or spectrophotometer is used to measure the scale of the colour to allow for comparison between samples.	
Viscosity	**Viscosity** is measured using a template of circles. A small, exact amount of the product to be measured is placed in the centre of the ring of circles and both the time the product takes to spread and the distance are measured.	
Texture	Measuring the texture of a product can be done through texture profile analysis, whereby products undergo a double compression test to provide insight into how samples behave when chewed.	

Viscosity
Used to describe the sticky, thick consistency between a liquid and a solid.

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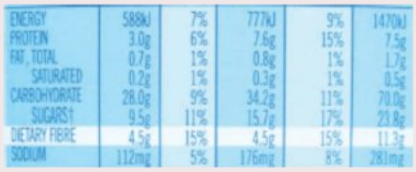
Quantitative measure	Description of the test carried out	
Nutrient content (chemical properties)	Computer programs are used to determine the exact chemical composition of a product. This information is required for the label of the food product.	

Let's talk

When testing products, each product is given a random three-digit sample number, such as 691, 349 or 107. Why do you think this is the case?

Activity 7.25 (Practical): How does bread measure up?

In this activity, you will need two slices of the same type of bread from the same brand, which you will test for consistency. Label one sample 604 and the other 242.

Part A

Record your results in the table below.

1. Using a set of scales, weigh both pieces of bread separately. Record the weight of each slice of bread.
2. Using a ruler, measure the height of each slice of bread lying flat.
3. Using a weight (such as an unopened can or jar, or a glass with a measured amount of water), measure the density of the bread. Place the weight in the centre of the bread and in the same location for both samples for 20 seconds, then remove the weight. Compare how each slice has compacted by measuring the height of the bread where the weight has been resting. Record your results in the following table.

Measure	Bread sample 604	Bread sample 242
Weight		
Height before compression		
Height after compression		
Shelf life		

4. Using your findings, discuss the consistency of the bread.

Part B

Now repeat the test, comparing two different types of bread, for example rye and white.

Part C

Complete a nutritional analysis of the two types of bread tested in Part B.

1. Record both nutrition information panels.
2. Use the labels to make a comparison and then evaluate which bread choice is the better nutritional choice.

Make sure you compare the breads using the quantity per 100g figures.

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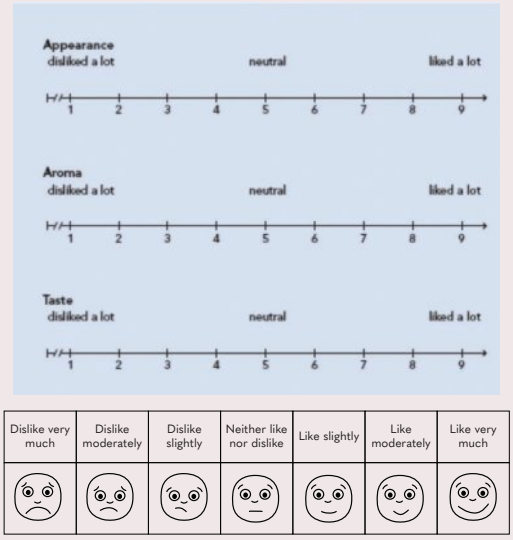
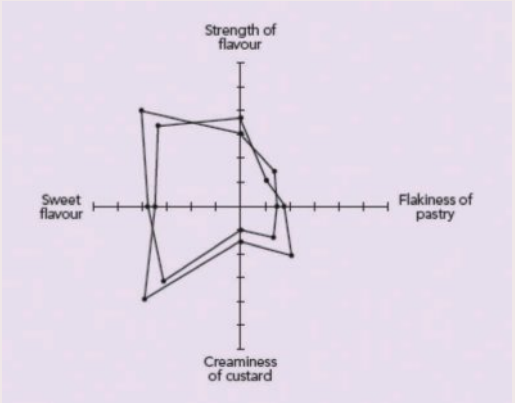
Qualitative analysis

Qualitative analysis relates to the sensory evaluation of a product, gathering **subjective** data on **organoleptic properties**. The data collected are based on personal opinions and each evaluation will vary between testers, but an overall understanding of how the product is perceived allows for manufacturers to make necessary conclusions. For example, if a new flavour of kombucha is being developed but is profiled as being too weak, then this product would likely not meet the brief and changes to the recipe would be made before the final product was released.

Subjective
A judgement made on the basis of individual preference rather than facts.

Organoleptic properties
The aspects of food experienced by the senses.

Table 7.3: Qualitative analysis

Qualitative tests	Description of test	
Preference test (taste test)	This test is carried out using a panel of tasters who assess a product's sensory properties of appearance, aroma, taste and mouthfeel. They show their preference by using either hedonic descriptors, or a number rating system – with 1 representing disliked a lot through to 9 as liked a lot – or descriptive language – such as strong chocolate flavour – to record their opinions. A decision is then made regarding the preferred product. Hedonic descriptors are most commonly used when testing food products with children.	 **Figure 7.27:** Hedonic descriptors
Profiling test	A star diagram is used to compare key features of a product, such as aroma, ingredient flavour, saltiness, etc., with another product. Profiling tests are carried out by sensory experts or experienced tasters due to the complexity of completing this type of test. A star diagram can have as little as four axes, through to more than 20, depending on the number of elements being tested.	 **Figure 7.28:** A sample star diagram comparing a homemade and a commercial vanilla slice

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Qualitative tests	Description of test	
Difference test	This type of test involves using either a triangle test or a two-out-of-five test. In a triangle test, three samples are tasted: two are the same and one is different. In a two-out-of-five test, three of the samples are the same, and the two others are slightly different. The differences are recorded, and tasters are required to identify the same samples.	 **Figure 7.29:** Triangle test

Let's talk

Bliss balls are protein-packed healthy treats that have become increasingly popular over the past 10 years. They can easily be modified to incorporate different flavours and textures. Consumer demand has seen the rise of bliss ball popularity. Suggest factors that may have contributed to this.

Describe advertising techniques that could be utilised to market this food product.

Activity 7.26 (Practical): Difference testing

Conduct a difference test using two similar products developed by different manufacturers

1. Organise two samples of one product and one sample of the other. Label each sample with a random three-digit sample number.
2. Set up a panel of three to five people.
3. Give the three samples to your tasting panel.
4. Ask your panellists to identify which two samples are the same and which one is different.

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Bliss balls

Ingredients (makes 10 balls)

8 Medjool dates, pitted (or substitute with dried dates)

2 tablespoons Dutch cocoa powder

100 g almond meal

2 tablespoons desiccated coconut

2 tablespoons finely chopped nuts, sesame seeds or desiccated coconut, for rolling

Method

1. Place dates in a bowl and cover with warm water. Soak for 30 minutes or until soft.
2. Blend dates, cocoa powder, almond meal and coconut in the food processor until well combined. If too thick, loosen with a little water.
3. Using wet hands, roll level tablespoons of mixture into balls.
4. Roll in coating and refrigerate.

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Evaluation questions

Sensory testing

For this activity, you will need one quantity of the bliss balls and a commercial equivalent (bliss ball/protein ball) purchased from your supermarket.

1. Place a sample of each on separate plates and label with a random three-digit sample number. For your own reference, record which sample is which.
2. Swap samples with a friend so you are not familiar with the samples being tested.
3. Conduct a blind tasting of both samples and complete the sensory analysis tests below.

Profiling test

4. Draw up the axes for a star diagram and label with the following factors to be considered: strength of aroma, flavour, appearance, texture.
5. Using two different-coloured pens, one for each sample, complete your profiling analysis of the bliss balls.

Preference test

6. Draw two sets of five hedonic descriptors.
7. Choose which descriptor best represents how you feel about each bliss ball sample.

Descriptive analysis

8. Copy and complete the following table using descriptive sensory language to describe both samples.

Sensory analysis

Sample	Appearance	Aroma	Taste	Mouthfeel

Nutrition analysis

9. Use the FSANZ Nutritional Panel Calculator on the Food Standards Australia New Zealand website to create your own nutrition information panel for the bliss ball recipe.
10. Complete a nutritional analysis between the commercial bliss balls and your homemade product.

Conclusion

11. Using the information you have gathered from the tests you carried out, determine which bliss ball sample you prefer and explain why.

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Chapter revision

- The food industry is a significant contributor to the Australian economy. The industry has a reputation for providing safe, high-quality food that meets the needs of consumers, both locally and internationally. These industries not only influence food patterns in Australia, but are also influenced by the food patterns of consumers.
- The demands of consumers influence our food supply, what is available on the market and potential new products for the market. The media, activists, health professionals, consumer rights organisations, food sovereignty and food citizenship all play a role in shaping consumer opinions and shifting their demands.
- The steps involved in the development of new products using design briefs include research, design and innovation, product testing, production, evaluation and marketing.
- Quantitative analysis measures the physical and chemical properties of foods and is based on information or facts gathered by tests that are carried out. Quantitative tests include weight, height, viscosity, colour, texture and nutrient content. Qualitative analysis tests the sensory properties of a product and evaluation is based on personal opinion. Results will vary between testers, but an overall understanding of how the product is perceived can be gained.

Apply your knowledge

1. Suggest a challenge and opportunity within Australia's food service sector.
2. Evaluate how food retailing has influenced food patterns in Australia.
3. Describe the role of the food service sector in Australia.
4. Describe how the media can influence consumer food demand.
5. Discuss the influence of consumers on food sovereignty.
6. Choose three stages of the design process used in the development of new food products and outline the importance of each of these stages.
7. Describe the difference between qualitative and quantitative measures.

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Practice exam questions

Question 1

Understanding and applying responsibilities such as making informed and ethical decisions about food choice and behaviours when considering actions on the food system reflects:

A Food sovereignty
B Food citizenship
C Food auditor
D Food critic

1 mark

Question 2

During the development of new food products, food manufacturers evaluate the physical, sensory and chemical properties of their product.

A Name one test that a company might carry out to evaluate their new product. **1 mark**
B Identify whether this is a quantitative or qualitative analysis. **1 mark**
C Describe how the test you named would be carried out. **3 marks**

Question 3

Analyse the influence that consumers have on food industries. **6 marks**

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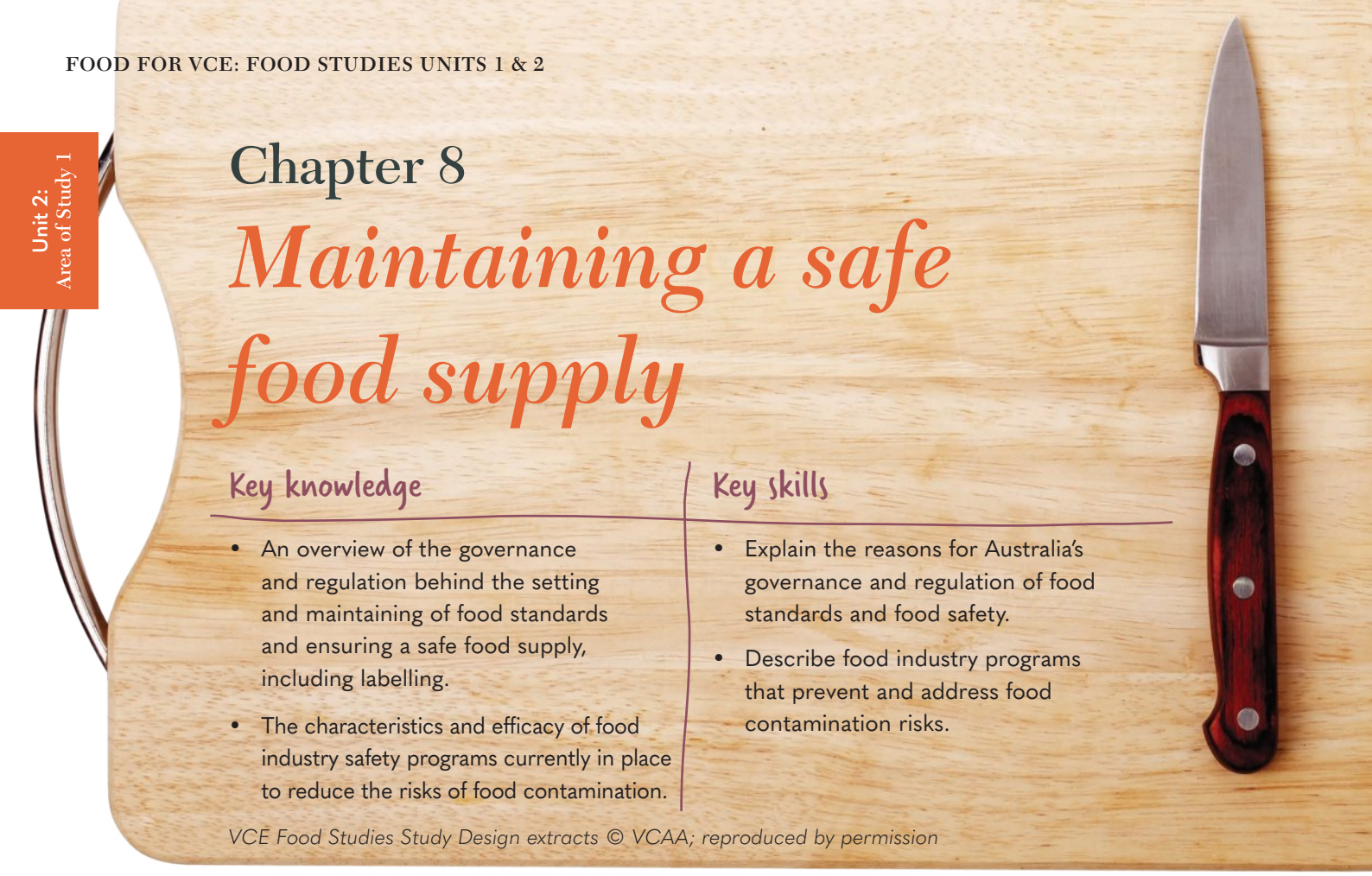
Chapter 8
Maintaining a safe food supply



Key knowledge

- An overview of the governance and regulation behind the setting and maintaining of food standards and ensuring a safe food supply, including labelling.
- The characteristics and efficacy of food industry safety programs currently in place to reduce the risks of food contamination.

Key skills

- Explain the reasons for Australia's governance and regulation of food standards and food safety.
- Describe food industry programs that prevent and address food contamination risks.

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Video 8.1: Chapter Overview

Do you ever ask yourself, 'Is this food safe?' before you eat it? Contrary to popular belief, most cases of food poisoning in Australia occur not in cafes or restaurants but in the home due to food that is not prepared safely. In this chapter, we will investigate the processes in place to ensure a safe food supply. We will look at the significance of food industries to the Australian economy and the importance of providing safe, high-quality food that meets the needs of consumers.

Get knowledge ready

1. **Name the levels of government involved in ensuring food safety in Australia.**
2. **Explain the role of food labels.**
3. **Describe three steps in a food safety program.**

FSANZ (Food Standards Australia New Zealand)
The national authority that develops the laws and practices regulating food production in Australia and New Zealand.

Food-borne illness
Illness caused by eating food that has harmful micro-organisms in it – for example, gastroenteritis ('gastro').

Ensuring a safe food supply in Australia

Globally, Australia has a reputation for having one of the safest food supplies in the world. This reputation has developed as a result of the strict governance and regulations that we have in place.

At the federal, state and local levels, authorities such as **Food Standards Australia New Zealand (FSANZ)**, the Australian Department of Agriculture, Fisheries and Forestry (DAFF) and local government environmental health officers work to ensure that safe food is available to consumers and that the incidence of **food-borne illness** is kept to minimal levels.

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What is a safe food supply?

As food consumers, we can be assured that we have a safe food supply.

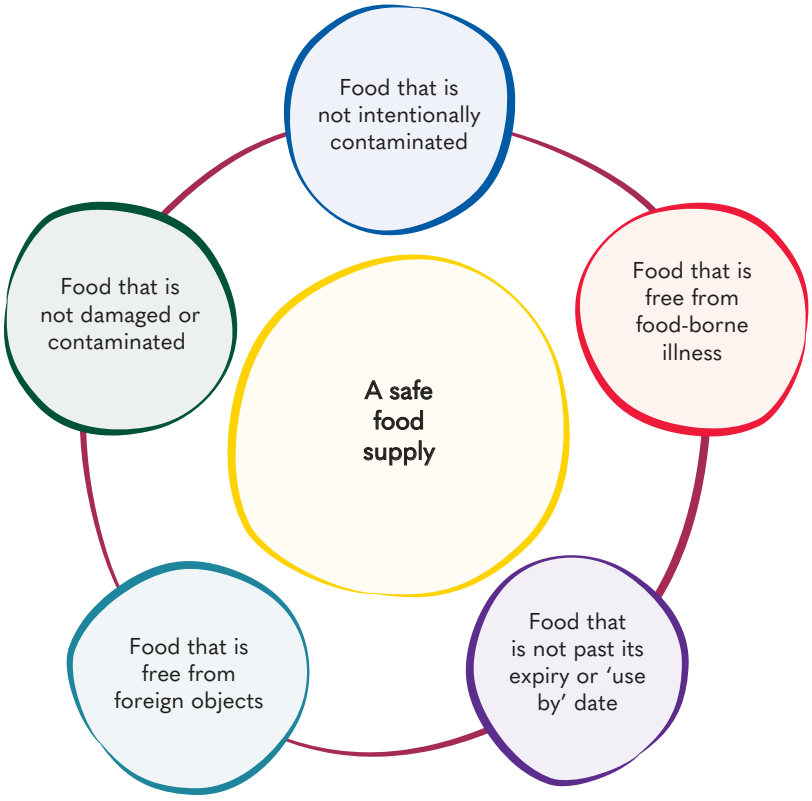

Figure 8.1: A safe food supply

Let's talk

Have you ever encountered an unsafe food supply? What was your experience? Describe the difference between a safe food supply and food security.

To ensure that safe food is supplied to Australian consumers, national, state and local authorities work together to develop **food standards** and **food laws**. They then work together to ensure they monitor and enforce these regulations.

National authorities

The federal government plays a major role in ensuring a safe food supply in Australia. It has a commitment to protecting and improving the health of all Australians. As consumers, we expect our government to guarantee the safety of the food supply and to ensure that adequate information is provided when buying food. Food businesses expect the government to minimise the cost of any regulation and not to put any unnecessary hurdles in place that inhibit innovation. These expectations are fulfilled through FSANZ and DAFF.

Food standards
A collection of individual standards for all foods sold in Australia.

Food laws
Rules and regulations that cover all foods produced, imported and sold in Australia.

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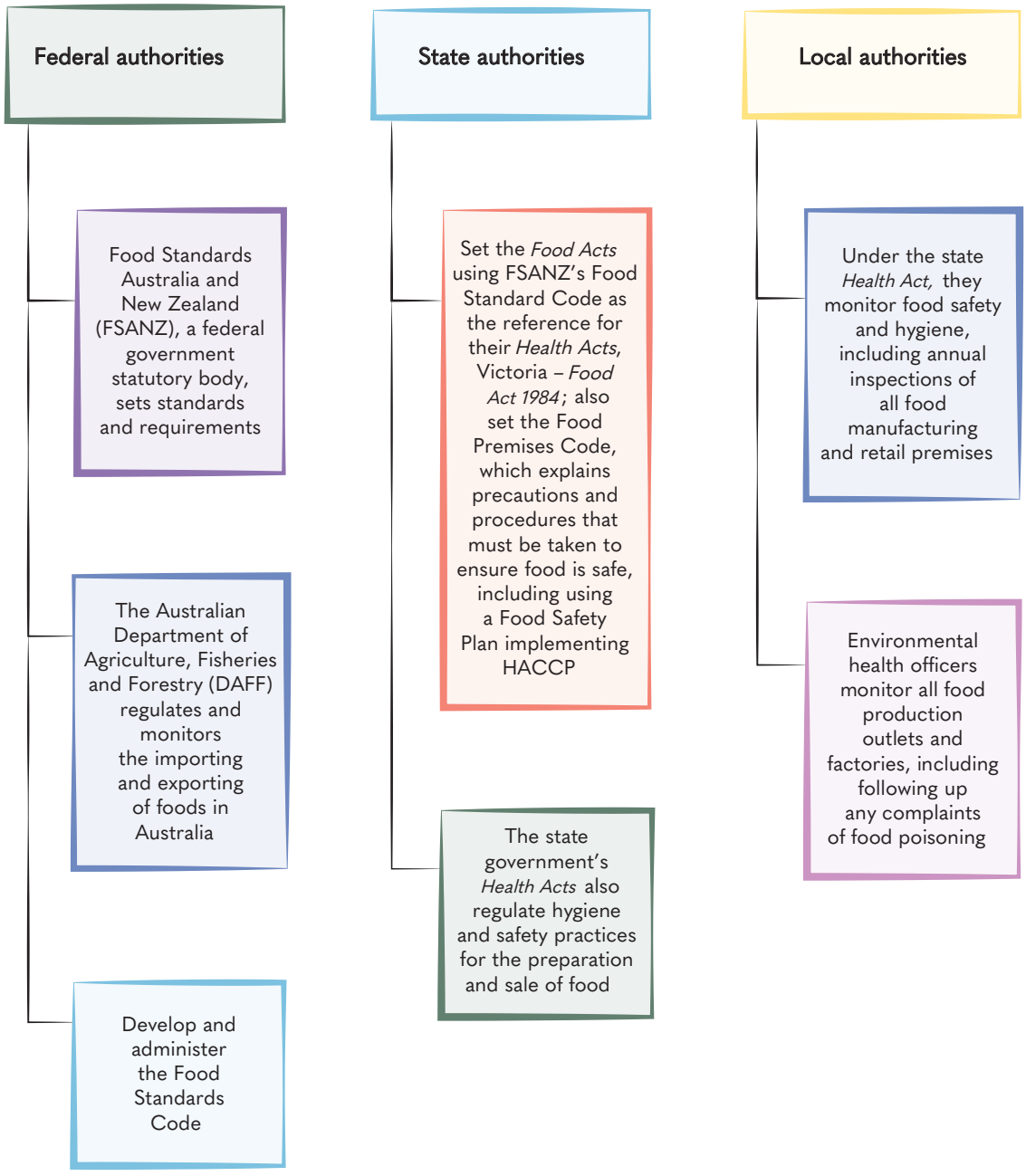

Figure 8.2: The three levels of governance in Australia all play a role in the control of food safety in Australia.

Food Standards Australia and New Zealand (FSANZ)

FSANZ is the government regulatory authority responsible for developing and reviewing the Food Standards Code for food sold or prepared for sale in Australia and New Zealand, as well as food imported into Australia and New Zealand.

Under a cooperative and integrated arrangement between the governments of Australia (all the Australian states and territories) and New Zealand, FSANZ maintains a safe supply of food.

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FSANZ

Vision: Providing a safe food supply for the people of Australia and New Zealand.
Mission: To work in conjunction with Australia and New Zealand governments to develop and sustain effective food standards.
Aims and objectives:

- Protect public health and safety.
- Ensure the provision of adequate information relating to food to enable informed consumer choice.
- Prevent misleading and deceptive conduct.
- Develop or review food standards as set down in legislation.

FSANZ undertakes a range of other functions on behalf of the Australian Government. These responsibilities include:

- coordinating food surveillance, enforcement and recall of products
- providing information to consumers
- research
- support for the Australian Department of Agriculture, Fisheries and Forestry
- development of Australia-only food standards to address food safety issues, including the requirements for primary production
- taking into consideration growth and innovation in the food industry.

Activity 8.1 (Inquiry): It is a criminal offence!

It is a criminal offence in Australia to supply food that does not comply with relevant food standards. It is also an offence to sell food that is damaged, deteriorated or perished, adulterated or unfit for human consumption. Using the Food Safety Information Council website as a starting point, investigate the following:

1. Define the following terms:
   - damaged food
   - deteriorated food
   - perished food.
   - adulterated food
   - food that is unfit for human consumption.
2. What sorts of penalties apply for anyone who breaks the law with regard to the supply of the above foods?

Food Standards Code

Food Standards Code
A code that lists requirements for foods, such as additives, food safety, labelling and genetically modified (GM) foods.

All food products for sale in Australia must comply with the **Food Standards Code**. FSANZ is responsible for the development and maintenance of the Australia and New Zealand Food Standards Code. The responsibility for enforcing and policing food standards rests with the Australian state and territory governments.

'The Code' (the Food Standards Code) is a collection of individual food standards.

The food standards are categorised as:

1. standards that apply to all food
2. standards for particular classes of foods
3. standards for food safety
4. standards for primary production and processing.

The overall objective of the Food Standards Code is to:

- protect public health and safety
- provide adequate information to consumers
- prevent misleading and deceptive conduct.

The Food Standards Code is broken down into four chapters covering a range of areas, including:

- labelling
- food additives
- processing aids
- microbiological limits
- contaminants
- residues
- food hygiene
- foods developed by new technology.

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Activity **8.2** (Inquiry): Meat pies

Visit the FSANZ website and answer the following questions:

1. State the main responsibilities of FSANZ.
2. List the four areas of the Food Standards Code and describe what each area covers.
3. Using the Code, investigate the standard for a meat pie, including the definition of meat flesh.
4. Is this what you were expecting? Explain your answer referring to the meat pie.
5. Does knowing the composition of a meat pie change how you feel about consuming one? Explain your answer.
6. List the standards for three different food groups.
7. Explain why having these food standards is important for both consumers and food producers.

Hazard Analysis Critical Control Points (HACCP) system

The HACCP system is a food safety program functioning in Australia to ensure a safe food supply. It evolved from the hazard analysis and critical control point system used in the 1960s. This system was developed in the United States and used in the NASA space program. The system is scientifically based and identifies specific hazards and measures for their control to ensure food safety.

The purpose of HACCP is to identify potential hazards associated with food production and preparation, and to develop mechanisms to eliminate or control these hazards. HACCP can be applied throughout the food chain from primary production to the final consumption of food – 'from paddock to plate'.

HACCP also aids in the inspection of food premises by the regulatory authorities (local government environmental health officers) and should ensure food consumers have confidence that the food in Australia is safe to eat.

A HACCP system consists of seven principles or steps that all food workplaces or businesses should implement as part of their food safety program.

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Activity **8.3** (Inquiry): Food safety program template

Source: Department of Health Victoria

Search online to view and download the food safety program template on the Victorian Department of Health website (search for food safety program templates class 2).

Browse through this document and complete the following questions:

1. Explain who can use this template.
2. Outline how this template aids in the development of a food safety plan.
3. Develop an A4 fact sheet for food premises that outlines the importance of completing this written plan before operating a food business. In your fact sheet, outline the following:
   - potential hazards that can result in unsafe food
   - support procedures that can be put into place to ensure food that is prepared, served or sold is safe
   - important records that need to be kept when the food premises are operating.

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1. **Conduct a hazard analysis:** Information on hazards associated with the food items being processed or produced is collected and evaluated. Biological, physical and chemical hazards that may pose a significant risk are identified and listed. A decision is made about which are the most significant and must be addressed by the HACCP plan.

2. **Determine the critical control points:** The critical control point is the step in the process where controls are applied to control the hazards analysis. As a result of the critical control points, a food safety hazard can be identified, controlled, reduced and eliminated.

3. **Establish critical limits:** This involves establishing or setting limits (maximum or minimum levels that must be achieved), such as temperature, time, pressure, pH, water activity or microbiological content, movement of people, pollution or equipment in order to control the hazard.

4. **Establish monitoring procedures:** Decide how the critical control points should be monitored. The monitoring procedures must be able to detect loss of critical control points. All monitoring must be signed by the person undertaking the actual process.

5. **Establish corrective actions:** If monitoring indicates that critical limits are not met, the necessary corrective actions must be taken. This action must be clearly stated. Corrective action must be identified and taken, otherwise the HACCP is of no use.

6. **Establish effective record-keeping procedures or verification procedures:** Documentation of procedures and record-keeping is essential to show that the HACCP principles have been followed and continue to be adequate. Procedures should include annual reviews when a process, ingredient or product changes.

7. **Establish procedures for record-keeping:** Procedures, monitoring or tests to ensure that the HACCP system is complying with the HACCP plan help to confirm that a safe product is being produced. These record-keeping procedures will ensure that proper documentation is maintained to verify that the HACCP is under control.

Figure 8.3: Steps involved in a HACCP system

Activity **8.4** (Inquiry): HACCP steps

Develop a flow chart that summarises the seven steps involved in HACCP. For each of the steps, complete the following:

1. Explain the purpose of the step.
2. Detail corrective action that would need to be taken if the step were not adhered to.
3. Discuss how each step plays a role in ensuring food safety.

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Activity **8.5** (Case study): Internet of Things (IoT) technology and HACCP

While IoT technology is a powerful tool that can improve the efficiency of restaurants and provide enhanced customer experiences, some of its greatest potential lies in its ability to safely monitor food preparation and production. Live data from IoT devices makes it possible to closely monitor food safety data points, allowing manufacturers and restaurants to reduce the risks of food-borne illness outbreaks through enhanced data collection and automated reporting.

Domino's Pizza, for instance, embraced IoT technology to enhance management processes and monitor the food safety of its products. In the past, restaurants have relied on workers to record food temperatures, a practice that was occasionally overlooked and could lead to issues with health inspectors. Using IoT devices for real-time temperature monitoring, Domino's automatically records and displays the temperature levels of a store's production, refrigeration and exhaust systems, allowing employees to view conditions from a live dashboard.

Source: 'The Future of Food Production: IoT and Blockchain' by Wendy Stanley, Food Safety Tech, May 21 2020

Case study questions

1. How is IoT being used by Domino's Pizza to ensure food safety?
2. Describe the benefits of IoT in HACCP monitoring.
3. Describe the challenges of using IoT in HACCP monitoring.
4. 'IoT isn't just a safe solution for improving food safety: It's a smart solution.' Explain what is meant by this statement.

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Curried egg sandwich

Serves 1

Ingredients


1 egg, hard boiled


¼ teaspoon curry powder


1 tablespoon whole egg mayonnaise


1 teaspoon parsley, chive or dill, chopped


Salt and pepper, pinch


Lettuce leaf


2 slices thick multigrain bread

Method

1. In a small bowl, mash the egg with a fork.
2. Mix through curry powder, herb/s and mayonnaise.
3. Season to taste with salt and pepper.
4. Lay out your bread. Top with egg mix and lettuce leaf. Top with the remaining bread slice.
5. Cut sandwich and serve.

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Evaluation questions

1 Annotate the curried egg sandwich recipe to show the potential hazards.

2 Copy and complete the following table to outline the hazards, control measures, critical limits, ways to monitor and corrective action that could be applied to making the curried egg sandwich.

Hazards at critical control points (CCPs)

Production step/method	Possible hazards at CCPs	Control measures and critical limits	Monitoring and recording	Corrective action
	What can go wrong?	What action has to be taken to effectively reduce or get rid of the hazard? What are the critical limits?	How are the control measures checked and recorded?	What should be done if the control measure fails and/or the critical limits are not met?
Delivery of raw Ingredients				
Storage of raw Ingredients				
Preparation of curried egg sandwich				
Cooking temperatures				
Storage of prepared sandwich				

3 Name the authority that sets out the criteria for the development of a food safety program.

4 What is a critical control point?

5 Explain why eggs are considered a high-risk food.

6 Mayonnaise is prepared using eggs. Identify and describe the functional property of eggs when making mayonnaise.

7 Define food poisoning. Describe how you could get food poisoning from consuming the curried egg sandwich.

8 Assess the benefit of the HACCP system in ensuring safe food service.

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Food labelling

Food labelling regulations are developed by FSANZ as part of the Food Standards Code. Labels provide detailed information that is important for both the consumer and manufacturer. They let you know about the key ingredients found in a food, which are listed in order of weight, from greatest to smallest. Labels also contain a 'use by' or 'best before' date that ensures food is only consumed when it is safe to do so. Additionally, food labels contain a nutrition information panel that lists how much energy (kilojoules), protein, total fat, saturated fat, carbohydrate, sugar and sodium are found in a product.

Information on a food label

The information that must be included on a food label is determined by FSANZ. The aim of a food label is to ensure that consumers are able to make informed choices.

Figure 8.4: The ingredients list is a compulsory component of a food label. Ingredients are listed according to weight, from greatest to smallest found in the food.

Let's talk

What is the benefit to the consumer of knowing that ingredients in a food product are listed according to weight?

Let's talk

What is the difference between a 'best before' and a 'use by' date? List five products that would have a 'use by' date and five products that would have a 'best before' date. Can you name any food items that don't have any dates on them? Why?

Figure 8.5: 'Use by' and 'best before' dates

Figure 8.6: Nutrition information panels provide consumers with a detailed breakdown of the product's nutritional value per serving and per 100 g.

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Table 8.1: Information appearing on a food label

Information that MUST appear on a food label:	Purpose
Name or description of the food	Should be accurate and specific and advise the consumer exactly what the product is.
Lot identification	An identification number and/or letters that relate to the packaging premises and job lot. It aids in food-recall processes.
Weights and measures	A legal requirement of fair trading regulations. Accurate metric weights and measures must be listed on the label.
Nutrition information panel	Nutrition information panels provide consumers with a detailed breakdown of the products nutritional value per serving and per 100 g.
Information about characterising ingredients and characterising components/percentage labelling	If an ingredient is characterised in the name of the product or in an image or words on the product, this ingredient must be declared as a percentage in the label. The percentage is based on ingoing weight of the characteristic ingredient.
Food recall information – name of manufacturer, importer or packer	A reference to the name and business address in either Australia or New Zealand of a person who is a supplier.
Storage conditions and directions for use	A food product has to inform a consumer about how to store the food product to ensure it meets its 'best before' or 'use by' date. If the food product poses a risk because it is not stored in the correct conditions, then it is mandatory to state the storage conditions on the product to avoid any risks posed to consumers.
Date marking information – 'best before' or 'use by' date	Food that has a shelf life of less than two years must have a 'best before' date marked on it. Foods that must be consumed by a particular date for health and safety reasons must have a 'use by' date and are prohibited from being sold after the specified date.
Country of origin	To inform the consumer about where the food is made, grown and packed. This will ensure a consumer is aware of what is 'made in Australia'.
Advisory statements, warning statements and declarations	Foods that could be a health or safety risk for consumers must include an advisory or warning statement or a declaration. For example, if a food contains a food allergen, a declaration must be made; or if GM technology is used, this has to be declared.
Ingredients list	All ingredients must be listed on the food label in descending order of their weight. For example, if sugar features at the beginning of the ingredient list, it means that the product contains a greater amount of sugar than any of the other ingredients listed.

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Let's talk

Nutrition information panels are not mandated on products in every country. What happens to food products that are imported into Australia?

Bar code
A machine-readable code on a product consisting of numbers and parallel lines of varying widths, and used for stock control and entering data into a computer system.

Serving suggestions
Ideas for the best way to consume or present a product.

Information that may appear on a food label

While bar codes are not compulsory on a food label, with scanning technology used in supermarkets today, it is unusual to find a product without a **bar code**. A bar code allows both the manufacture and retailer to gain data information about the sale of the product, and also helps with data collection of stock control and sales figures.

Figure 8.7: A bar code

Figure 8.8: A serving suggestion on a wholegrain crispbread packet

A **serving suggestion** is usually presented on a food product as a picture or statement regarding the best way to consume the product.

Figure 8.9: Examples of optional information that can be contained on a food label, but are not a FSANZ requirement

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The **health star rating** is a front-of-pack labelling system whereby a rating is given for a product's overall nutrition profile from half a star to five stars. It is a tool that can be used to compare similar packaged foods.

Health star rating
A front-of-pack labelling system whereby a rating is given for a product's overall nutrition content from half a star to five stars.

Percentage daily intake
The percentage of an average adult's dietary requirements that the food product provides.

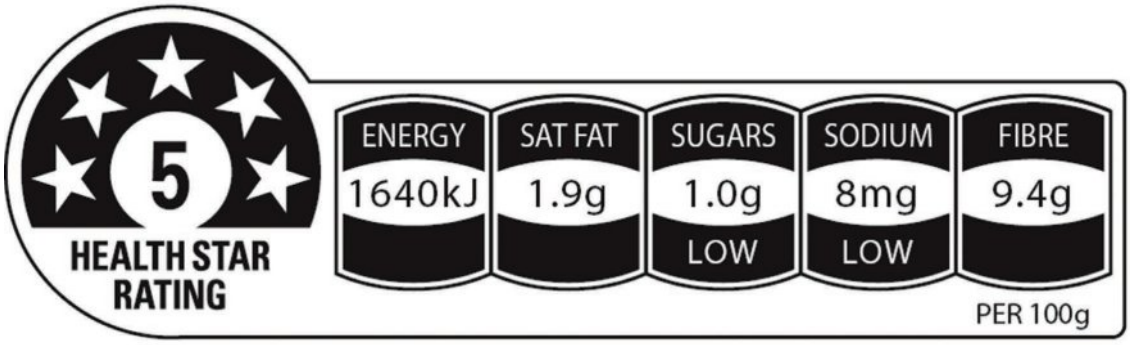

Figure 8.10: A health star rating

Serving size: 36 g (2 biscuits) Serving per pack: 12	Per serve	Per 100g
Energy (kJ)	529	1470
• (Cal)	127	351
Protein (g)	3.8	10.5
Fat (g)	1.7	4.8
• Saturated fat (g)	0.3	0.7
• Trans fat (g)	0.0	0.0
• Polyunsaturated fat (g)	1.1	3.1
• Monounsaturated fat (g)	0.4	1.0
Carbohydrate (g)	21.9	60.7
• Sugars (g)	1.0	2.7
Dietary fibre (g)	3.5	9.7
Sodium (mg)	91	254
Potassium (mg)	124	344
Thiamin (vitamin B1) (mg)	0.55 (50% RDI)*	1.53
Riboflavin (vitamin B2) (mg)	0.43 (25% RDI)*	1.19
Niacin (vitamin B3) (mg)	2.5 (25% RDI)*	6.9
Folate (µg)	80 (40% RDI)*	222
Iron (mg)	3.0 (25% RDI)*	8.3
Magnesium (mg)	34 (11% RDI)*	95

Figure 8.11: Percentage daily intake (%DI) example

Figure 8.11 shows the nutrition information panel for a breakfast cereal. Based on the product's serving size, **percentage daily intake (%DI)** indicates the percentage of an average adult's requirements that the food product provides.

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Information that must not appear on a food label

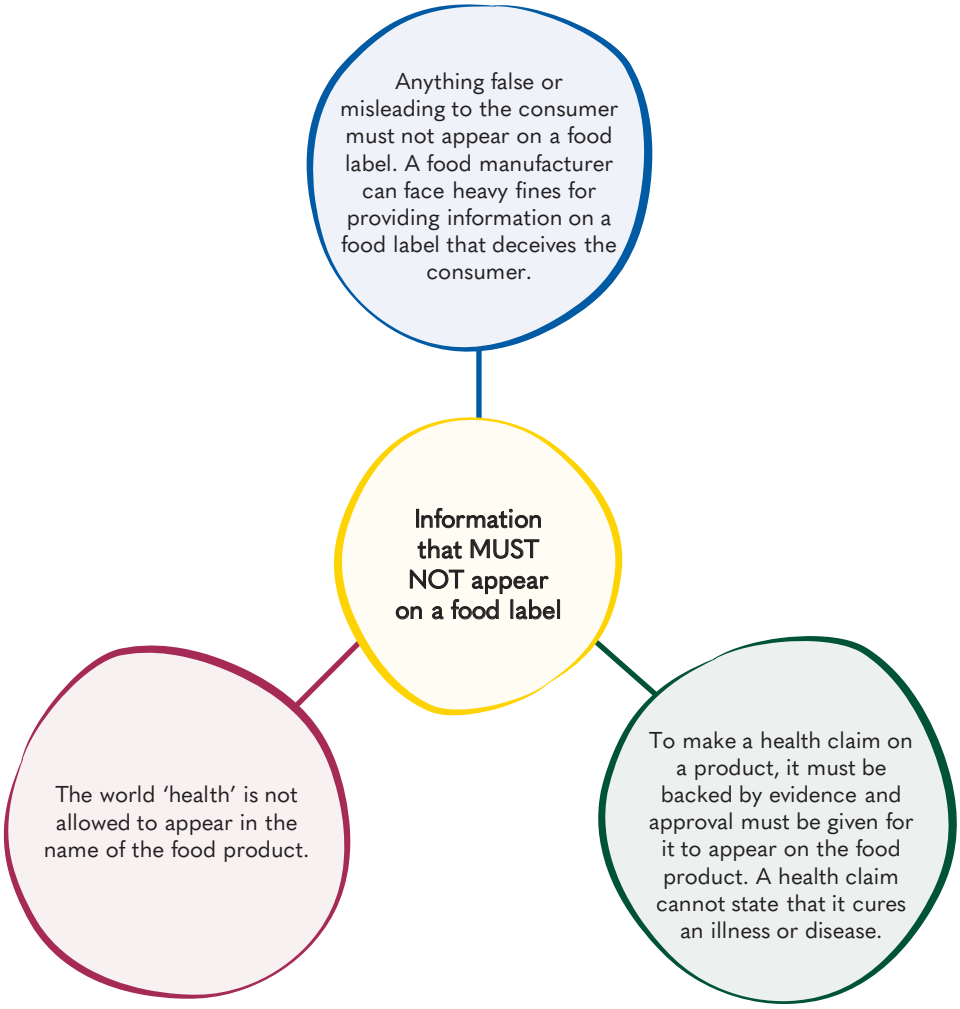

Figure 8.12: Information that must not appear on a food label

Activity **8.6** (Inquiry): Reading labels

Search for the interactive 'Labelling poster – how to read food labels' link on the Food Standards Australia New Zealand website, and use it to do the following:

1. Annotate a label. Find an empty food package and stick it into your notes. Annotate the label to highlight the components.
2. Detail the reasons why each of the above components of a label is so important for consumers.

Quarantine
Removal or isolation of pests and other items that are dangerous to plant and animal life.

The Australian Department of Agriculture, Fisheries and Forestry (DAFF)

Australia has strict **quarantine** laws. These have ensured that our country remains free from the world's most severe pests and diseases. It is the responsibility of DAFF to screen, inspect and clear millions of people, parcels, luggage, ships, animals, plants and cargo to help prevent the introduction and spread of exotic pests and diseases. It is the overall responsibility of DAFF to inspect and protect Australia from exotic pests and diseases.

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Let's talk

Do you watch the TV show *Border Security*? What breaches of quarantine laws have you seen on this program?

Activity 8.7 (Inquiry): Travel declarations

1. Visit the DAFF website and develop a list of items that must be declared before being brought into Australia.
2. Which of these items could have an effect on the Australia food supply? Explain why this might be the case.

State and territory authorities

It is the role of Australian state and territory authorities to implement and act upon the food standards that have been developed by FSANZ and published in the Food Standards Code. These authorities achieve this through food legislation that is individually developed and administered by each of the Australian state and territory authorities.

The *Food Act 1984* is the Victorian Government's means to be able to implement and act upon possible food safety issues.

Food Act 1984

All aspects of food, including production, processing, distribution, retail, packaging and labelling, are governed by laws under the *Food Act 1984*, which is designed to protect public health.

Under the *Food Act*, the role of the Victorian Government is to ensure that food businesses and staff who prepare or process food ensure that food sold to customers is safe to eat.

The Act also covers food served at:

- aged-care facilities
- childcare centres
- hospitals
- fundraising activities.

The Act requires that businesses must comply with the Food Standards Code in terms of:

- how food is cooked – control of temperature for storage, preparation and service
- requirements of food premises.

Under the *Food Act*, it is the responsibility of the Victorian Government to:

- set out offences for breaches of the food law and relevant penalties, and issue closing orders to premises that have breached these laws, putting public safety at risk
- adhere to the Food Standards Code
- protect public health using emergency powers – this includes food product recalls
- ensure that all food companies have a food safety plan that encompasses HACCP.

Local authorities

Local governments, through councils and municipalities, work to ensure a safe food supply in Australia. The roles of the local government/authority are to:

- administer the *Food Act*
- employ **environmental health officers**
- register and inspect food businesses
- ensure that food businesses develop and follow food safety programs
- regularly visit food premises to sample food products and ensure compliance.

Environmental health officers
People employed by local government who are responsible for inspecting food premises and advising on public health standards.

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Figure 8.13: Environmental health officers work for local councils and municipalities.

The responsibility of these local government employees is to ensure a safe food supply by:

- looking after the health of the community by maintaining public health standards
- ensuring food for sale is safe for human consumption
- investigating food-related complaints made by consumers
- investigating incidences of food poisoning
- investigating infectious disease outbreaks and making notifications of these
- ensuring compliance with the relevant *Food Acts*, regulations and codes
- ensuring that food premises have in place and are following a Hazard Analysis Critical Control Points (HACCP) plan.

Food industry safety programs

The aim of a food safety program is to reduce the risk of contamination. A registered food business in Australia has to provide its food safety program to be able to obtain registration and operate as a safe food-handling business. This helps to ensure safe and hygienic food systems in Australia.

Food industry safety programs require all three levels of government in Australia to work together to create an efficient, safe and robust system. Each level of government has a different responsibility for action.

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Figure 8.14: Characteristics of a food safety program that ensure hazards and risks are managed to keep our food safe

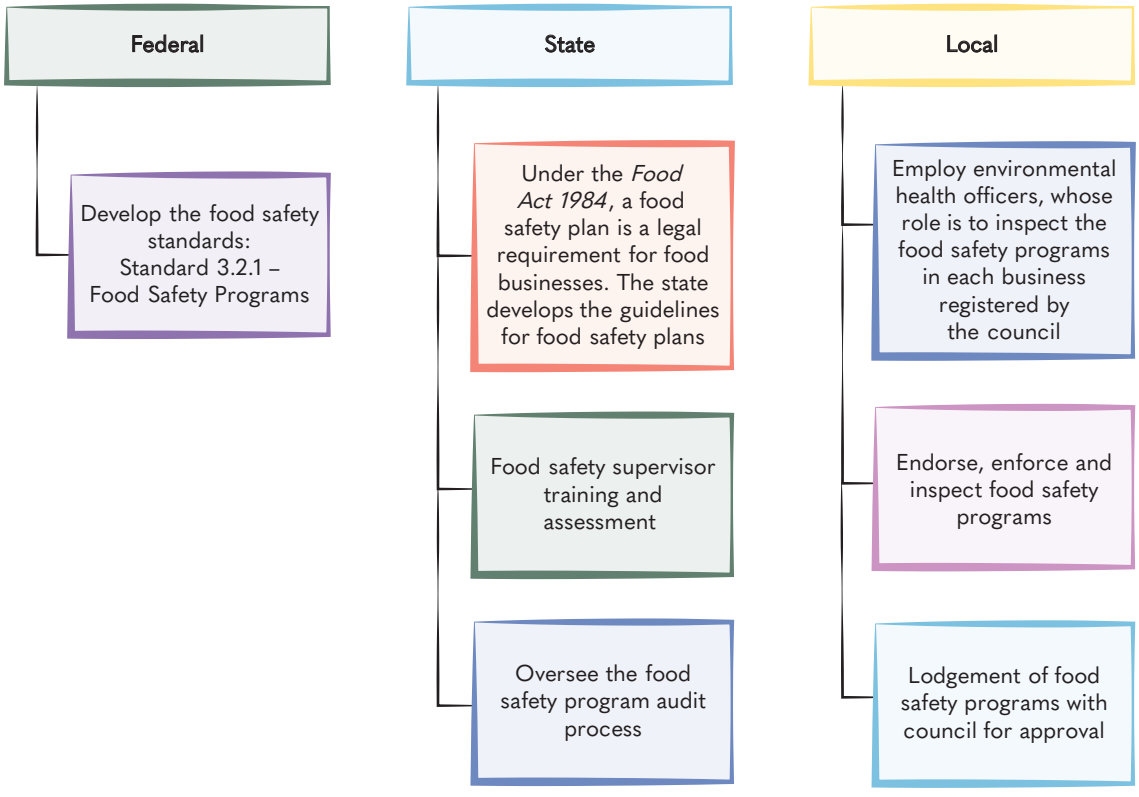

Figure 8.15: Responsibilities of federal, state and local government in relation to food safety

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Federal: The Food Standards Code

The Australian Government's FSANZ develops the food safety standards for Australia. They are outlined in Chapter 3 of the Food Standard Code. Standard 3.2.1 relates specifically to food safety programs.

Food safety plan
A documented system in place to ensure that food sold to Australian consumers is safe for consumption.

What is the difference between a 'plan' and a 'program'? A **food safety plan** is just one part of a food safety program. A food safety program is the implementation of a business's food safety plan.

Standard 3.2.1 - Food Safety Programs

(August 2015)

Standard 3.2.1 – Food Safety Programs

A food safety program is a written document indicating how a food business will control the food safety hazards associated with the food handling activities of the business. Only certain high risk food businesses are required to have food safety programs:

- Businesses that serve or process potentially hazardous food for service to vulnerable people are required to comply with Standard 3.2.1, in accordance with Standard 3.3.1 - Food Safety Programs for Food Service to Vulnerable Persons. This includes businesses providing food to hospital patients, aged care residents and children in child care centres. It will also normally apply to delivered meal organisations, that is, organisations that prepare food for delivery to vulnerable people.
- Seafood businesses that engage in the primary production or processing of, or manufacturing activities concerning, bivalve molluscs must implement a documented food safety management system that effectively controls the hazards. These businesses can comply with the requirements by following Standard 3.2.1 or other compliance options listed in subclause 16(2) of Standard 4.2.1 – Primary Production and Processing Standard for Seafood.
- Businesses producing manufactured and fermented meats are required to develop a food safety management system in accordance with Standard 4.2.2 (Poultry Meat) and Standard 4.2.3 (Meat).

FSANZ has prepared Proposal P290 Food Safety Programs for Catering Operations to the General Public. This Proposal is currently on-hold pending the outcome of a review of the Ministerial Policy Guidelines for Food Safety Management in Australia.

Food businesses may also be required to have food safety programs under state or territory food legislation. Food businesses should check state/territory requirements with their local council or state/territory health department.

Guidance

A Guide to Standard 3.2.1 - Food Safety Programs

Source: Food Standards Australia New Zealand

Figure 8.16: Standard 3.2.1: Food Safety Programs as outlined by FSANZ

State: Food safety plan for a food premises

Any person in Victoria who wishes to buy or begin their own food business must comply with Victorian food laws and the *Food Act*. A food safety plan is a legal requirement. The law states that all food businesses must have a food safety program written and in place before a food premises begins operation. The Department of Health develops the guidelines for food safety programs. This is a written plan that shows how the food business will ensure the food it prepares, serves, manufactures and sells is safe.

Food safety programs are based on the principles of HACCP. It is essential that food businesses review their food safety programs and food safety systems, which incorporate HACCP, each year.

The Victorian Government, through the Department of Health, provides a food safety program template, which can be used by food premises to develop their food safety plan.

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As part of ensuring a safe food supply, food businesses must ensure they prepare, process, serve and deliver safe food to their customers. Health orders may exist over food premises that have failed to ensure safe food and it is the role of the state's approved food safety auditors to issue the closure orders. These orders issued to the local council are then placed on the premises by the local council environmental health officer.

Local

Food businesses develop their food safety programs based on the principles of HACCP. Basing food safety programs around the HACCP principles ensures all risks associated with food production are minimised and controlled.

A business lodges its food safety program with the local council, which inspects the food business and checks over the program. If the program is adequate, the council will renew the food business's registration. If the plan is deemed inadequate, the food business must review feedback and amend the food safety program before applying again.

Figure 8.17: Food businesses must be registered through their local council with a certified food safety program in order to produce and supply food.

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Rice salad

Serves 2

Ingredients


1½ cups long grain rice


1 tablespoon parsley, chopped


1 tablespoon chives, chopped


1 spring onion, thinly sliced


1 stick of celery, diced


½ carrot, diced


¼ red capsicum, diced


½ cup canned corn, drained


1 tomato, diced


Salt and pepper, to taste


2 tablespoon olive oil


1 tablespoon lemon juice

Method

1. Add rice to a saucepan with 3 cups of water. Bring to the boil, cover with a tight-fitting lid, turn heat to low and cook for 13–15 minutes. Stand covered for 5 minutes, then fluff with a fork.
2. Allow rice to cool.
3. In a bowl, add cooked and cooled rice, parsley, chives, spring onion, celery, carrot, red capsicum, corn, tomato, salt and pepper, olive oil and lemon juice.
4. Toss and serve.

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Evaluation questions:

1. Demonstrate the application of commercial food production principles. How long can you safely keep cooked rice in the fridge?
2. Practise personal hygiene, appropriately store foods and maintain cleanliness in the kitchen. Identify the food safety hazards from this practical activity.
3. Construct a chart or table using the following headings as a guide to record food safety information that reduces the risks of food contamination: key steps in food operation; potential hazards likely to occur at each step; control for each hazard identified; monitoring of each control; and corrective action.

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Food recalls

A **food recall** is defined as an action taken to remove from distribution, sale and consumption food that may pose a health and safety risk to consumers. These actions are the result of reports that come from manufacturers, wholesalers, retailers, medical practitioners, government authorities and consumers with regard to unsafe food.

It is the responsibility of FSANZ to coordinate and monitor food recalls within Australia. All food recalls occur as a result of consultation between state and territory authorities and another party, usually the product's supplier – for example, the manufacturer or the importer of the unsafe food item.

Food recall
'An action taken to remove from distribution, sale and consumption food which may pose a health and safety risk to consumers' (FSANZ).

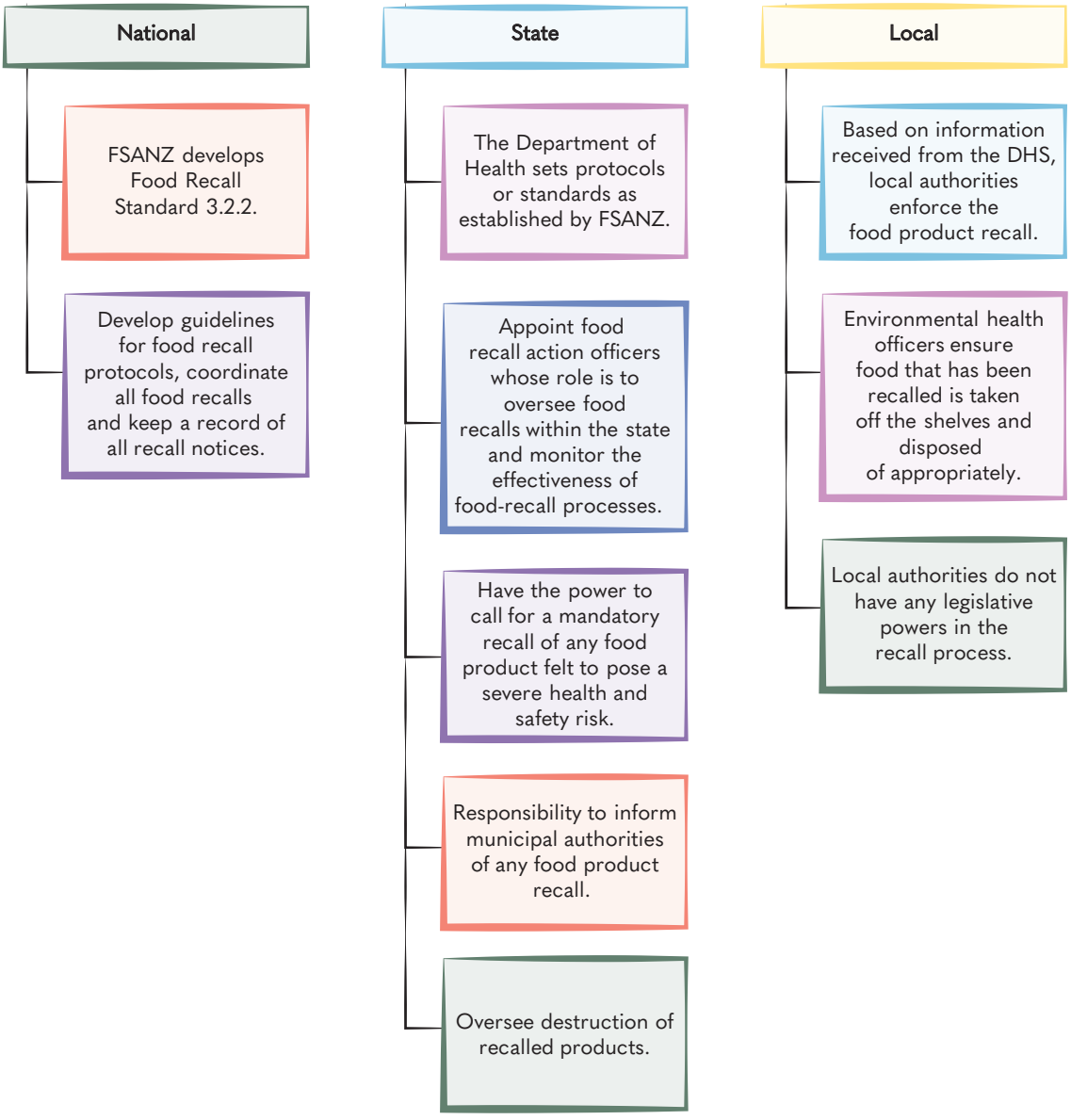

Figure 8.18: The role of national, state and local authorities in the food recall process

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Activity **8.8** (Inquiry): Food recalls this month

1. Name food products that have been recalled recently. Visit the FSANZ website and search for 'Food recalls' to find out whether any of the food items that you have at home or your Food Studies rooms at school have been recalled.
2. Outline why each of the foods has been recalled.
3. Detail the procedure to follow if you have these products at home or at school.
4. Explain the potential health outcome of consuming these recalled products.
5. Discuss the reasons why you believe that these errors in production occurred.
6. Do you or have you ever consumed these products? Will this influence your food choices in future?

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Chapter revision

- At the federal, state and local levels, authorities such as Food Standards Australia New Zealand (FSANZ), the Department of Health and local government environmental health officers work to ensure food is safe in Australia.
- The purpose of HACCP is to identify potential hazards associated with food production and preparation, and to develop mechanisms to eliminate or control these hazards. The HACCP system consists of seven principles or steps that all food workplaces or businesses should implement as part of their food safety programs.
- Food labelling regulations are developed by FSANZ as part of the Food Standards Code. Labels provide detailed information that is important for both the consumer and manufacturer.
- The role of Australian state and territory authorities is to implement and act upon the food standards that have been developed by FSANZ. The *Food Act 1984* is the means by which the Victorian Government is able to implement and act on possible food safety issues.
- The role of the local government/authority is to administer the *Food Act*, employ environmental health officers, register and inspect food businesses, ensure food businesses develop and follow food safety programs, and regularly visit food premises to sample food products and ensure compliance.

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Apply your knowledge

1 List the factors that make a food supply unsafe.
2 Outline the importance of the following in ensuring a safe food supply:
- FSANZ
- the Food Standards Code
- Food labelling
- DAFF
- the Victorian Government
- environmental health officers.

3 Discuss how FSANZ is able to achieve its aims and objectives.
4 Complete the following summary table:

The federal government ensures the food I eat is safe by:	The state government ensures the food I eat is safe by:	The local government ensures the food I eat is safe by:

5 Describe the similarities and differences between Standard 3.2.1 on Food Safety Programs and Codex HACCP (Hazard Analysis Critical Control Points).
6 List the information that must be found on a food label. Explain the importance of each of these components.
7 Using the following table, describe food industry programs that prevent and address food contamination risks.

Program	Description	How the program prevents food contamination risks

8 List and explain the seven principles of the HACCP system.
9 Outline how the HACCP system can minimise the risk of food-borne illness.
10 Who needs to have a HACCP system and how is this monitored?

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Practice exam questions

Question 1
Inspection of a food business and its food safety plan is regulated by:
A FSANZ.
B Environmental Health Officers.
C Border Security.
D The Department of Health.

Question 2
Explain two reasons for Australia's governance and regulation of food standards. **4 marks**

Question 3
Name one food industry program and describe how it works to prevent and address food contamination risks. **3 marks**

Area of study 1: Extended response question

Question 1

Analyse the relationship between the opportunities, weaknesses, threats and strengths of Australia's food systems.

8 marks

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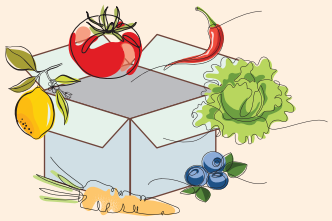
Let's unpack it



Refer to the **How to unpack exam questions** section on page xvi as a guide to the question breakdown below.

Question 1

Analyse the relationship between the opportunities, weaknesses, threats and strengths of Australia's food systems.

8 marks

A Annotate the command word

Analyse: Identify components/elements and the significance of the relationship between them; draw out and relate implications; determine logic and reasonableness of information.

B Parts of question

Strengths
Weaknesses
Opportunities
Threats

C Count the marks

8 marks:
2 = strengths
2 = weaknesses
2 = opportunities
2 = threats

D Determine key words to use

Food systems: 'the many components and activities involving primary production, processing and packaging, distribution and access, media and marketing, consumption and waste management of food, all of which can affect accessibility in different ways and subsequently affect health.'
Opportunities
Weaknesses
Threats
Strengths

E Evidence

Use your knowledge to provide evidence to support your statements made.
Provide an in-depth response for each component of the question.
Provide an example to demonstrate a deeper understanding.

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Unit 2
Food makers

Area of Study 2: Food in the home

In this Area of Study students further explore food production, focusing on domestic and small-scale food production. They compare similar food products prepared in different settings and evaluate them using a range of measures. They consider the influences on the effective provision and preparation of food in the home.
Students learn and apply food science terminology relating to physical and chemical changes that occur during food preparation and cooking, and undertake hands-on experimentation to demonstrate techniques and effects. Through practical activities, students design and adapt recipes, encompassing a range of dietary requirements commonly encountered by the food service sector and within families. Students propose and test ideas for applying their food skills to entrepreneurial projects that potentially may move their products from a domestic or small-scale setting to a commercial context.

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Chapter 9
Considerations and influences in food planning

Key knowledge

- Sensory, physiological, economic, social and health considerations in the comparison of particular meals and dishes prepared in commercial and domestic or small-scale settings.
- Influences on effective planning, management and decision making in the provision and preparation of food in the home, including resources such as time and money, and values such as health and sustainability.

Key skills

- Understand and apply principles and practices in the sensory evaluation of food products.
- Compare and evaluate foods using qualitative or quantitative measurements.
- Develop and demonstrate food knowledge and skills through consideration of the principles of effective planning, management, preparation and cooking of food.

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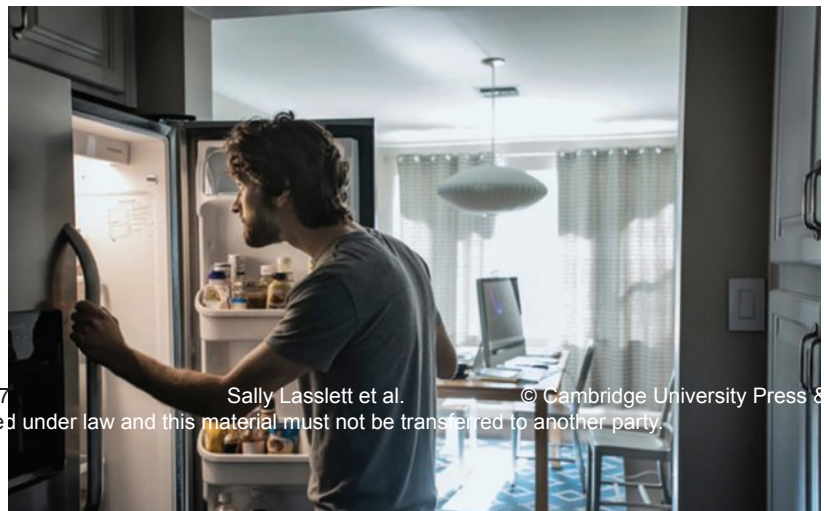
Video 9.1: Chapter Overview

It is Friday night and you have a fridge full of food that can be prepared, but the thought of ordering a takeaway meal seems very tempting. Do you go to the fridge or reach for your phone? There are many factors that influence food planning and preparation practices. Pre-prepared and takeaway options can have great appeal, but how do they compare with home-cooked meals? In this chapter, we will evaluate food products from commercial settings and compare them with their domestic counterparts. Effective planning, management and preparation strategies will be explored in order to develop successful practices for food production at home.

Figure 9.1: Even with a fridge full of food, takeaway is often an appealing option.



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Get knowledge ready

1. Identify factors that influence a person purchasing a meal from a commercial retailer rather than preparing it at home.
2. Explain one strategy a consumer can implement to reduce the cost of their weekly grocery shop.
3. Outline ways a household can reduce their food waste.

Comparing food products

The same food product purchased or prepared in different settings can have significant variations to their sensory properties. A frozen supermarket pizza will look and taste very different from a takeaway or homemade alternative. Although frozen pizza may not be considered the tastiest choice, its convenience and price can be more appealing than the other options.

A number of factors influence our choice to purchase food from commercial settings. However, when doing so we often have little chance to modify the dish to suit our personal preferences or values.

Figure 9.2: The aroma and appearance of food provide sensory cues about how the food will taste. What sensory cues do you think this dish provides for the little girl in this image?

Sensory considerations

Our senses play a key role in the selection and evaluation of food. The aroma of food can trigger our appetite before we even view the product. Appearance draws us in: it can indicate how the product might taste and what its texture might be. The flavour of food is a combination of the taste and the aroma, and is a key indicator of whether the food is liked or disliked.

The sensory properties of a meal can seem appealing to one person, yet unappetising to another, as sensory appreciation is subjective. A rare, cooked steak served with a mushroom sauce might have you salivating, while the thought of eating mushrooms or rare meat is nauseating to others. What appeals to you? Mushrooms? Steak well-cooked or not?

Figure 9.3: If you're a meat-eater, how do you like your steak cooked? The texture of the meat can impact our sensory appreciation of the food.

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Activity 9.1 (Practical): Jelly bean taste test

Aim

To identify the flavour of jelly beans without the use of sight or smell.

Equipment:

- Packet of jelly beans with a variety of flavours
- Blindfold
- Results table

Jelly bean colour/flavours	Number of attempts	Times correctly identified

Method

For this experiment, you will need to work in pairs. You will take turns at being the participant and the observer.

1. Sort the jelly beans into their different colours/flavours.
2. Draw up a results table to record each guess. The first column should list the jelly bean flavours. The second column should list the number of attempts the participant has for each jelly bean and the third column tallies the number of times each jelly bean has been identified correctly.
3. Select one person as the first participant. Blindfold them and have them pinch their nose with their hand so they can't smell.
4. Pass the participant one jelly bean at a time. Have them sample the jelly bean and guess the flavour. Record their response.
5. Repeat the previous step with the other flavoured jelly beans.
6. Switch roles with your partner and record the results.

Analysis

1. Analyse the similarities and differences between the two results.
2. Identify the jelly bean flavour that was easiest to identify. Explain the reasons for this.
3. Describe how limiting our senses impacts our ability to distinguish the flavour of food.
4. If the experiment was repeated and this time the participants were only blindfolded, the results may vary. Explain how they would vary from the original conditions.

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Let's talk

Some foods are considered particularly polarising: loved by some yet hated by others. Create a nine-point hedonic scale in the classroom ranging from extreme like to extreme dislike. How do you and your peers feel about the following polarising foods?

- Coriander
- Blue cheese
- Anchovies
- Pickles
- Dark chocolate
- Liquorice
- Wasabi
- Marzipan

When each is read out, select a place along the hedonic scale to represent your opinion.

Physiological considerations

Physiological conditions such as **food allergies** and **food intolerances** can dictate what a person can and cannot eat. It is essential that particular foods are avoided, and meals are adapted in order to prevent the harmful effects that can result from these conditions.

Food allergies

A food allergy is the body's **immune system** reacting to a particular food, which can trigger an **allergic reaction**. Depending on the sensitivity to the food or the amount consumed, the reaction can be mild to severe. A severe reaction is known as **anaphylaxis** and can have life-threatening effects on the body. A number of foods can be the cause of a food allergy; common examples are eggs, milk, shellfish and nuts.

Figure 9.4: When purchasing food from commercial settings, people with a food allergy must read the label carefully or consult with the business to ensure they avoid their allergen.

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

Food intolerance
Chemical reaction in the body to particular foods; it is not an immune response. Food intolerance is much more common than food allergy – for example, gluten intolerance.

Immune system
The body's defence against infection. It is made up of cells and proteins that create a complex network. When the body senses foreign substances (antigens) and perceives them as threatening, it will stimulate an immune response to fight off the invader.

Allergic reaction
When the body overreacts to an allergen and triggers a series of symptoms that vary for each individual and depend on the severity of the reaction. A reaction can be mild (sneezing) or life threatening (anaphylaxis).

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Food intolerances

A food intolerance is a chemical reaction that occurs in the body when a particular food or drink is consumed. A person with a food intolerance will have varying symptoms upon consuming their trigger food; this can involve bloating, stomach cramps and diarrhoea.

Coeliac disease is a disease of the small intestine that results in a permanent intolerance to gluten, the protein found in wheat, oats, barley and rye cereals. Consuming gluten damages the **villi** or finger-like projections on the surface area of the small intestine, preventing the absorption of nutrients. Gluten must be avoided as the damage to the small intestine is irreversible.

Long-term effects of the disease can include malnutrition, osteoporosis and associated lifestyle diseases.

Figure 9.5: Gluten-free flour can be used in baked products to produce items with similar sensory properties to those containing wheat flour.

Anaphylaxis
Extreme sensitivity to a food product; can be life-threatening.

Coeliac disease
Disease of the small intestine that results in permanent intolerance to gluten, inflammation of and damage to the lining of the small intestine and medical complications.

Villi
Finger-like projections that extend along the small intestine and absorb nutrients during digestion.

Activity 9.2 (Practical): Gluten-free pasta product analysis

There are many commercial pasta products that cater for people with coeliac disease, such as pasta made from chickpeas, lentils, rice and potato starch.

Select three gluten-free pasta varieties to compare with traditional wheat pasta. Cook each following the packet instructions, then copy and complete the table below.

	Wheat flour pasta	Gluten-free sample 1	Gluten-free sample 2	Gluten-free sample 3
Cooking time				
Appearance				
Texture				
Taste				
Energy per 100 g				
Carbohydrates per 100 g				
Protein per 100 g				
Fibre per 100 g				

1 Based on the sensory properties, select your preferred pasta and justify why you prefer it.
2 Comparing the nutrition information, select and justify which pasta variety would keep you fuller for longer and best promote the gut microbiota.

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Lactose intolerance is a condition whereby the body is unable to digest lactose, the sugar found in milk and milk products. The body does not have enough of the enzyme lactase to break the lactose down into simple sugars for digestion. Some people can tolerate small amounts of lactose with minimal symptoms and really only have to avoid drinking milk, whereas others are more sensitive and have to avoid lactose altogether.

FODMAP is the acronym used to describe the group of fermentable, short-chain carbohydrates (sugars). FODMAP intolerance means that these short-chain carbohydrates cannot be properly digested and absorbed, causing symptoms in people with irritable bowel syndrome (IBS), such as bloating, flatulence and unpredictable bowel movements.

Lactose intolerance
A condition whereby the body is unable to digest lactose.

FODMAP
An acronym used to describe the group of fermentable short-chain carbohydrates: fermentable oligosaccharides, disaccharides, monosaccharides and polyols.

Figure 9.6: Lactose-free milk and plant-based milks are suitable alternatives for lactose intolerant consumers.

Let's talk

Identify the difficulties a person with a dietary requirement might face when selecting a meal from a commercial setting.

Let's talk

Physiological considerations can also relate to health concerns, such as type 2 diabetes or stages of life, such as pregnancy and lactation. How might these considerations impact food choice?

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Economic and social considerations

A range of economic and social considerations influence food planning, preparation and production. These considerations can impact whether a person selects to produce a meal at home or purchases a pre-made product from a commercial food service. These economic and social considerations are also known as **social factors**.

Social factors
Factors including education, income, location, accommodation, available time and cultural norms that influence responses to food information, food accessibility, food choices and healthy eating.

Figure 9.7: Social factors

Income

The amount of money we have available to us will influence the foods we purchase, prepare and consume. High-income earners are more likely to frequent commercial settings such as cafes and restaurants or to utilise food-delivery services. Convenience products such as heat-and-serve meals are often cheaper, so more affordable to low-income earners. The cost of home-cooked meals can vary, depending on the type and quality of ingredients purchased.

The cost of a meal is heavily dependent on the setting. Take a Thai green curry for example: a heat-and-serve frozen meal can cost under $5, whereas a local restaurant may charge upwards of $25. Purchasing the curry at one of Melbourne's best restaurants, such as Longrain or Chin Chin, will cost well over $30. How about cooking at home? You could purchase a stir-through sauce for under $4 and add other ingredients. Making it from scratch with an empty pantry? You would need to purchase 13 different ingredients just to make the sauce. However, foods produced in commercial settings can cost significantly more than the same product prepared at home.

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Figure 9.8: The cost of a Thai green curry can vary from $4 to $40, depending on the setting. Consider how the sensory properties of the meal may vary based on the price and setting.

Education

A person's food literacy relates to their knowledge, skills and attitudes towards food, which in turn impacts their behaviour. Being food literate enables us to effectively compare products and make informed decisions. This can relate to health, physiological conditions, values, income, food safety and the sensory properties of ingredients. Having extensive food knowledge and effective technical skills enables a broader cooking repertoire, which means a wider variety of food choices can be prepared.

Figure 9.9: Understanding food labels enables consumers to effectively compare food products in order to make healthy, safe and informed choices.

Some foods require a high skill set to produce, such as uniform macarons, a risen and light soufflé or a perfectly cooked beef Wellington. With dishes such as these, it is easy to distinguish between a trained chef and an amateur home cook.

Figure 9.10: It takes approximately three years to become a qualified chef.

Let's talk

Think of an elaborate meal or dessert you have eaten. Where did you consume this item and what was the occasion? What level of knowledge and skills were required to create the dish? How successful do you think you would be at creating it at home?

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Available time

Choosing to make food or purchase it from a commercial setting has a lot to do with our available time. Cooking a meal at home can be difficult to manage when people are juggling a number of responsibilities. Planning meals, shopping for ingredients and producing a dish takes time. Consumers often want something that is quick and easy, whether that is convenience foods, heat-and-serve meals or a takeaway dinner. Foods from commercial settings are useful for time-poor households.

Figure 9.11: Purchasing a sandwich can be a healthy option for consumers who don't have the time to prepare their own at home.

Some foods take a long time to prepare, such as slow-cooking meat for pulled pork burritos or smoking beef to make brisket. Think about the time is takes to develop the layers of flavour when simmering a bone broth to make pho – a really good bone broth for pho can simmer for 12 hours or more. These meals, such as the pho prepared in commercial settings, are much more appealing than waiting eight or more hours for this one element of a dish to be ready.

Cultural background
The beliefs, customs and practices of a particular group of people that influence food choice.

Figure 9.12: For restaurant-quality pho, simmering bone broth can take 12 hours or more.

Activity 9.3 (Practical): Pizza challenge

Pizza is a favourite in many households; however, not many people make it from scratch.

1. Select a pizza recipe to make in class that requires the preparation of the dough.
2. Analyse the time it would take to make a pizza from scratch compared with reheating a frozen variety or waiting for a takeaway food order to arrive. State the time difference between the three options.
3. Outline the advantages and limitations of each option by considering the following:
   - available time
   - income
   - education
   - physiological considerations
   - sensory properties.

Cultural norms

Culture relates not only to the foods we eat, but also the behaviours in which we engage around food. Australia's multicultural society is reflected in the diverse range of foods available in commercial settings, as well as the types of foods produced in the family home. The availability of international foods enables migrants to continue to cook and enjoy foods from their **cultural background**.

The sensory appreciation of food can be influenced by cultural norms. People who were brought up enjoying a wide range of spices in their food will have a broader palate and can often tolerate high levels of heat from chilli. Those who have had less exposure to chilli may find that a small amount is incredibly spicy.

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Figure 9.13: Cultural norms are reflected in our knowledge, behaviour, attitudes and practices in relation to food.

Let's talk

What is your spice tolerance like? How has this been influenced by your family background?

Location

Where we live has an impact on the availability and cost of food. People living in major cities have access to a wider variety of food options. The foods found in the supermarkets, specialist stores, delis and restaurants in major cities offer a wide range of multicultural cuisines. Food options are plentiful and diverse.

Rural and remote areas have fewer food businesses, and supermarkets tend to stock only products that are guaranteed to be sold. As remoteness increases, so does the price of food due to transportation costs.

Figure 9.14: Some communities rely on a general store for their groceries, as the closest supermarket can be over an hour away. This will have a significant impact on cost and the variety of foods available.

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Accommodation

To effectively prepare a meal, you need the appropriate facilities and equipment. The size of a domestic kitchen will depend on the size of the residence. Many apartments are designed and built with small kitchens, as space is limited. With reduced space, there is only so much cooking equipment and so many food products a person can store, limiting the types of meals that can be prepared. Commercial settings, on the other hand, are designed to produce high volumes of food and have a range of specialised equipment to do so.

Figure 9.15: Many dishes get their unique flavour from the equipment used in their preparation. This can be difficult to recreate in a domestic setting.

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Chicken Thai green curry

Serves 1–2

Produce the chicken Thai green curry recipe below and compare it with a takeaway and frozen variety.

Ingredients


½ cup jasmine rice


2 teaspoons oil


2 cloves of garlic, finely diced


4 cm piece of lemongrass, finely sliced


1 small piece of ginger, peeled and finely sliced


1 chilli, finely chopped


1 chicken breast, diced


1 onion, roughly diced


1 kaffir lime leaf, finely sliced


½ red capsicum, diced


10 green beans, roughly chopped


2 teaspoons soy sauce


200 mL coconut cream


½ cup chicken stock


2 teaspoons green curry paste


1 teaspoon coriander, chopped

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Method

1. Start steaming the rice in a microwave or steamer while you prepare the curry.
2. Heat oil in a frypan over a medium heat and sauté garlic, lemongrass, ginger and chilli for 1–2 minutes to release the flavours and aromas of the spices.
3. Add the chicken and cook for 3–4 minutes until sealed all over.
4. Add the onion and sauté on low heat until translucent. Do not brown, as this will discolour your sauce.
5. Stir in the remaining ingredients (but only half the kaffir lime leaves) and simmer for about 15 minutes until the chicken is tender.
6. Serve with the rice and garnish with the remaining pieces of kaffir lime leaf and some fresh coriander.

Evaluation questions

1. Calculate the total cost of preparing this recipe. Compare this with the cost of the takeaway and frozen meals. Discuss factors that would contribute to the variation in cost between the three dishes.
2. Discuss how the social factors, such as available time and education, would contribute to a person choosing to prepare this meal rather than purchasing it from a commercial setting.
3. Explain why this dish is suitable for a person with lactose intolerance.
4. Complete a profiling test to compare the three meals by drawing up a star diagram. Label each axis with the following: strength of aroma, flavour, appearance and texture.
5. Using a nine-point hedonic scale, complete a preference test for the three dishes.

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Health considerations

When selecting food to prepare at home or purchase from commercial settings, people often consider the health implications of their choices. Food selection can assist in the prevention of **lifestyle diseases** and is essential for optimising health and development. The ingredients and method used to produce a meal will dramatically impact its nutritional properties. A burger purchased through a fast-food chain is considered a discretionary food, while one prepared at home with modifications can be a well-balanced meal.

Figure 9.16: Wholemeal bun, lean beef patty and a range of vegetables of different colours and types: a delicious burger for a health-conscious consumer.

Let's talk

Do you want fries with that? Suggest different ways in which hot chips can be produced that align with the values of health-conscious consumers.

Activity 9.4 (Inquiry): Discretionary choices

Discretionary choices should be limited in the diet as they are high in saturated fat and/or added sugars, added salt or alcohol and low in fibre.

1. Identify meals that can be considered discretionary choices.
2. Outline the health risks that can arise through the over-consumption of these foods.
3. Aside from burgers, explain how a discretionary meal can be adapted to meet the health concerns of consumers.

Lifestyle diseases Diseases associated with our lifestyle, including obesity, cardiovascular disease, type 2 diabetes, hypertension and some forms of cancer.

Food preparation in the home

Effective planning, management and preparation of food in the family home require adequate knowledge and skills. With high levels of food literacy, we are better able to acknowledge the influences on the effective provision and preparation of food and adapt accordingly.

Let's talk

Who organises the groceries and meals in your household? What strategies do they implement in order to do so?

Resources

Think about your household. How many mouths are there to feed? What cooking facilities and equipment are available to produce a meal? Are weeknights busy with commitments or are they relaxed? Is there a steady stream of income available to shop for food? The answer to these questions will influence the household's food planning and preparation.

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Figure 9.17: Income and available time are two social factors that have a considerable influence on food preparation in the home.

Available time

Planning, shopping and preparing meals can be a time-consuming task. Households are busy places, with people juggling a number of commitments and responsibilities such as work, study, parenting, sport, cleaning and walking the dog. These commitments impact the amount of available time to plan and produce a meal. To best manage our time, planning is essential to ensure the effective provision and preparation of food in the home.

To best utilise available time, the selection of meals needs to be considered carefully. By cooking in bulk or reutilising leftovers, we can save time in the preparation of meals. On lighter days, food preparation for meals later in the week can be completed.

Figure 9.18: Cooking large quantities allows for quick and easy meals to be available during busy times of the week.

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When planning meals for the week, consider these strategies:

- Map out the household's schedule to identify times when meal preparation can occur, compared with nights where a grab-and-go dinner is required. Plan meals accordingly.
- Create a shopping list for the weekly meals and complete one large shop rather than making smaller trips to the grocery store during the week.
- Cook in bulk: leftovers can be consumed across the week.
- Freeze leftovers to be used during weeks where minimal food preparation can be achieved.
- Chop and prepare ingredients earlier in the week to save time later. For example, you can cut up carrots and celery for quick and easy snacks or to use in recipes during the week.
- Have a repertoire of meals that can be produced in under 30 minutes.
- Many hands make light work – cooperate as a household when preparing meals to save time.
- Utilise time-saving equipment to prepare meals.

Figure 9.19: A meal can easily be prepared in a slow cooker with minimal effort. Add the ingredients in the morning and come back to a delicious meal at night. Can you think of other time-saving equipment?

Figure 9.20: Wash and pre-cut vegetables then store them for later use.

Figure 9.21: Cook in bulk so that leftovers can be eaten throughout the week or frozen for a future meal.

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Activity **9.5** (Case study): Meet the Smith family

Meet the Smith family. David and Margaret work full time and their children, Rachel and Sam, are in high school. Rachel plays netball and just started working part time. Sam plays football and basketball. David and Margaret share the cooking responsibilities, as well as driving their children to and from work and sport. Due to their busy schedules, they find it difficult to prepare meals each night. They do their weekly grocery shop on Sunday as that is the only day of the week when everyone is free from work, study and sport.

To plan for their grocery shop, the family members map out their available time to prepare food during the week. They prefer to eat home-cooked meals rather than purchase takeaway foods and only like to consume leftovers once each week.

Read through their schedule and that helps the Smiths to effectively plan and prepare dinners to suit their busy lifestyle.

Key:

	No available time
	30 minutes available
	An hour available
	No time restrictions

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

Prepare a meal plan of weekly dinners for the family, taking their schedule into account. Justify your selection by explaining the strategies used to best utilise their available time.

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Money

Aside from the cost of rent or a mortgage, groceries are one of the biggest household living expenses. On average, a family of four spends approximately $187 on groceries each week. Supermarkets offer a wide variety food choice, and with greater food choice there is also greater variance in price. The cost of food is not only determined by the quantity we purchase, but is also influenced by seasonality, availability, brands and types.

Households can implement a number of strategies to make the most of their food budget. Through careful planning and considered food selection, a little can go a long way.

Consider these strategies before your next grocery shop:

- Plan out your week by considering the available time you will have to cook.
- Check what you have at home first before buying more food.
- Write out a shopping list.
- Select recipes that utilise similar ingredients.
- Eat in season.
- Incorporate more vegetarian meals into your weekly repertoire.
- Select cheaper cuts of meat.
- Buy in bulk.
- Compare similar food products by price per 100 g.
- Purchase fresh, unprocessed fruit and vegetables rather than pre-cut options.
- Some supermarkets discount fruits and vegetables that are misshaped, so select these at a reduced cost.
- Look out for specials: if a staple non-perishable product is discounted, consider stocking up.
- Shop at farmers' markets, greengrocers and wholesalers if they are available in your area.

Let's talk

Consider the list of money saving strategies. Discuss how each strategy works to save money when buying groceries.

Figure 9.22: Planning ahead and shopping with a list work to reduce the cost of grocery bills.

Figure 9.23: Check the ingredients you have at home first before heading to the shops.

Let's talk

Making one food item go a long way is key when saving money on meals. How many dishes could you make out of a roast chicken? What about a whole uncooked chicken?

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Activity 9.6 (Data analysis): Recipe costing

Working out the cost of a recipe can be a necessary skill for households on a tight budget. It is necessary to determine the cost of each ingredient based on the quantity used. To calculate the recipe cost for each ingredient, you need to divide the cost to purchase by the quantity purchased, then multiply by the amount used in the recipe. For example:

Olive oil costs $5.50 for a 500 mL bottle. The recipe requires 1 tablespoon of olive oil (20 mL). The cost of olive oil for the recipe is

$(5.50 \div 500) \times 20 = \$0.22$

1 Calculate the cost of the spaghetti bolognese recipe below.

Ingredient	Amount	Cost to purchase	Recipe cost
Olive oil	1 tablespoon (20 mL)	$5.50 – 500 mL bottle	$0.22
Brown onion	1		
Garlic cloves	3		
Carrot	1		
Celery stick	1		
Beef mince	500 g		
Passata	700 g		
Tomato paste	1 tablespoon		
Beef stock powder	1 teaspoon		
Bay leaves	2		
Dried Italian herbs	1 teaspoon		
Spaghetti	300 g		

2 When 'shopping' for each ingredient, what decisions did you make to reduce the total cost of the meal?

Activity 9.7 (Practical): Healthy convenience products

Complete a product comparison by researching the cost and nutritional properties of four healthy convenience products found within the frozen section of a supermarket.

1 Complete the table below.

Product name	Cost	Nutrient content per 100 g
1		
2		
3		
4		

2 Explain the influence of consumer demand in the formation of these products.

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Equipment

Every year there is a new 'must have' appliance that is designed to save us time or complete a specialist task. However, a knife, chopping board, saucepan, frypan, wooden spoon, whisk and tongs seem to do the trick for most basic recipes. The availability of kitchen equipment is heavily influenced by a household's accommodation type, income and passion for cooking. Ice-cream and pasta machines, deep-fryers, stovetop smokers, spiralisers and blenders may fill the cupboards in one household, while another may only have the basics.

Let's talk

What specialist equipment do you have at home? Is this used regularly or is it collecting dust at the back of the cupboard?

Activity **9.8** (Inquiry): Would you buy it?

New appliances are being released onto the market at a rapid rate. They are marketed to save time while producing high-quality food items. Although they often sound very appealing, the cost of these products leaves many to question: 'Is the price worth the time saved?'

Complete the table below by describing the features of each appliance, identifying its price range, providing equipment alternatives the average household would already have to match the features of the appliances, and make a personal judgement on whether you think it is worth the cost.

	Product description/ features	Price range	Equipment alternatives	Is it worth the hype?
Food processor 				
Stand mixer 				

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	Product description/ features	Price range	Equipment alternatives	Is it worth the hype?
Thermomix 				
Air fryer 				
Pressure cooker 				
Slow cooker 				
Rice cooker 				

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Values

Decision-making around food is heavily influenced by our values. These refer to what we believe is important and how we adjust our behaviour accordingly. This can be influenced by many factors, such as our experiences, family, culture, religion and society. Health and environmental sustainability are two core values that heavily influence food planning, preparation and management.

Let's talk

How are your food choices influenced by your personal values? Do these values align with those of other members of your household or do they differ?

Health

Our food choices have a major impact on our health. Eating nutritious foods not only makes us feel good but also protects us against lifestyle diseases. The *Australian Dietary Guidelines* are a framework for healthy eating that provides information on the types and amounts of foods we should consume to promote optimal health and wellbeing. Following these practical recommendations offers guidance on foods, food groups and dietary patterns.

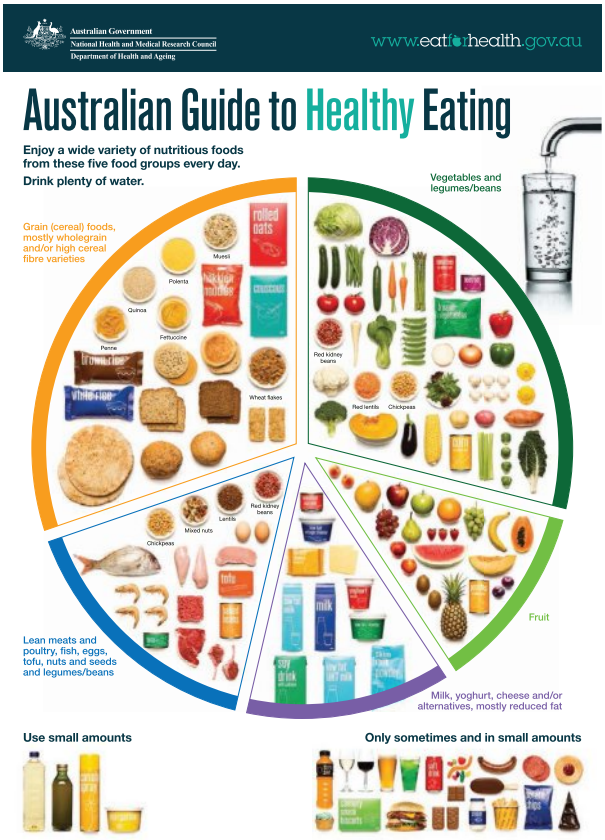

Figure 9.24: The *Australian Guide to Healthy Eating* (AGTHE) represents the proportion of the Five Food Groups recommended for consumption each day.

The *Australian Guide to Healthy Eating* is a visual representation of Guideline 2. It depicts the proportion of the Five Food Groups recommended for consumption each day. When planning healthy meals, households can utilise this model to ensure they are selecting a wide variety of healthy and nutritious foods.

Activity 9.9 (Practical): Healthy makeover

Read through the daily meal plan below and suggest changes that could be made to better align with the recommendations of the *Australian Guide to Healthy Eating*.

Breakfast	Lunch	Dinner	Snacks
Two slices of white bread with butter and strawberry jam Glass of milk	Meat pie	Fettuccini carbonara	Packet of chips Strawberry-flavoured yoghurt

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Figure 9.25: How colourful is your daily food intake? By eating a wide variety of fruits and vegetables of different colours and types, we are consuming a greater range of nutrients.

Sustainability

Caring for the environment means taking responsibility for our actions. Food plays a major role in this. Conscious decision-making about our food purchasing, preparation and practices can help support sustainable food systems, reducing our impact on the environment and our contribution to **climate change**.

Climate change
Any long-term trends or shifts in climate over many decades (CSIRO).

The following strategies can be implemented in the provision and preparation of food in the home to align with the household's sustainability values:

- Buy ingredients that are local and in season to reduce food miles.
- Purchase food in bulk rather than in single-use containers.
- Consume or freeze leftovers.
- Select items that are not sold in single-use plastics.
- Reduce meat intake.
- Purchase organic produce.
- Prepare a shopping list so over-purchasing does not occur.
- Store food correctly.
- Repurpose ageing fruit and vegetables rather than them becoming waste.
- Keep an inventory of the pantry so foods are not wasted.
- Select fresh foods over processed foods.
- Use reusable shopping bags.

Let's talk

What sustainable strategies does your household implement? If you could only achieve five from the list above, which ones would you prioritise?

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Chapter revision

- Our senses work together to gather information about food, but how we respond to this information is subjective. Our likes and dislikes of particular foods or the way they are prepared are formed by our personal experiences.
- Food allergies and intolerances are serious physiological conditions that must be taken into consideration when selecting or modifying foods.
- Social factors including income, education, available time, cultural norms, location and accommodation all influence whether a person chooses to produce a meal at home or buy a product from a commercial food service.
- In order to effectively plan meals, households need to consider their available time and budget. These constraints will impact their food choices. Several strategies can be utilised to reduce the total cost of groceries each week and maximise the available time to produce meals.
- The *Australian Guide to Healthy Eating* (AGTHE) is a visual model representing the proportion of the Five Food Groups that should be consumed each day. Health-conscious consumers can utilise this model when planning, purchasing and selecting food in commercial or domestic settings.
- Making conscious and considered food choices when planning and preparing household meals can reduce our impact on the environment and work towards creating more sustainable food systems.

Apply your knowledge

1 Identify meals and dishes that are often purchased from commercial settings rather than being produced at home due to their complexity and time.
2 Describe the difference between a food allergy and a food intolerance.
3 Explain why the sensory appreciation of food is subjective.
4 The cost and variety of fruit and vegetables found in stores are heavily influenced by location. Suggest reasons for this.
5 Explain how food literacy can be used to compare food products.
6 Discuss how the sensory appreciation of food is influenced by cultural norms.
7 Describe the *Australian Guide to Healthy Eating*.
8 Identify strategies that households with limited available time can implement when planning and preparing their weekly meals.
9 Describe two strategies a household can use to reduce the cost of its grocery bills.
10 Discuss ways in which households can adapt their behaviour in order to make sustainable purchasing choices.

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Practice exam questions

Question 1

Which of the following strategies works to best utilise a household's available time when preparing weekly meals?

A Reduce consumption of discretionary foods.
B Shop at greengrocers and wholesalers.
C Purchase fruit and vegetables in season.
D Cook in bulk.

1 mark

Question 2

Explain how income and accommodation can influence a person's decision-making in purchasing food from a commercial setting. **4 marks**

Question 3

Identify and describe one strategy that can reduce the cost of a household's grocery bill and that aligns with its values of environmental sustainability. **5 marks**

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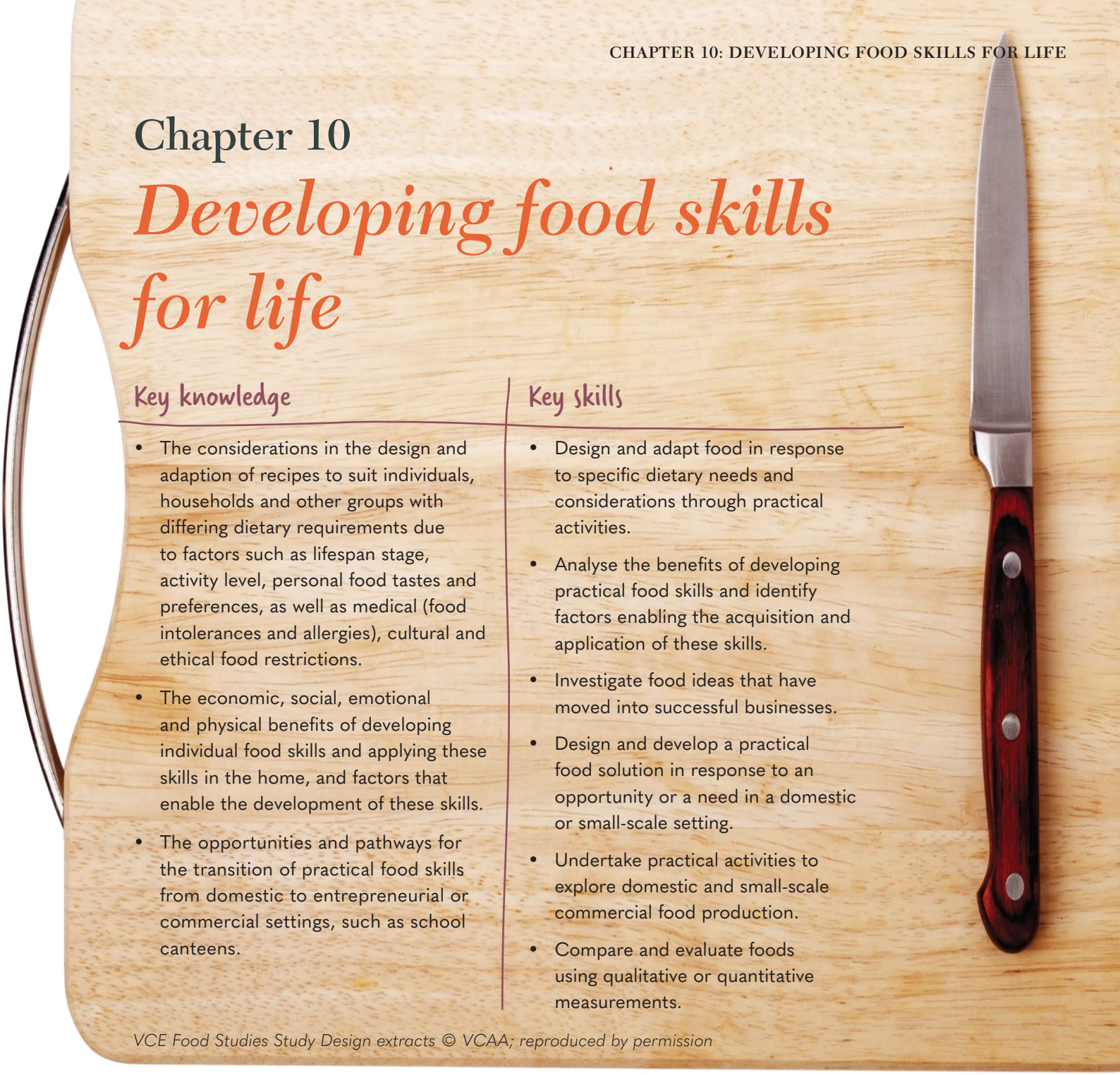
Chapter 10

Developing food skills for life



Key knowledge

- The considerations in the design and adaption of recipes to suit individuals, households and other groups with differing dietary requirements due to factors such as lifespan stage, activity level, personal food tastes and preferences, as well as medical (food intolerances and allergies), cultural and ethical food restrictions.
- The economic, social, emotional and physical benefits of developing individual food skills and applying these skills in the home, and factors that enable the development of these skills.
- The opportunities and pathways for the transition of practical food skills from domestic to entrepreneurial or commercial settings, such as school canteens.

Key skills

- Design and adapt food in response to specific dietary needs and considerations through practical activities.
- Analyse the benefits of developing practical food skills and identify factors enabling the acquisition and application of these skills.
- Investigate food ideas that have moved into successful businesses.
- Design and develop a practical food solution in response to an opportunity or a need in a domestic or small-scale setting.
- Undertake practical activities to explore domestic and small-scale commercial food production.
- Compare and evaluate foods using qualitative or quantitative measurements.

We all need food skills. What influences someone's love of food, knowledge and skill development? Understanding the needs of others, whether that is simply what they like and dislike, or responding to their food needs, is critical to creating a meal that can be enjoyed by all. For some, creating food is a passion that moves from feeding others in their home to becoming a business opportunity.

Video 10.1: Chapter Overview

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Get knowledge ready

1. List the benefits of having food skills.
2. Suggest how to adapt a chicken parmigiana for someone who is gluten intolerant, lactose intolerant, vegetarian and one year of age.
3. Discuss why is it important to be able to design and adapt recipes to suit the needs of individuals.

Managing and adapting recipes

Everybody, no matter what age, needs to ensure they are eating a nutritious and balanced diet. These dietary requirements can differ between individuals, age groups and populations, depending on a number of factors, including gender, age, state of current health and special dietary needs, such as food allergies or food intolerances. When planning and preparing food, these are important considerations to provide the most appropriate and enjoyable meal for all. For some, getting this wrong can impact their health or even be life-threatening.

Activity **10.1** (Inquiry): Considerations when designing meals

1. Develop a concept map that helps to highlight the different considerations that you need to take into account when designing or adapting meals for individuals, households and other groups. Continue developing your ideas as you complete this chapter.
2. Suggest related foods and ingredients for each branch that you record.

Needs across the lifespan

As we age, the nutrients needed by our body can vary due to the physical changes that are occurring as one grows. Some nutrients are required in greater quantities for specific purposes, such as the increased calcium needs of adolescents because of the formation of peak bone mass. It is important that these specific nutrient needs be understood and addressed through the correct consumption of food. Designing or adapting meals may be required to ensure the needs of individual lifespan stages are being met.

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Table 10.1: Nutrients across the lifespan

Lifespan stage	Significant nutrients required and reasons why	Considerations for meal planning
 **Figure 10.1:** Prenatal	• B group vitamins – release of energy • Calcium – developing foetal skeletal system • Carbohydrate – energy source • Folate – reducing the risk of neural tube defect • Iron – increased blood volume and red blood cell production • Protein – new foetal tissue growth and placenta • Vitamin C – connective tissue development and iron absorption	• Wholegrain cereals • Fresh fruits and vegetables • Low-fat protein sources such as lean meat, fish and chicken
 **Figure 10.2:** Infancy	• Calcium – needed for bone growth and development • Carbohydrate – energy source • Fat – energy source • Protein – rapid growth and development	• Breast milk – recommended for the first six months • Cereals • Fruits • Vegetables • Legumes • Dairy foods (not low fat) • Meat • Fish
 **Figure 10.3:** Childhood	• B group vitamins – release of energy • Calcium – needed for bone growth and development • Carbohydrate – energy source • Iron – red blood cell production • Protein – for continued growth • Zinc – assists muscle growth and the development of the immune system	• Wholegrain cereals and legumes • Fresh fruits and vegetables • Low-fat protein sources such as lean meat, fish and chicken • Nuts

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Lifespan stage	Significant nutrients required and reasons why	Considerations for meal planning
 **Figure 10.4:** Youth	• B group vitamins – release of energy • Calcium – forming peak bone mass • Carbohydrate – energy source • Iron – red blood cell production • Protein – for continued growth • Vitamin C – antioxidant, detoxifier and helps iron absorption	• Dairy foods – milk, cheese and yoghurt • Wholegrain cereals • Fresh fruits and vegetables • Low-fat protein sources such as lean meat, fish and chicken
 **Figure 10.5:** Adulthood	• Calcium – to prevent osteoporosis • Iron – red blood cell production • Protein – repair of body tissue and cells	• Low-fat protein sources such as lean meat and chicken, fish and liver • Low-fat dairy foods – milk, cheese and yoghurt • Leafy green vegetables
 **Figure 10.6:** Late adulthood	• Calcium – especially important for women because calcium loss can increase during menopause • Fibre – to prevent constipation • Protein – repair of body tissue and cells	• Low-fat dairy foods – milk, cheese and yoghurt • Wholegrain cereals • Fruit • Vegetables • Lean meat, chicken and fish

Let's talk

Are you making appropriate food choices for your stage of the lifespan? What nutrients might you be lacking? Discuss ways you could incorporate the nutrients you need into your everyday diet.

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Activity **10.2** (Practical): Design brief – local hospital

Your local hospital is reviewing its menu. It requires a full day's menu – breakfast, lunch, dinner and snacks – designed for each of the lifespan stages in order to best cater for all patients' needs. Choose one of the lifespan stages and design a menu that will ensure patients are consuming the nutrients needed. Once you have designed your menu, prepare a final recipe for one of the meals, then produce and photograph the final product solution. The hospital requires the recipe and photograph for its kitchen cookbook.

1. Choose your lifespan stage.
2. Prepare four criteria for success questions.
3. Research the dietary needs for your lifespan stage.
4. Brainstorm good food sources for all listed nutrients.
5. Research any other needs of your lifespan stage and the implications this may have for your menu. For example, some elderly people have false teeth.
6. Design your menu.
7. Determine which meal you will prepare.
8. Prepare a food order for your chosen product solution.
9. Produce your meal.

Evaluation

1. Describe the physical and sensory properties of your meal using sensory language.
2. Evaluate your menu and meal using your criteria for success questions.
3. Justify how your menu meets the needs of your chosen lifespan stage. Include information on which nutrients each food source provides and why you chose them.
4. Complete a SWOT (strengths, weakness, opportunities and threats) analysis, including comments on both the menu and meal you produced, and your planning and production performance.

Activity levels

Food is a source of nutrition and energy. Energy levels can vary greatly depending on your lifestyle, particularly activity levels.

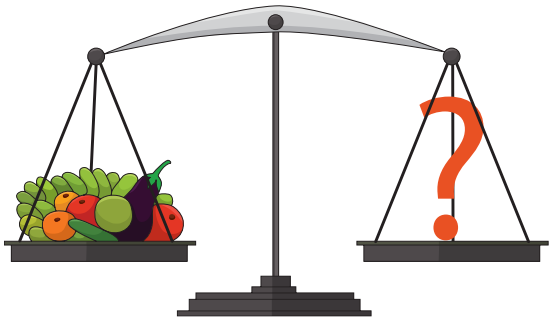

Figure 10.7: Energy balance is achieved when energy input (food) matches energy output (activity levels).

Eat for Health defines levels of physical activity as follows:

- **Sedentary** activities mainly involve sitting or lying down, using little energy.
- Light activities include standing and moving around in the home, workplace or community.
- Moderate activities require some effort, but you can still have a conversation – for example, walking briskly, gentle swimming or social tennis.
- Vigorous activities make you huff and puff, so talking is difficult – for example, jogging, aerobics and sports such as football and netball.

Activity **10.3** (Inquiry): Calculate your dietary needs

1. Go to the Eat for Health Calculators link on the Eat for Health website.
2. Use these calculators to estimate your energy needs (including your activity levels), nutrient requirements and the number of serves from the Five Food Groups you need every day.

Sedentary
Describes a lifestyle that involves little or no physical activity. It is usually characterised by spending long periods of time sitting.

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Activity **10.4** (Inquiry): Requirements of athletes

Plan a meal for an active AFL/AFLW player or another elite athlete.

1. Research the training schedule of an elite athlete.
2. Visit the Eat for Health website to determine their nutrient needs based on their activity levels.
3. Document their nutritional needs.
4. Design an after-training snack that is quick to make, portable for training and helps to meet the needs of the athlete.
5. Justify why your snack is the best choice.

Personal food tastes and preferences

Imagine if we all had the same tastes and preferences – how boring! Thanks to the range of foods available, we have such a variety of different foods to consume. When designing and planning meals, it is important to meet the needs of the people you are producing for, taking into consideration their food preferences and tastes.

Figure 10.8: The humble Brussels sprout has a poor reputation for being one of the most hated vegetables, but cooked correctly they are truly delicious – it is all about knowing how to cook them well to bring out their best. How do you feel about Brussels sprouts?

Let's talk

Discuss your favourite and least favourite foods with a partner or small group. Are there any similarities? Why do you think food tastes and preferences are an important consideration when planning meals? How can you make sure you are addressing the taste preferences of the people you are feeding?

Activity **10.5** (Practical): Flavoured yoghurt – what's your taste preference?

1. Taste a range of different yoghurt flavours to determine your flavour preference.
2. Draw up the table below reflecting the number of yoghurt samples you have to try.

Yoghurt	Appearance	Aroma	Taste	Texture	Rating (out of 10)

3. Graph the results of the class to see which flavoured yoghurt variety is preferred.
4. Explain why you rated your favourite flavour first.
5. Now you have tasted a variety of different flavoured yoghurts, will your yoghurt consumption stay the same or change? What type of flavoured yoghurt do you usually consume?
6. Discuss how understanding personal tastes and preferences allows you to adapt food in response to the people or purpose for which you are planning.

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Let's talk

Describe what happens in your house at mealtimes. Does everyone have a different meal that suits their preferences, or it is a common meal that all will enjoy? Suggest why this is the case. What approach would you take if you were the main meal provider? Justify your response.

Let's talk

Why do our personal tastes and preferences change over time? Can you describe a food that you once didn't enjoy but now eat happily? What do you do when you are served something you have not tried before? What about when you are given something you know you don't like?

Medical

It is well known that what you eat can either be protective for your health or a risk factor. Research shows that a diet high in fibre can have an integral role in preventing diseases such as bowel cancer, and a diet high in fat – especially saturated and trans fats – can be seriously detrimental to your health, resulting in obesity and other dietary-related diseases, such as type 2 diabetes and heart conditions. It is important as consumers that we are aware of what to eat to prevent dietary diseases and retain optimal health.

Reduced fat

Eating too much fat and too many fatty foods can lead to you becoming overweight/obese. The issue of **obesity** in Australia is on the rise. As discussed earlier in this chapter, fat is the most concentrated source of energy for the body but is not the preferred energy source. It is important for all Australians to reduce the fat that they are consuming in their everyday diets and ensure that the fats they are eating are 'good' fats. Saturated fat, mainly found in animal products such as meat, butter, cream and milk, contain **cholesterol** and are linked with many health concerns. A diet high in saturated fat has been linked with obesity, heart disease, high blood pressure, stroke and diabetes. Good fats, polyunsaturated and monounsaturated fats, can contribute positively to health, lowering cholesterol levels and the risk of heart disease.

Saturated fats – bad fats – are mainly found in animal products such as fatty meats, cream, butter, milk, pastries and deep-fried foods. Monounsaturated fats – good fats – are in olive oil, peanuts, hazelnuts, cashews and avocado; and polyunsaturated fats – also beneficial to the body – are in tuna, vegetable oil, sunflower oil, nuts and seeds.

Figure 10.9: Examples of foods high in saturated fats

Obesity
Having a BMI of 30 or over; being 20 per cent or more above your ideal weight according to height and sex.

Cholesterol
A fatty substance found in our cells.

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Figure 10.10: Examples of foods high in good fats (poly and monounsaturated fats)

Activity **10.6** (Inquiry): Finding fats

1 List a minimum of 10 food products that you would consider to be high in saturated fat.
2 For each product identified, determine whether the fat is from an animal or plant source.
3 Which foods are therefore highest in saturated fat content?

To reduce fat in the diet, saturated fats need to be reduced and good fats increased. Looking at product labels, making changes from high-fat to low-fat products such as milk, eating fresh rather than processed foods and using cooking methods that involve little or no fat are all simple ways to reduce fat intake. However, some reduced-fat products have an increased amount of sugar, which can also add to weight gain, so care should be taken when selecting fat-free or reduced-fat products.

Activity **10.7** (Inquiry): Reduce me

The following list contains foods high in fat. For each food, determine an alternative that could be used to reduce fat intake:

1 regular milk
2 coconut cream
3 cheddar cheese
4 macadamia nuts
5 vegetable oil
6 hot chips
7 sausages
8 butter
9 cream
10 pastry.

Let's talk

Come up with a list of your three top tips on how to reduce fat in your diet.

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Activity **10.8** (Practical): Nutritional analysis – baked not fried

Compare two similar products, regular potato chips, and chips with the statement 'baked not fried' – such as Smiths Better for You Chips.

1. Compare the nutritional analysis of the two products.
2. Complete a sensory analysis of both types of chips.
3. Which chip is a better choice from a nutritional perspective? Justify your choice.
4. Discuss why the 'baked not fried' product is available on the market. Include reference to the considerations to which this product has been designed to adapt.

Figure 10.11: Which chip is better? Are any chips better?

Activity **10.9** (Practical): Design brief – The Heart Foundation

The Heart Foundation is producing a selection of heart-healthy, reduced-fat recipe cards for local supermarkets. It has asked you to choose a popular meal and modify it to ensure it has a reduced fat content. Some of the recipe ideas for modification that the Heart Foundation has suggested could include fish and chips, pizza, hamburgers and fettuccini carbonara. The Heart Foundation would like to you trial your chosen recipe and produce a recipe sheet, including a styled photograph of the product to be considered as its podcast recipe. If you have access to the technology, the Heart Foundation is happy for you to submit this as a recipe demonstration podcast, as an alternative to the recipe card.

Tasks

1. Investigate recipes that have a high fat content.
2. Decide which recipe you will modify to be a reduced-fat version.
3. Research substitute ingredients for those high in fat that will work functionally in your chosen recipe.
4. Write three criteria for success questions from the design brief.
5. Prepare food order for your final product solution.
6. Produce and present your product solution.

Evaluation

1. Evaluate your production using your criteria for success questions.
2. Describe the physical and sensory properties of your final product. Discuss how it differs from its full-fat version.
3. List the ingredients that you determined were high in fat. Highlight what you substituted these for and justify your choice.
4. Explain any other modifications you made to the recipe.
5. Evaluate how successful you have been at completing this task.

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High fibre

Eating enough fibre is important for digestive and bowel health. To reduce the risk of bowel cancer, it is recommended that people increase their consumption of dietary fibre. A diet high in fibre contains at least 30 g of fibre a day. Most Australians are not meeting this requirement, but with some simple changes to boost fibre in food intake, they could ensure they are consuming a high-fibre diet.

Adaptions to boost your fibre every day include:

- choosing multigrain or wholemeal breads, pastas and cereal products
- starting your day with a high-fibre breakfast cereal
- eating fresh fruits and vegetables, including their skin for extra fibre
- including legumes in your meals, including salads, pasta dishes and soups
- choosing foods high in fibre by reading food product labels.

Figure 10.12: Choose multigrain or wholemeal breads, pastas and cereal products.

Figure 10.13: Start your day with a high-fibre breakfast cereal.

Figure 10.14: Eat fresh fruits and vegetables, including their skin for extra fibre.

Figure 10.15: Include legumes in your meals, including salads, pasta dishes and soups.

Figure 10.16: Choose foods high in fibre by reading food product labels.

Activity 10.10 (Inquiry): Adapt me

1. Change the following breakfast menu to one that is high in fibre, setting you up for a great day:
   - bowl of Coco Pops®
   - glass of orange juice
   - piece of white toast with strawberry jam.
2. Now plan a menu for the rest of the day, including snacks that will ensure fibre content is high.

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As discussed in Chapter 9, a food sensitivity can be an abnormal immunological or chemical reaction to a food, which can occur frequently and can be divided into two main types: a food allergy or a food intolerance. These physiological conditions often dictate what should be removed from a person's diet in order to avoid the short- and long-term effects of their condition.

Food allergies

A number of foods can cause a food allergy, leading to an adverse reaction for the person with the allergy. Common allergens – usually a protein – include eggs, milk, shellfish, sesame, soy and most commonly nuts, especially peanuts. Allergic reactions are easily avoided by making careful and appropriate food choices.

Activity **10.11** (Inquiry): Hidden allergens

Nuts or products possibly containing traces of nuts, as well as other allergens, are hiding in many unsuspecting products.

1 Check out your school kitchen pantry or visit your local supermarket to complete a hidden nut audit. All products that contain nuts or may contain traces of nuts are required by law to contain an allergen declaration on the product label. Check the labels of all the products you find. Copy the table below to record each product (add as many rows as you need).

Contains nuts	May contain traces of nuts	Nut free

2 Are you surprised by the number of items in each column? Suggest why.
3 How many products need to be avoided by people with nut allergies?
4 How many of these products were not on the list above?
5 Now complete this investigation again for a different allergen. Record your findings.

Food intolerances

Coeliac disease

As explained in Chapter 9, the treatment for coeliac disease is a permanent gluten-free diet. Unfortunately, even the slightest amount of gluten consumed can cause a reaction.

The long-term effects of consuming gluten if you are gluten intolerant include osteoporosis, due to calcium being unable to be absorbed, bowel damage and malnutrition, due to the prevention of nutrient absorption.

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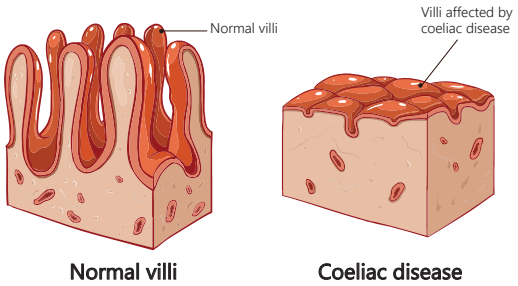

Figure 10.17: The image on the left shows the villi of a healthy small intestine. The image on the right shows the villi of a person who is gluten-intolerant. Note the inflamed and flattened villi, damaged by gluten.

Table 10.2: Foods for coeliac disease

Foods to be avoided ✗	Gluten-free food choices ✓
• Bread products • Pastry goods • Pasta products • Breakfast cereals • Flour products • Many snack foods containing gluten • Biscuits • Condiments containing gluten (such as some soy sauces) • Processed meat containing gluten, such as salami, ham and sausages	• Gluten-free products such as gluten-free flour, gluten-free pasta and gluten-free bread • Rice • Corn-derived products such as cornflour, corn tortillas and corn chips • Meat, poultry and fish • Fruit and vegetables • Most dairy products

Figure 10.18: Gluten is found in many foods, including bread, pastry goods, pasta, breakfast cereals, biscuits, many types of flour, snack foods, condiments and processed meats such as salami, glazed ham and sausages.

Let's talk

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

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Good sources of gluten-free foods

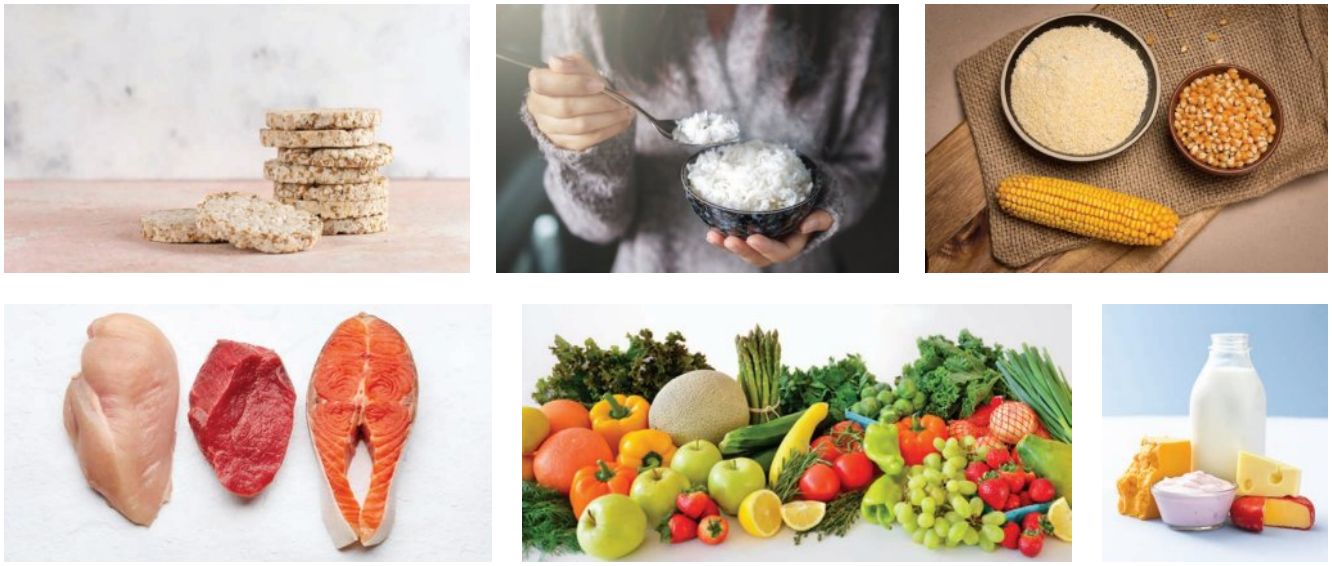

Figure 10.19: Gluten-free products include many varieties of gluten-free biscuits, flour, pasta and bread. Other gluten-free foods include rice, corn-derived products such as cornflour, corn tortillas and corn chips, fruit and vegetables, most dairy products, poultry, meat and fish.

Activity **10.12** (Inquiry): Avoiding gluten

1. Find a recipe you know well that contains gluten.
2. Modify this recipe by substituting the gluten ingredients with gluten-free ingredients, such as rice flour or gluten-free flour.
3. Prepare the recipe in class.
4. Analyse the physical and sensory properties of your production.
5. Write an evaluation of the role of gluten in the product you made and the similarities and differences of having to substitute gluten-free ingredients.

Lactose intolerance

As discussed in Chapter 9, lactose intolerance is a condition where the body is unable to digest lactose: the sugar found in milk and milk products. The body does not have sufficient amounts of the enzyme lactase to break the lactose down into simple sugars for digestion.

Let's talk

Scrambled eggs, pancakes, muesli bars and soups have been identified as foods to avoid if you are lactose intolerant. Discuss why this is the case. What ingredients would you be looking for on the food labels of these products?

Table 10.3: Foods for lactose intolerance

Foods to be avoided ✗	Lactose-free food choices ✓
• Milk • Chocolate • Cream • Ice-cream • Custard • Some cheeses • Many desserts, cakes and biscuits	• Lactose-free milk • Soy milk • Lactose-free ice-cream • Lactose-free chocolate

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Figure 10.20: Lactose can be found in many foods, such as milk, chocolate, cream, ice-cream, some cheeses, and many desserts, cakes and biscuits.

Figure 10.21: Some cheeses contain virtually no lactose so can be tolerated by many people with a sensitivity to lactose.

Figure 10.22: Yoghurt is generally digested well by the body due to its natural bacteria cultures, so can be consumed when on a lactose-free diet.

Figure 10.23: Lactose-free products.

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Activity **10.13** (Practical): Chocolate comparison

For this activity, you need to sample a piece of chocolate and a piece of lactose-free chocolate. Copy and complete the following table then complete the questions below.

	Appearance	Aroma	Taste	Texture	Chemical properties (ingredients)	Cost
Chocolate						
Lactose-free chocolate						

1. Outline the differences you tasted between the two samples.
2. Was there a difference between the textures of the two chocolates? Justify your response.
3. Explain the similarities and differences in the sensory properties of each chocolate.
4. Suggest who the target markets for each chocolate might be.
5. State which chocolate you preferred. Explain why.
6. There are a number of other lactose-free food products available on the market. List 10 more products and conduct a second trial comparing one of these products with the original.

Activity **10.14** (Inquiry): FODMAP intolerance

Building on your knowledge from Chapter 9, research the considerations when planning and adapting meals for a FODMAP diet.

1. Think back and record all the foods you consumed yesterday.
2. Adapt your day's food consumption to be suitable for someone who needs a FODMAP diet.

Activity **10.15** (Inquiry): Food intolerances

Copy and complete the table below by summarising food intolerances and researching suitable alternatives to the trigger foods.

	Coeliac disease	Lactose intolerance	FODMAP intolerance
Description			
Trigger foods			
Symptoms			
Suitable alternatives			

Activity **10.16** (Practical): Recipe adaptation

Working in pairs, adapt the following recipe so it is suitable for coeliac, lactose-free and FODMAP diets.

Prepare one quantity of your recipe adaption and one quantity of the recipe following. Compare the two products using a qualitative analysis tool.

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Parmesan crusted chicken with German cucumber salad

Parmesan crusted chicken

Ingredients


1 tablespoon parmesan cheese, grated


1 tablespoon dried breadcrumbs


1 tablespoon flour


1 egg, beaten


1 chicken breast


2 tablespoons olive oil

Method

1. Mix the parmesan cheese and breadcrumbs in a bowl. Place the flour and egg into separate bowls (you should have three bowls in total).
2. Coat the chicken in flour, shaking off the excess, then dip it in the egg and finally press firmly to coat with the breadcrumb mix.
3. Heat the oil in a frying pan. Add the chicken and cook on each side until golden brown. Make sure your chicken is thoroughly cooked through.
4. Place the chicken on a clean plate with absorbent paper to drain the excess oil.
5. Serve with the German cucumber salad.

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German cucumber salad

Ingredients


1 Lebanese cucumber, peeled and thinly sliced


2 tablespoons sour cream


1 teaspoon apple cider vinegar


1 teaspoon cream


½ shallot, finely chopped


1 teaspoon fresh dill, finely chopped


1 teaspoon fresh chives, finely chopped


1 teaspoon parsley, finely chopped


Salt and pepper to season

Method

1. Make the dressing by whisking the sour cream, vinegar and cream together.
2. Stir in the chopped herbs and shallot.
3. Add cucumber to the dressing and mix well.
4. Refrigerate for 20–30 minutes.
5. Garnish with fresh dill and a drizzle of olive oil.

Evaluation question

How would you adapt this recipe if you wanted to serve a similar meal to someone who is vegan?

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Cultural food traditions

Culture can influence the consumption of certain foods, provide the traditional methods used to prepare foods, and lead to restrictions placed on the consumption of certain foods, such as the exclusion of meat and milk from the diet. The innovative flavours and techniques that are used to prepare the abundant fresh foods we have in Australia make for a very special cultural food mix that is a part of everyday Australian food culture. Adaptions for culture could be simply reflecting and incorporating traditional foods, flavours and techniques, or they could involve understanding food requirements that may result in a food not being consumed for a religious or cultural reason.

Figure 10.24: Food customs are closely related to our cultural and religious backgrounds. These social customs are developed over time and often influence what is eaten at different times of the year.

Religious beliefs

The beliefs held by religious groups or different races influence food acceptability. Each religion has evolved with a set of rituals or customs that are important to the members of that religion. These customs and rituals can often be linked to food. For some religions, dietary restrictions can influence an individual's food choice, preparation and consumption of foods. Dietary restrictions associated with religion include foods that can and cannot be eaten, foods that must be avoided during certain times of the year or day, foods that cannot be eaten together, ways in which food should be prepared, and when and how long to fast.

Christianity

Christianity is one of the world's most widespread religions with a strong history and a number of different religious divisions.

- Strict Roman Catholics follow the dietary practice of not eating any food that comes from an animal on Fridays. For many, this practice has changed and is only followed on Good Friday, during Lent and before communion.
- The Orthodox religion has strict fasting days every Wednesday and Friday during Advent and Lent. 'Fasting' for this religion means avoiding certain foods, but not all foods. All animal products and fish are avoided on fast days. There are also a number of specific feast days when food is consumed.
- The Protestant faith has considerable diversity with little emphasis on fasting or holy days, except for Christmas and Easter.
- Seventh Day Adventists are lacto-ovo vegetarians; they also avoid tea, coffee and alcohol, as well as tobacco products, and they practise moderation.

Figure 10.25: Hot cross buns are traditionally made and consumed at Easter, with the cross on the bun a religious symbol.

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Judaism

People of the Jewish faith view themselves as chosen people of God, and as such have specific responsibilities to God. They believe that humans are capable of perfection, and each is responsible for their own actions – each of us chooses between right and wrong.

Bread is the major staple of those of Jewish faith and it is eaten at all meals. Bread symbolises the 'bread from heaven'. Oil is a symbol of prosperity and wine is a symbol of joy. The most common vegetables eaten are leeks, onions and cucumbers. Garlic, herbs, spices and cheese are food for the wealthy and red meat is only eaten for special feasts.

Kosher foods are the permitted foods, and these foods must have been prepared according to the kosher rules.

Kosher
Food that has been prepared so that it is fit to eat under the food requirements of the Jewish religion.

Table 10.4: Keeping kosher

To 'keep kosher ... '	Only animals with cloven hooves and that chew their cud may be eaten – for example, cattle, sheep, goats and deer.
	The eating of pigs is expressly forbidden, as they do not have a cloven hoof.
	Only those fish that have scales and fins may be eaten.
	Poultry may be eaten but carnivorous animals may not be eaten.
	Only meat from animals that have been slaughtered by the prescribed method may be eaten; this method requires a rabbi to supervise the slaughter of all food animals.
	Meat and dairy foods may not be eaten at the same meal.
	The sciatic nerve of an animal must not be eaten.
	The internal fat must not be eaten.
	All foods must be without blemish.

There are a number of holy days and festivals celebrated by the Jewish faith, which include:

- Sabbath – this begins at sundown on Friday and ends at sundown on Saturday. It is a day of rest in Orthodox practice and food must not be prepared on the Sabbath.
- New Year – 10 solemn, holy days from Rosh Hashanah (Day of Judgment) to Yom Kippur (Day of Atonement, a day of fasting), which occurs in September or October.
- Festival of Pesach (Passover) – this lasts for eight days during which time no **leavened bread** or flour is allowed.
- Sukkot (Feast of Tabernacles) – this is thanksgiving and occurs in September or October.
- Hanukkah (Festival of Lights) – this festival lasts for eight days and is usually in December. It commemorates the recapture of the Temple in Jerusalem in 169 BCE.
- Purim – occurring in February or March. This signifies the rescue of the Persian Jews from Haman by Queen Esther.

Figure 10.26: Chicken soup with matzo balls (also called Kneidlach). This meal is often considered traditional Jewish comfort food.

Leavened bread
Bread made by adding gas to the dough before or during the baking process to produce a lighter bread.

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Islam

Islam has a range of different food habits, which depend very much on local cultures – for example, Indonesian Muslims have different requirements from Arab Muslims. In Islam, eating is considered a matter of worship. An individual is to eat for survival and good health, and self-indulgence is not permitted. Food is to be shared and is not to be thrown away or wasted. Dietary restrictions are very similar to Jewish law with prohibitions on pork, carnivorous animals and blood. Specific rituals exist for the slaughter of animals, which is called **Halal**. Alcoholic beverages are forbidden by the Qur'an and the use of coffee, tea and tobacco is discouraged for the very religious.

Halal
Meat that has been slaughtered in a ritual way according to Islamic law.

Ramadan, which occurs in the ninth lunar month of each year, commemorates the first revelation to Mohammed by the angel Gabriel. It requires complete abstinence from food and water from sunrise to sunset for one month. Ramadan is followed by those who have reached the 'age of responsibility', which is 12 years of age for girls and 15 years of age for boys.

A number of holy days and festivals are celebrated by the Islamic faith, including:

- Eid al-Fitr (Feast of Fast Breaking) – the celebration of the end of Ramadan
- Nau-Roz (New Year's Day, primarily celebrated by Iranians) – the first day after the sun crosses the vernal equinox
- Maulud n'Nabi – the birthday of Mohammed.

Ghee
Butter that has had the impurities removed or clarified.

Figure 10.27: Gathering for Iftar in Ramadan together, breaking the fast by sharing dates

Let's talk

Have you ever noticed Halal products available in your local shops? Explain why it is critical for you to ensure you are purchasing and providing Halal products if you are planning and producing meals for Muslims. What could you do if you were unsure of the religion or culture of the individuals for whom you were preparing meals?

Hinduism

The caste system determines the social structure within the Hindu faith, including foods to be eaten. Most deeply religious Hindus are vegetarian because they believe the soul of an ancestor may be in an animal. Some Hindus do not eat eggs. The cow is sacred, and beef is therefore forbidden. Some people, especially those of the lower castes, will eat pork and chicken. Milk and **ghee** are sacred because they are products of the sacred cow; coconut is also sacred as the three 'eyes' of the coconut represent the three eyes of Shiva. Other forbidden foods include domestic fowl, salted pork, onions, garlic, turnips and mushrooms. Some Hindus also avoid red foods such as tomatoes and red capsicum because of their association with blood.

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Figure 10.28: Ghee is sacred in the Hindu faith.

Buddhism

Buddhists vow to abstain from killing or otherwise injuring living creatures, which is the general Buddhist precept of *ahimsa* (non-violence); however, eating meat in and of itself does not constitute a violation of Buddhist beliefs unless they are directly harming life, so some Buddhists do eat meat, and many eat fish, including the Dalai Lama.

Buddhist monks may fast twice a month on a new moon and full moon, and most monks do not eat after noon.

Activity 10.17 (Inquiry): Meal Adaptation

Adapt your favourite evening meal to make it suitable for your Hindu friend to eat for dinner at your house.

Ethical food restrictions

Vegetarianism

Individuals who are vegetarian usually have a strongly held set of beliefs that influence the foods they choose to eat. Vegetarianism has existed for many thousands of years and a number of factors influence a person's decision to become a vegetarian. Today vegetarians hold many and varied personal beliefs. Individuals become vegetarians for many different reasons, including an awareness of the importance of diet in maintaining health, an interest in Eastern philosophy and religion, and a concern over animal welfare and/or the degradation of the environment. Many people who call themselves vegetarians are actually semi-vegetarians. Some may have eliminated red meat because they dislike the taste but may choose to eat poultry or fish; others will still include fish in their diet. Individuals who use or consume no animal products at all, including honey, eggs or milk, and even leather in shoes, are known as vegans.

Not all vegetarian diets are alike. Some of the major vegetarian categories are outlined in Table 10.5.

Table 10.5: Types of vegetarian diets

Ovo-vegetarian	Eats eggs but no meat.
Lacto-ovo vegetarian	Eats dairy and egg products but no meat.
Lacto-vegetarian	Eats dairy products but no eggs or meat.
Vegan	Eats only food from plant sources and no meat, eggs or dairy products. They also do not use any items made from animals, such as leather.

Activity 10.18 (Practical): Product evaluation

In response to individual dietary needs and the adaption of meals, a range of meat-free 'like meat' products are now available in supermarkets, such as chicken-free chicken and plant-based 'meat'.

Using two or three products, develop your own qualitative and quantitative tests to compare these products. You might consider also including the meat they are mimicking in your testing.

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Individual food skills

The family or household has a major influence on food planning, preparation and consumption. Throughout the lifespan of an individual, it is mainly the family that influences the development of food skills and knowledge, with a major impact on nutritional knowledge, exposure to the kitchen and the development of food skills.

Figure 10.29: The family or household has a major influence on food planning, preparation and consumption.

Activity **10.19** (Inquiry): Development of food skills

1. Develop a mind map to show how you have developed your food knowledge and skills.
2. Compare your mind map with those of your classmates and add to your map.
3. Suggest the factors that have enabled you to develop these skills.
4. Discuss the benefits of having these skills now as a young person and in the future.

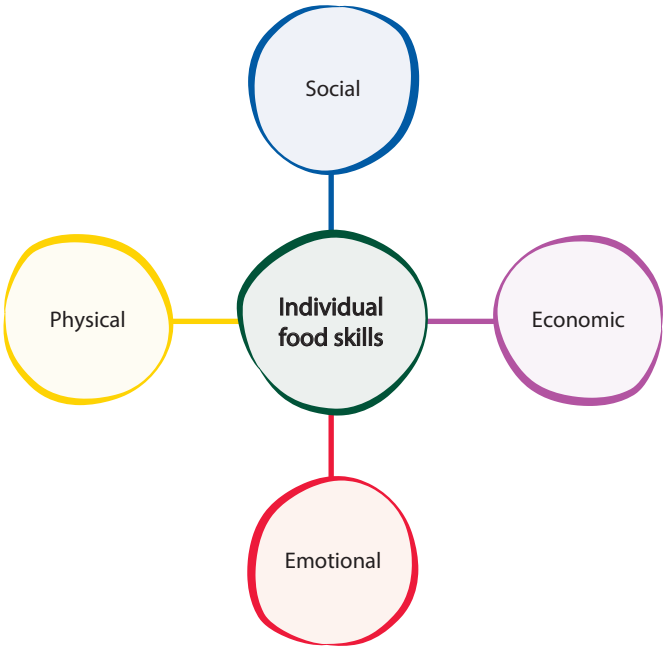

Figure 10.30: Factors that enable the development of individual food skills.

Food preparation skills are difficult to acquire for some people, unless they do a class, such as the subject you are currently studying. Imagine if you did not know how to use a knife. Simple skills can assist in so many ways. A person who is skilled in food preparation can plan and prepare a variety of food products and is knowledgeable and confident with several food preparation techniques. They often also know how best to cook a wide range of foods and have an understanding of the nutritional value of these foods. Variety and willingness to try new meals and food items also enhance the final outcome.

Economic

Knowing food ingredients and how to cook them definitely saves you money. Understanding how to use cheaper protein sources in your everyday diet, such as tougher cuts of meat or dried legumes, ensures an economically balanced diet. Understanding seasonal produce means buying fresh ingredients at their cheapest price.

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Figure 10.31: Knowing how to use up what is left in the fridge to reduce waste is an economic gain for individuals and families.

Let's talk

Figure 10.32: A Thermomix is a very expensive piece of kitchen equipment.

Do households need a Thermomix to prepare food in the kitchen? What skills and knowledge does it replace? How did we cook without one in the past? What has the Thermomix replaced? Is it worth it for the price? You decide.

Activity **10.20** (Inquiry): Understanding meat

1. Research which cuts of an animal are tender and which are considered to be tough. Explain why this is the case.
2. Compare a cost analysis for the different cuts of meat. Suggest why some are more expensive than others.
3. Suggest why the tougher cuts of meat are less popular with consumers than the more tender cuts.
4. Explain how it is possible to turn the tougher cuts of meat into tender portions to consume.
5. Discuss the economic benefits of understanding meat cuts and how best to use them.
6. Analyse factors that enable the development of food skills and knowledge required for understanding meat cuts and how to use them.

Activity **10.21** (Inquiry): Create a meme

Use your skills and knowledge to design a meme that could be displayed to provide tips for how to save money in the kitchen or reduce your food budget.

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Social

Our food skills in planning and preparation of a meal or food item are a result of what individuals have learnt from family members. Parents and grandparents or the elders of the family often pass their cooking skills on to their children and grandchildren.

When planning a meal or food item, we always consider our own likes and dislikes. These are developed as a result of family influences, as are the foods that are available to individual family members throughout the lifespan.

Figure 10.33: Who taught you to cook?

Figure 10.34: Social media has fast become an emerging avenue for the development of food skills and knowledge, especially for our young people. Have you watched any cooking TikToks or Cookalongs?

Figure 10.35: School Home Economics education has played an important role in developing food skills and knowledge within our community.

Let's talk

Do you think there is enough education in schools developing food literacy, skills and knowledge?

Emotional

Research suggests that those people who prepare a family meal and sit down to the table to eat a meal together as a family are more likely to eat foods that are healthier. Those families who do not prepare a family meal or sit at the table and eat together are more likely to eat foods that are higher in saturated fat and these foods are often not made with fresh ingredients.

Figure 10.36: Family dinner

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Let's talk

Discuss how cooking for someone can make you feel. How does it feel when someone cooks something especially for you? List any foods to which you have an emotional connection. Explain their story. Suggest the emotional benefits of developing individual food knowledge and skills.

Activity **10.22** (Inquiry): Emotional response to food

1. Search YouTube to watch the following Cadbury advertisements:
   - Mum's Birthday: Cadbury
   - Cadbury Dairy Milk – Bus 30s
2. Discuss the emotional influence of food shown.
3. Suggest what it is about the food shown that makes us feel better and how this occurs. What if the food offered were a carrot?
4. Outline the emotional benefits of developing food knowledge and skills.
5. Suggest where these skills are developed.

Physical

Food knowledge and skills are practical. They involve the understanding of ingredients, how best to prepare them and the use of different tools and equipment in the kitchen.

There are many physical benefits of developing food knowledge and skills, such as preparing healthy meals that optimise growth and development, support immune health, reduce the risk of illness and disease, and keep us active rather than sedentary during the preparation of foods.

As we become more competent in food preparation, our skills develop. Consider the physical skills required to julienne a carrot. This precision cutting technique would be very difficult to achieve as a child, but as we age and our fine-motor skills develop, so do our food preparation abilities. However, we don't just wake up as a teenager with these skills: practice makes perfect.

Let's talk

Make a list of all the physical skills you utilise when cooking.

Activity **10.23** (Inquiry): 25 skills every cook should know

Search online for the BBC Good Food Blog to read the article '25 skills every cook should know'.

1. Identify any skills on this list that you don't currently know.
2. Suggest why you think these have been determined as the top 25.
3. Explain how these physical food skills are developed.
4. Choose two skills and annotate them with the economic, social, emotional and physical benefits of these skills.

Activity **10.24** (Practical): Cooking demonstration

Choose your favourite family meal to prepare as a cooking demonstration.

Video your demonstration and share with your class.

Highlight the physical food skills and knowledge you need to be able to prepare this meal.

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Activity **10.25** (Inquiry): Review your skills

1 Annotate the parmesan crusted chicken with German cucumber salad recipe from page 316 with the specific food skills and knowledge required to prepare the meal.
2 Discuss the benefits of this knowledge when planning and preparing food.

Let's talk

Figure 10.37: Passata Day is an annual Italian tradition involving families gathering to prepare, cook and bottle their tomato sauce for use in cooking throughout the coming year.

Passata making is a whole-family activity, with family members coming together to make enough sauce to last the year at the end of the tomato season. But this isn't just a social occasion.

Discuss the economic, emotional and physical benefits of this food custom and how such food skills and knowledge are developed.

Activity **10.26** (Inquiry): Factors influencing food skills

Develop a mind map to show the factors that have helped to develop food skills and knowledge alongside the economic, social, emotional and physical benefits of developing these skills.

From the domestic to the commercial kitchen

Many food business have started on the basis of a food item they want to take from their home to manufacture in commercial quantities, or because someone has realised that there is a gap in the market and wants to seize the opportunity to enter the market.

Figure 10.38: Raph Rashid launched his burger truck Beatbox Kitchen in 2009 and now runs four separate food businesses.
Source: Courtesy of Beatbox Kitchen

Figure 10.39: Daniel Bartalotta established Daniel's Donuts in 2015 and has grown his business over time, with 23 stores operating in 2022.
Source: Courtesy of Daniel's Donuts

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Activity **10.27** (Case study): Recipe to riches

Watch *Recipe to Riches,* Season 2, Episode 6: Bite Size on ClickView, or search online.

This episode sees three home cooks attempting to develop their small-bites product from a domestic kitchen to make it suitable for a commercial supermarket setting.

1. Name the three products that have been chosen by the judges as the three best bite-sized products.
2. What is another name for 'batch up'?
3. Describe how the recipes came to be developed.
4. Suggest why Maria was worried about using the equipment.
5. Explain why Maria started making chutneys. Suggest how her individual food knowledge and skills enabled her to do this.
6. Describe the inspiration for sausage rolls.
7. Suggest why choosing the right commercial equipment is an important skill.
8. Explain how individual skills and knowledge are developed during this episode.
9. Discuss the challenges involved in taking a product from the domestic kitchen to the commercial environment.
10. Suggest the role of the success of the actual product compared with the influence of other factors involved, such as marketing and product launch.
11. Which product would you have picked to be the winner? Justify your choice.

Activity **10.28** (Practical): Batch up – gyoza

Apply your food knowledge and practical food skills to produce the following gyoza recipe for domestic and small-scale commercial food production.

1. Scale up this recipe from the domestic to the commercial setting. Perhaps you might be able to sell these products in your school canteen as a special?
2. Determine what batch-up quantity you will produce.
3. Calculate the recipe quantities, determine the cooking equipment required and establish any changes to preparation methods you will need to make to adapt domestic to commercial.
4. Produce your commercial quantity.

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Gyoza

Ingredients

Gyoza


100 g pork mince


8 wonton wrappers


⅛ small cabbage or ¼ cup, finely shredded


¼ teaspoon sesame oil


1 teaspoon soy sauce


½ garlic clove, crushed


1 cm piece ginger, peeled and grated


1 teaspoon vegetable oil

Dipping sauce


¼ teaspoon sesame seeds


1 tablespoon teriyaki sauce


¼ teaspoon sesame oil


Sliced spring onion, for garnish

Method

Gyoza

1. Combine pork mince, cabbage, soy sauce, sesame oil, garlic and ginger in a bowl. Mix well.
2. Divide into eight portions, each of which should be roughly a heaped teaspoon.
3. Place the mixture portion onto one half of a wonton wrapper.
4. Brush the edge with cold water and fold over remaining wrapper to cover filling. Press the edges together to seal.

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5 Heat the vegetable oil in a large frypan.

6 Arrange the gyoza in the frypan and cook until bases are brown, about 1–2 minutes.

7 Add ½ cup hot water and cover with the lid.

8 Cook for 4–5 minutes. Add more water if needed. Allow to stand for 1–2 minutes or until gyoza come away from the bottom of the frying pan.

9 Serve with dipping sauce.

Dipping sauce

1 Combine all ingredients together in a bowl. Mix well.

Evaluation questions

1 Discuss the challenges of converting a domestic recipe to a commercial quantity. What went well and what would you do differently next time?

2 Describe the sensory properties of the final product. Were there any differences between the domestic quantity produced and the larger commercial quantity?

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Activity **10.29** (Case study): School canteen

Search online for the news article, 'Food truck business staffed by asylum seekers breathes new life into school canteen'. Read the article, then answer the following questions:

1. Outline how the school canteen at Warwick Senior High School is unusual.
2. Describe how culture has influenced the menu planning of the canteen.
3. Explain how this canteen approach is also developing the individual food knowledge and skills of students.
4. Discuss the benefits of a social enterprise school canteen.
5. Outline the benefits of being involved in the canteen: economic, social, emotional and physical.
6. Research any other exciting opportunities happening in school canteens across Australia.

Activity **10.30** (Case study): Carman's kitchen

Visit the Carman's Fine Foods website to read the Carman's story, then answer the questions below.

1. Describe how Carolyn Creswell become involved in the muesli business.
2. Highlight the steps taken to grow the Carman's business into a household name.
3. Outline what Carolyn has learnt about business.
4. Explain how her food knowledge and skills enabled her to move into commercial food production.
5. Have you ever eaten any Carman's products?

Figure 10.40: Carman's was founded in 1992 by Carolyn Creswell while she was still at university.
Source: Courtesy of Carman's Fine Foods

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Activity **10.31** (Practical): Design brief – school canteen

Identify an opportunity to develop a new food item for inclusion on your school canteen menu. It needs to be popular, profitable and suitable for the lunch market at your school.

Investigating

1 Evaluate your food canteen menu. Consider the range of foods available and the adaptions of items to suit the needs of your school population.
2 Develop a survey for the students in your school to identify a gap in the school canteen market.

Criteria for success

3 Prepare three criteria for success questions based on the brief and your market research.

Designing and producing

4 Design a practical food solution.
5 Prepare a prototype of your design solution.

Evaluation

6 Design a survey and product test to gather feedback on your prototype from your target market.
7 Outline any modifications still required to make the shift from domestic to commercial production.
8 Determine what quantities would be needed on a daily basis for sale in your school canteen. Calculate these quantities.
9 Determine the cost of your product and the price you will sell it for. Calculate your profit.

Activity **10.32** (Inquiry): Food entrepreneurs

1 Research an example of an entrepreneurial success, moving from the domestic to the commercial setting. You may like to choose one of the following entrepreneurs, or select one of your own:
   - Beatbox Kitchen – Raph Rashid
   - Carman's Kitchen – Carolyn Creswell
   - Bistro Morgan – Morgan Hipworth.
2 Prepare a presentation to share their story. Suggest what you think are the keys to their success. Describe any lessons that can be learnt from their experience or the thoughts they share for success.

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Chapter revision

- Meal planning involves more than simply making decisions about what to cook. It also includes understanding nutritional needs across the lifespan and activity levels, cultural and ethical food understanding, food intolerances and allergies, and personal tastes and preferences.
- Recipes can be adapted with the substitution of ingredients to make them suitable for others rather than alternative recipes being sourced.
- There are economic, social, emotional and physical benefits of developing individual food skills and being able to apply these skills in the home.
- Individual food skills and knowledge are developed in many ways, including learning from family members and loved ones, education at school, personal research including learning from social media, and having a passion for food.
- Many commercial food products have been created in the kitchen. Pathways and opportunities can include finding a gap or need in the market and trialling the idea before branching out on a larger scale.

Apply your knowledge

1. Define coeliac disease and suggest which ingredients you need to avoid or adapt when planning meals to meet these dietary needs.
2. Discuss why it is important to include fibre in your diet. Suggest five ways to increase fibre intake.
3. Explain how you might need to adapt your everyday family dinner to meet the cultural needs of friends coming over.
4. Develop a list of factors that need to be considered when planning and preparing a meal for each vegetarian diet.
5. Discuss how the level of skill and the equipment you have available at home and at school can influence the preparation of a product.
6. Describe how an opportunity to take a practical food skills from the domestic kitchen to a commercial setting may emerge.

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Practice exam questions

Question 1

There are a range of benefits in developing individual food skills. These include:

A being self-sufficient.
B being able to cook for one.
C economic, social, emotional and physical.
D ethical, sustainable, citizenship and sovereignty.

1 mark

Question 2

Your best friend, who is coeliac, is coming over for dinner this Friday, which is homemade pizza night. They are really excited as you always talk about pizza night. Explain the adaptions you would need to make to the evening meal to ensure they are able to enjoy homemade pizza with you. **4 marks**

Question 3

Discuss how understanding personal tastes and preferences allows you to adapt food in response to the people or purpose for which you are planning. **6 marks**

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Chapter 11
Cooking food

Key knowledge

- The principles of heat transfer in cooking techniques and the effects on the properties of food of dry and moist heat, electromagnetic radiation, mechanical action, enzymes and changes to pH.

Key skills

- Analyse the benefits of developing practical food skills and identify factors enabling the acquisition and application of these skills.
- Use accurate food science terminology and techniques to describe and demonstrate, through practical activities, chemical and physical changes to the properties of food.

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Video 11.1: Chapter Overview

When we prepare and cook food, we change the properties of the original food item. The cooking of food improves its digestibility, appearance and taste. Consider a chicken breast – think about the changes that occur if we poach, fry, roast, barbecue or stir-fry the meat. Understanding how heat and cooking techniques affect foods is important for ensuring the foods we prepare are pleasing to our senses. Most importantly, though, we need to ensure the food we prepare is safe to eat. When food is heated to 75°C – that is, outside the temperature danger zone – bacteria are killed and spoilage of food is delayed.

Get knowledge ready

1. **List three methods of heat transfer.**
2. **Name and describe a cooking technique that uses water and one that uses oil. Suggest one food that is best suited to each method.**
3. **Explain why practical food skills and knowledge are important for the sensory properties of the foods we prepare.**

Let's talk

List all the foods that look and taste better after cooking.

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Figure 11.1: Consider a raw and a cooked egg. Through cooking, mechanical action and altering the pH, we are able to make changes to the chemical and physical properties of the egg.

Figure 11.2: Consider the loaf of bread before being cooked and after. There is a definite sensory advantage to the cooking techniques we have available to us.

The cooking of food

Preparing and cooking food results in a variety of changes to the food. Cooking is about accurate measurements, combining the right ingredients in the correct quantities and ensuring that the food is safe and edible to eat. It can also improve the physical and sensory properties of the ingredients.

A number of different techniques can be used to cook foods, including:

- **dry methods of cooking**: roasting, baking, grilling and frying
- **moist methods of cooking**: boiling, poaching, blanching, steaming and stewing
- combination methods of cooking, such as microwave cooking, which uses **electromagnetic radiation**

Each of these cooking techniques involves one or more of the methods of heat transfer. The effects on the properties of the food alter, as does the length of time to cook each food item. The cooking techniques chosen to prepare different foods will depend on a number of factors, including:

- the origin of the food – whether it is plant or animal based
- the texture of the food
- the size or portion of the food
- the condition of the food – whether it is fresh, frozen or dehydrated
- access to tools and equipment
- the level of skill of the food handler
- the time available for food preparation and cooking.

Dry methods of cooking
Cooking techniques where the heat is transferred to the food without moisture. These methods of cooking involve high temperatures.

Moist methods of cooking
Cooking techniques which use liquid (such as water, stock or wine) or steam to transfer heat to food.

Electromagnetic radiation
A type of energy that takes many forms, including visible light. In cooking, thermal (infra-red) and microwave radiation are its main applications.

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Activity 11.1 (Inquiry): What is the most suitable cooking technique?

Use your current knowledge of food preparation and cooking techniques to determine the most suitable cooking technique to:

1. cook an egg
2. cook a potato
3. warm up a mug of milk
4. prepare a whole chicken to eat
5. cook a cake
6. reheat last night's left-over dinner.

Activity 11.2 (Practical): Be the cook!

You have arrived home after school. The other members of your family are busy this afternoon and you have been tasked with preparing tonight's dinner. You have in the fridge and pantry to use: a piece of left-over leg of lamb, a packet of fresh pasta and homemade pasta sauce, two-day old bread and cheese.

1. Describe what you will prepare with these ingredients.
2. Explain the reason for your selection. In your response, consider each of the factors that influence the choice of cooking techniques.
3. Discuss the reasons why time has such a great influence on food preparation.
4. Do you believe a nutritious balanced meal can be prepared in a minimal amount of time? Explain your response.
5. List the cooking technique you will use to prepare the meal. Justify the reason for your selection of cooking technique.
6. Prepare the meal and evaluate the sensory properties.

Conduction
The transfer of heat between substances that are in direct contact with each other – for example, a frying pan.

Convection
The transfer of heat through circulation of hot fluid (water, oil, air or steam) that surrounds the food. As the fluid warms, it becomes less dense and rises. Cooler, denser fluid above then sinks down towards the heat source, creating circular convection currents.

Radiation
The indirect transfer of heat by electromagnetic waves, which behave like light, heating the surface of food but not penetrating it. The interior of the food is heated by conduction from the surface. Radiation is used in grilling, barbecuing and microwaving.

Principles of heat transfer

The application and transfer of heat allow food to be cooked so it is edible and safe for consumption. The heat that is transferred to and through food involves one of three principles of heat transfer:

1. **conduction**
2. **convection**
3. **radiation**.

Note that these principles may be combined. When boiling pasta for example, heat transfers by conduction from the heating element through the metal wall of the saucepan into the liquid closest to it, then convection transfers the heat through the water to the pasta, and finally from the surface to the centre of the pasta by conduction again.

In barbecuing, heat transfers from the heat source by radiation and air convection, which then disperses into the atmosphere.

Food can also be cooked through the action of another form of electromagnetic radiation, namely microwaves. These do not transfer heat, but when they penetrate food, their energy is converted into heat.

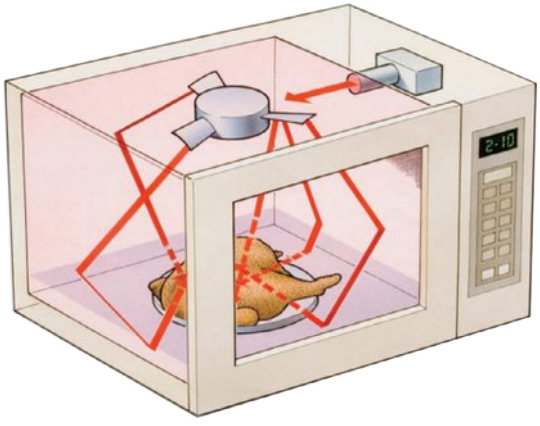

Figure 11.3: In a microwave oven, microwaves are generated and aimed at a rotating reflector which reflects the rays into the food. The rays cause water and other molecules to vibrate and heat up.

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Table 11.1: Principles of heat transfer

Principle of heat transfer	How is the heat transferred?	Picture it
Conduction	Heat is transferred between substances that are in direct contact with each other – for example, from molecules of a hot frying pan to molecules of food.	  **Figure 11.4:** Have you ever burned yourself on a hot pan because you touched it? This is a great example of direct conduction. Heat has been transferred through matter – to your skin!
Convection	Heat is transferred through circulation of hot fluid (water, oil, air or steam) that surrounds the food. As the fluid warms, it becomes less dense and rises. Cooler, denser fluid above then sinks down towards the heat source, creating circular convection currents. The transfer of heat occurs by the actual movement of the warmed fluid in the convection current, but heat is transferred by conduction where fluid is in contact with solids.	 **Figure 11.5:** The cooking of pasta in a saucepan of boiling water. Think about how the pasta moves around in the saucepan as the heat moves the liquid that surrounds the food.

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Principle of heat transfer	How is the heat transferred?	Picture it
Radiation	Heat is transferred indirectly by electromagnetic waves, which behave like light, heating the surface of food but not penetrating it. The interior of the food is heated by conduction from the surface. Radiation is used in grilling, barbecuing and microwaving. In order for food to be heated through, radiation and conduction are necessary.	  **Figure 11.6:** A great example of this is the cooking of a piece of steak on a barbecue or melting cheese underneath a grill.

Activity **11.3** (Practical): Create your own investigation – potatoes three ways

A number of different cooking techniques can be used to cook potatoes. What cooking techniques do you know of to cook potatoes?

1 Work in pairs to prepare potatoes using the following methods:
   - **a** water that is boiling in a saucepan on the stove top
   - **b** the microwave
   - **c** oil, a frying pan and the stove.

2 Three principles of heat transfer are used in each of the methods of cooking potatoes listed above. Create your own practical investigation, addressing the following:
   - **a** how to prepare potatoes using each of the methods listed
   - **b** which method uses conduction, convection and radiation
   - **c** how heat is transferred in each of the methods
   - **d** what tools and equipment are required for each method
   - **e** what amount of time is required to prepare each method
   - **f** what safety recommendations need to be followed for each method
   - **g** which method produces the 'best' outcome in terms of the sensory properties of the potato.

Prepare a report of the findings of your investigation. Make a decision about the best method to cook potatoes, then explain how the sensory properties have influenced your findings.

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Techniques for cooking foods

Food is cooked by the transfer of heat – this heat may be either dry or moist. Application of the correct temperature and the right amount of time in terms of heat transfer involves the development of practical food skills. It is important to experiment and have multiple experiences with food preparation, as this allows good decisions to be made to ensure that food is cooked correctly to enhance flavour, taste and visual appeal. The **acquisition** and application of these skills also ensure that when it is served, the food is free from micro-organisms and therefore safe and pleasurable to eat.

Figure 11.7: Food is cooked by the application of heat.

Acquisition
The act of obtaining or gaining a new skill.

Tenderising
Techniques for breaking down collagens in meat to make it more palatable and tender.

Dry heat cooking techniques

This technique of cooking involves the food being exposed to a source of heat or being subjected to heat in the absence of water or steam – for example, being placed in an oven. It is important to think about food selection when using dry heat cooking techniques. Dry heat adds crispness, colour and flavour, and reduces moisture content; however, it does not **tenderise** meats.

Let's talk

Develop a list of tender cuts of meat that could be cooked using the dry heat cooking techniques.

If meat is not tenderised by the use of dry heat, how does this impact the properties of foods? Why don't we cook the tougher cuts of meat using dry methods?

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Table 11.2 is a summary of the dry cooking techniques. Complete the third column of the table in your notebook to list the food products that are cooked using each of the dry cooking techniques.

Table 11.2: Dry cooking techniques

Dry cooking techniques	A summary explanation	Food products that are cooked using the dry techniques of cooking
Roasting	• **Roasting** is a cooking technique that utilises dry heat, whether from an open fire, oven or other heat source. • Roasting is generally carried out in an oven where the food is surrounded by heat and the food is coated in fat or oil. • This method of cooking causes **caramelisation** of the surface of the food. This enhances the appearance and flavour of the food. Sucrose caramelises fastest at 170–180°C. • The browning reaction can also be the result of the **Maillard reaction**. This changes the flavour as well. The Maillard reaction proceeds fastest at 165°C.	 **Figure 11.8:** Roasting meat on open fire  **Figure 11.9:** Roasting pumpkins in the oven  **Figure 11.10:** Caramelisation and Maillard reaction on the surface of food caused by roasting

Roasting
The cooking of food by a very hot air current that circulates around the food which is coated in fat or oil.

Caramelisation
The heating of sugar or foods containing sugar until a brown colour and characteristic flavour develop.

Maillard reaction
Browning that occurs when an amino acid of a protein reacts with sugar to produce a brown colour.

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Dry cooking techniques	A summary explanation	Food products that are cooked using the dry techniques of cooking
Baking	• When food is baked, hot air is created and circulated. High temperatures are generally created by an oven. Unlike roasting, the food is not coated in fat or oil. • The dry heat of **baking** changes the structure of the starch granules found in food. This causes the surface of the food to brown. These changes that occur to give the brown crust on the surface of the starchy food are called **dextrinisation**. • In baking, the Maillard reaction or browning also occurs when an amino acid of a protein reacts with sugar to produce a brown colour. Dry heat is required for this process to occur.	 **Figure 11.11:** Bread baking in an oven  **Figure 11.12:** The starch of the muffins is broken down to dextrins when dry heat is applied, resulting in a golden-brown crust.  **Figure 11.13:** Flat bread cooked in a hot charcoal oven known as a tandoor.
Air fryers	• Air fryers do not fry, basically they are mini fan ovens which circulate very hot air rapidly around the food. This creates a crispy surface texture similar to frying, especially if the food is coated in oil, as is done with roasting.	 **Figure 11.14:** Corn ribs cooked in an air fryer.

Baking
Cooking of food in an oven by currents of hot air surrounding food with no oil or fat coating the surface.

Dextrinisation
The process that occurs when starch is exposed to dry heat; the starch is broken down to dextrin, resulting in a change in colour to golden brown.

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Grilling
The cooking of food by placing the food under the heating element of the griller, using dry heat.

Frying
The cooking of food by conduction of heat in fat or oil. The food is cooked until crisp and golden.

Lard
A saturated fat used in pastry and dough or for shallow and deep frying. It produces a crisp texture.

Dry cooking techniques	A summary explanation	Food products that are cooked using the dry techniques of cooking
Grilling and barbecuing	• **Grilling** is a very quick method of cooking. The food usually has to be turned at least once while it is cooking. • This method of cooking is generally carried out underneath an electric or gas grill. Food can also be cooked above glowing charcoals or an open fire – this is referred to as barbecuing. • High temperatures are used to cook foods and the food is positioned close to the heat source. • Tender cuts of meat are best grilled or barbecued. This method of heat transfer cooks food quickly and can result in a charred surface. • Foods that are grilled have a distinct flavour because the grilling sears the exterior of the meat and seals in the juices. The outside of the food can be charred and develop a crust.	 **Figure 11.15:** Cooking on the open flames of a barbecue  **Figure 11.16:** Tender meats should be chosen for grilling.
Frying	• **Frying** foods involves cooking them in fat, which includes oil, butter and **lard**. Food is totally or partially immersed in hot fat and the food is cooked by coming into contact with it; the heating of the food is rapid since the fat can be heated to 200°C or more. • The temperature of the fat or oil is extremely important as it ensures that the outside of the food is sealed in order to prevent the food soaking up the heated oil like a sponge.	 **Figure 11.17:** Lard is often used to deep fry foods due to its ability to be heated to a very high temperature and its ability to create a crispy texture.

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Dry cooking techniques	A summary explanation	Food products that are cooked using the dry techniques of cooking
Frying (continued)	There are four main types of frying: 1 **Deep frying:** This cooking method involves immersing food completely in hot oil. Foods that are deep fried often have an outside crumb or batter; this helps to produce a crisp texture and also protect the food from the high temperature of the fat. This method of cooking results in loss of some important nutrients and increases the saturated fat content of the final product. Note that the heat is transferred by convection within the oil used in all but the shallowest frying. 2 **Dry frying (i.e no fat is added to the pan):** This method of cookery is used when foods already contain high amounts of fat. In the case of some foods such as bacon, a considerable amount of melted fat is released into the pan. 3 **Shallow frying** or pan frying: This method of frying involves the cooking of food in a shallow pan with a small quantity of preheated fat or oil. Shallow frying is a quick method of cooking and in the case of meat is only suitable for tender cuts. This method of frying results in a final cooked product that has a golden colour and has lost minimal amounts of nutrients. 4 **Stir-frying:** This method of cooking involves a high heat with very little oil, and a short cooking time with plenty of turning of the food or stirring. Food items are small and even-sized pieces. Food may be fried in small quantities and then combined at the end of the cooking process. This often occurs in a wok over high heat and is a healthier frying option.	 **Figure 11.18:** To deep fry, food is immersed in oil, which creates a crisp, brown outer surface. Limit use of this cooking technique, especially if the fats used are saturated or trans fats, as it increases the fat content of the food.  **Figure 11.19:** Dry frying of nuts  **Figure 11.20:** Stir-frying is a very healthy way to cook a variety of nutritious foods because it uses a very small amount of oil and is quick.

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Activity **11.4** (Practical): Dry cooking techniques

1 For each method of cooking, state which principle of heat transfer is used.
2 Find a recipe that uses each of the dry methods of cooking. Justify why the food item produced is best cooked using this method of cooking.
3 As a class, choose one recipe for each of the dry cooking techniques. Prepare each recipe.
4 Describe the sensory properties of each food item prepared using each of the cooking techniques.
5 Outline the changes in the properties of the foods that were cooked. In your response, explain how the cooking technique resulted in the altered properties of the foods.

Let's talk
Is an air fryer a better method of cooking?

Microwave cooking

The microwave is treated as a separate cooking method as no heat is transferred. The microwave oven uses electromagnetic radiation to produce heat inside the food and provides a convenient method of cooking and reheating food. The popularity of this piece of equipment is largely due to its ease of operation and time-saving properties.

Electromagnetic radiation works by causing vibration of water and some other molecules in the food.

Most foods are suitable for cooking in the microwave, but when choosing a food it is important to consider the effects being sought from the cooking process.

Consider a meat pie, for example – imagine if this were cooked in the microwave. Foods that require a different consistency inside and out should not be cooked in the microwave.

Figure 11.21: The microwave is most often used to provide quick and easy heating of food.

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As microwaves do not produce dry heat, browning of foods does not occur.

Foods that you can cook in the microwave include rice, pasta, meats, fish, poultry, vegetables, potatoes and any pre-cooked microwave meals.

Advantages of microwaves

There are a number of advantages to using a microwave:

- Foods cook more quickly than in an ordinary oven because the heat is produced inside the food and cooking does not depend on heat transfer from the outside.
- The microwave has the ability to quickly and conveniently defrost and reheat foods. The risk of burning foods is decreased, but note the disadvantages below.
- Most plastic containers can be placed in the microwave, so foods can be heated in the same container they are stored in, which increases the convenience of this piece of kitchen equipment.
- Food and drinks can be heated or cooked in the same bowls, cups or containers they are served in, saving on dishwashing.
- Hot food that has already been plated but has gone cold is easily heated without using a pan

Figure 11.22 The microwaves are transmitted through the materials of microwave-safe containers used for cooking.

Figure 11.23: Microwave cooking uses a form of electromagnetic radiation which works through the vibration of water molecules in the food.

Let's talk

Why is standing time so important for food that has been cooked in the microwave?

Disadvantages of microwaves

There are a number of disadvantages to using microwave cooking:

- Precise temperature control, and temperature much above 100°C are generally not possible.
- Food can't be closely observed or stirred while it's cooking
- Dry heat cooking is not possible because the water in the food turns to steam before high enough temperatures for roasting, baking, frying or grilling can be reached.
- Water in the food turning to steam may spoil its texture and taste, as well as causing moist heat cooking; and excessive steam may rupture the food's structure and parts may even explode.
- Uneven cooking can occur because of the nature of microwaves bouncing around in the oven and because certain food ingredients, such as water strongly absorb microwaves so most parts of the food heat up more quickly than the rest.
- Cold spots can remain in microwaved food due to uneven heating, which can result in unpleasant sensory experience and unwanted micro-organisms surviving in poorly heated foods. In order to eliminate

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these cold spots where harmful bacteria can survive, it is important to stir or rotate the food midway through cooking.

- Microwave ovens have potential safety issues, such as water being superheated and suddenly boiling over when the container is removed from the oven; scalds to the mouth due to hot spots inside while the outside is only warm; and the risk of harmful microwaves escaping the door or metal casing is damaged.

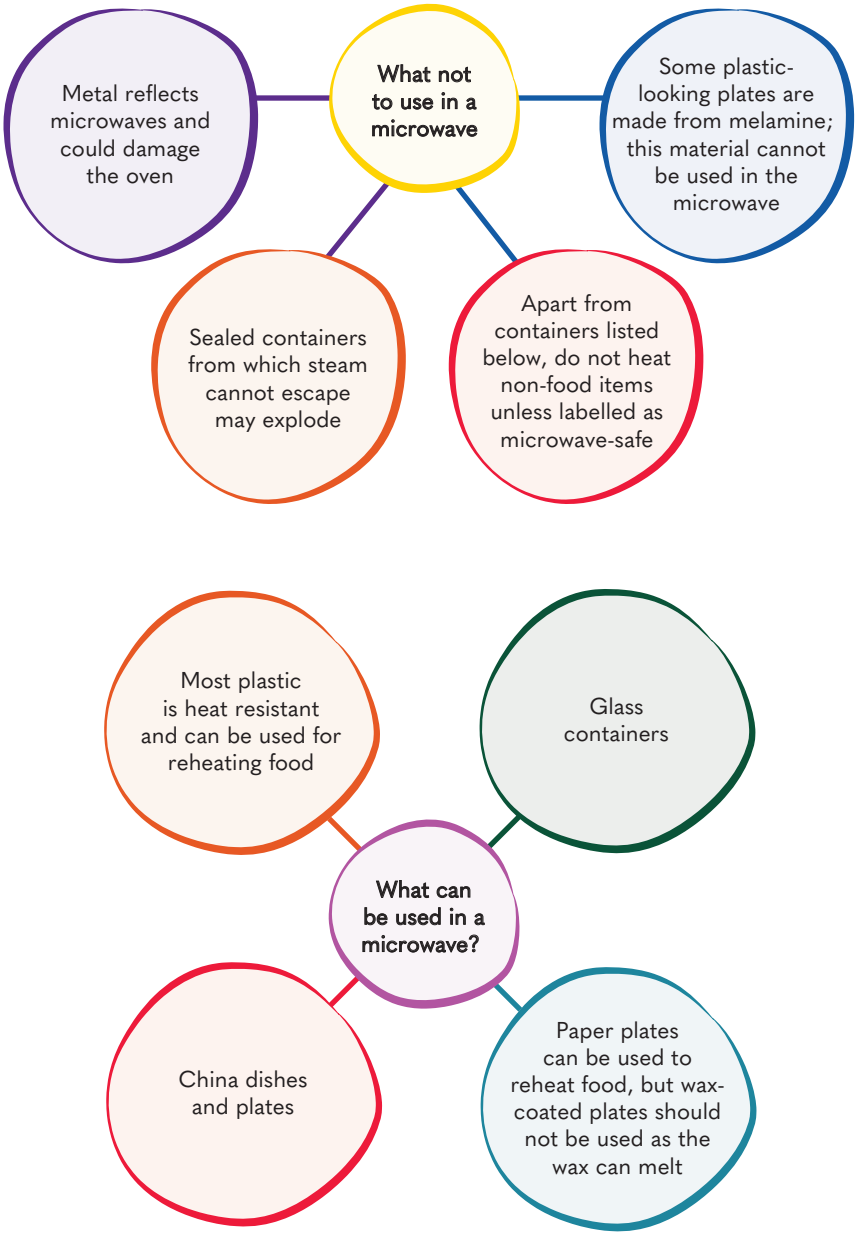

Figure 11.24: Equipment that can and cannot be used in the microwave.

Activity **11.5** (Practical): Comparing cheese on toast

1. Working in pairs, one person prepares cheese on toast using Method 1; the other student uses Method 2.
2. Sample each version and complete the evaluation questions.

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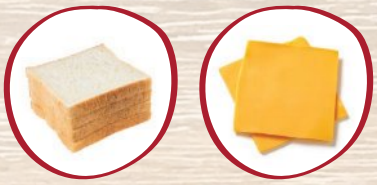
Cheese on toast

Ingredients



2 slices bread 2 slices cheese

Method 1

1. Toast the bread using a toaster or grill.
2. Place the cheese on the toasted bread.
3. Grill until the cheese is melted. Time how long this takes.
4. Serve.

Method 2

1. Place the cheese on the slice of bread.
2. Place in the microwave and cook until cheese has melted. Time how long this takes.
3. Serve.

Evaluation questions

1. Compare the time taken to melt the cheese using both methods.
2. Describe the processes involved in the cooking of cheese on toast using Method 1.
3. Describe the processes involved in cooking of the cheese on toast using Method 2.
4. Complete a sensory analysis of both samples.
5. Determine which method produces your preferred final product. Justify your response.

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Microwave satay chicken

Ingredients


¼ onion, finely chopped


1 clove garlic, crushed


½ tablespoon butter


½ cup chicken stock


¼ cup crunchy peanut butter


1 tablespoons honey


⅛ teaspoon ground turmeric


¼ teaspoon ground cumin


⅛ teaspoon ground chilli


1 chicken thigh fillet, sliced into thin strips


½ cup jasmine rice


1½ cups water

Method

1. Combine finely chopped onion, butter and garlic, and cook on high in microwave for 1 minute.
2. Stir in chicken stock, peanut butter, honey, turmeric, cumin and chilli. Mix until well combined to form the satay sauce.
3. Remove fat and skin from chicken, and cut into thin strips.
4. Add chicken and mix well, ensuring all chicken is coated with sauce and there are no lumps in the sauce.
5. Cook on high for 2 minutes, stir well, then cook for a further 6 minutes on high.
6. To prepare rice, add rice and water to a microwave-safe dish. Microwave for 10 minutes. Let rest for 5 minutes. After 5 minutes, fluff with a fork.
7. Serve satay chicken with rice.

Evaluation questions

1. Cooking in the microwave is often very difficult. Evaluate this practical task and outline why this is this case.
2. Evaluate your chicken satay and rice in terms of physical, chemical and sensory properties.
3. Suggest the changes that may have occurred to physical and sensory properties had this dish been fried.
4. Rice can also be steamed. How would this technique of cooking alter the properties of the final food item?

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Moist heat cooking techniques

The moist heat method of cooking uses liquid (water, stock or other water-based liquid) and steam for cooking. In order to change the properties of original food item, sometimes large quantities of liquid must be added, while others only require small amounts of liquid; sometimes even the steam created by the liquid is enough to cook the food. One disadvantage of boiling food in water which is then discarded is that nutrients and flavours tend to leach out of the food into the water during boiling, and these would be lost.

Table 11.3 provides a summary of the moist cooking techniques. Complete the third column of the table in your notebook to list the food products that are cooked using each of the moist cooking techniques.

Let's talk

Why is steam such an effective technique for cooking fish?

Can you think of other foods that are cooked using steam?

Table 11.3: Moist cooking techniques

Moist cooking techniques	A summary explanation	Food products that are cooked using the moist techniques of cooking
Boiling	• **Boiling** is the cooking of a liquid food or a solid food in water-based liquid at or above 100°C, commonly water. The liquid boils when its temperature is raised by heat to what is commonly termed as **boiling point**. • When the liquid heats, tiny bubbles appear on the bottom of the saucepan, then rise to the surface. Gradually the bubbles increase in size until large ones are formed; these then rise rapidly to the surface and break. This causes the constant agitation of the liquid. • Boiling changes the properties of food. It is responsible for toughening the **albumin** in eggs and the fibres in meat. It dissolves the connective tissues found in meat and softens the **cellulose** in cereals, vegetables and fruits. • **Simmering** brings water or liquid to a temperature just below boiling point, 85°C, and that temperature is maintained during cooking. Bubbling is gentle. Stews and casseroles use simmering to tenderise the meat and develop flavours. • **Blanching** involves submerging food in boiling water for a short period of time, often followed by 'shocking' it in ice-water to stop the cooking process. This retains the flavour, colour and texture of foods.	 **Figure 11.25:** Boiling cooks food from the heat of hot liquid.  **Figure 11.26:** Congee; the rice in this dish is softened as a result of being boiled.

Boiling
Cooking of food in water or liquid with the water bubbling at or above 100°C.

Boiling point
The temperature at which water or a liquid changes to steam.

Albumin
A water-soluble protein found in egg whites and blood.

Cellulose
One of the main components of plant cell walls. An indigestible carbohydrate and an important source of insoluble fibre.

Simmering
Bringing water or water-based liquid to a temperature just below boiling point, 85°C, with that temperature is maintained during cooking.

Blanching
Submerging food in boiling water for a short period of time.

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Stewing
A slow moist method of cooking. The food is cooked at low temperatures in a closed dish.

Roux
A mixture of equal proportions of butter or other fat and flour, used as a base for thickening sauce or making gravy.

Reduction
A process of decreasing the amount of liquid in a sauce, stock or stew, by simmering or boiling uncovered. In a stew this is done to make the sauce thicker.

Poaching
A cooking method in which food is gently simmered in liquid to seal it, and to retain its juices and flavour.

Steaming
The cooking of food in hot water vapour or steam.

Moist cooking techniques	A summary explanation	Food products that are cooked using the moist techniques of cooking
Stewing	• **Stewing**, also called casseroling, simmers the food gently in a water based liquid in a covered container at a temperature below boiling point. Boiling at 100°C spoils the texture and taste. • The cooking liquid is retained in the food, so no nutrients or flavours are lost. • This method of cooking alters the properties of tough cuts of meat. These can be made tender and tasty by long, low-temperature cooking. When cooked in the presence of moisture, collagen dissolves into gelatin, which allows the meat fibres to separate more easily and helps to develop flavour in foods. • The liquid used to stew foods often needs to be thickened with a **roux** or cornflour paste before they are eaten. Stews can also be thickened by **reduction**, by taking the lid off the container, turning up the heat a little and allowing steam to escape, taking care not to let the stew boil.	 **Figure 11.27:** Stewing can happen in the oven or on the stove top. Tough meat cuts are made tender through this cooking technique.
Poaching	• **Poaching** involves very gently simmering food in liquid (water, stock or wine) at a lower temperature than simmering, generally 70–80°C so it hardly bubbles at all. Fragile foods such as eggs are often poached as this is a 'gentle' method of cooking. • When poaching food, it is important to keep the heat low and to keep the poaching time to a bare minimum. This prevents the food from drying out or falling apart. It also helps to preserve the flavour of the food.	 **Figure 11.28:** Poaching is an ideal cooking method for delicate foods.
Steaming	• **Steaming** is the cooking of food by the application of steam. It involves putting the food into a steamer. As the water underneath the steamer boils, the water evaporates into steam. The steam rises and then heats and cooks the food. The advantage of steaming over boiling is that nutrients and flavour molecules do not leach out into the boiling water. Furthermore, delicate food is not ruptured by the bubbling of boiling water.	 **Figure 11.29:** Bamboo steamers are used to steam a variety of foods.

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Activity **11.6** (Practical): Which way to cook vegetables?

Vegetables can be cooked using a variety of techniques. Moist, dry and microwave methods can be used.

1 Choose five vegetables and state the moist, dry and microwave methods that can be used to cook each of the vegetables.
2 Select one vegetable and prepare it using the moist and dry techniques of cooking you identified. Also cook the vegetable using the microwave.
3 Evaluate the vegetables that the class has prepared by copying and completing the table below.

Techniques for cooking	Time taken to cook	Evaluation of physical properties	Evaluation of sensory properties	Evaluation of chemical properties	Most suitable to least suitable method for cooking this vegetable (1 being most suitable, 3 being least suitable)

4 Justify the 'best' technique to use to cook your vegetable. In your response, include a discussion of physical, chemical and sensory properties of the food.
5 Explain the changes that occurred to the vegetable that was cooked using the technique that was least suitable. In your response, include a discussion of the impact of the technique used to cook this vegetable.
6 Use the knowledge that you have gained from this practical task to explain whether this vegetable is best cooked using conduction, convection or radiation. Using the theoretical knowledge, explain why this is the case for this vegetable.

Activity **11.7** (Practical): Gumbo

A **gumbo** is a traditional stew of Southern United States. It is Creole cooking at its finest.

Your task is to develop a gumbo that uses a moist method of cooking and can be adapted to ingredients readily available in Australia.

The base ingredients, or 'holy trinity', of a gumbo are onion, celery and bell pepper (capsicum). You must use these base ingredients in your solution to this problem and you must also use a **broth** and a **dark roux**.

Broth is also known as bouillon, and is a type of stock made by simmering for a short time such things as bones vegetables, fish including fish heads. Bones and other unwanted bits may be sieved out after cooking, and broth may made to use in stews or to be consumed as a soup.

Dark roux is made by cooking the fat and flour for longer or on a higher heat, while stirring, so that browning reactions take place, which also give more flavour. The roux in Creole cooking may use oil or other fats rather than butter.

A traditional gumbo recipe is provided to get you started.

Gumbo
A traditional Southern American stew. Creole cooking uses a wet method of cooking. The base ingredients, or 'holy trinity', are an onion, celery and bell pepper (capsicum).

Broth
A stock made from simmering any of the following for a relatively short time: bones, meat, fish and/or vegetables are simmered.

Dark roux
A darkened mixture of equal proportions of butter or other fat and flour, used as a base for thickening sauces for making gravy.

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Gumbo

Ingredients


1 tablespoon butter


1 tablespoon plain flour


110 g canned, crushed tomatoes


1 rasher bacon, chopped


¼ teaspoon fresh basil, chopped


¼ teaspoon thyme


1 bay leaf


1 teaspoon curry powder


½ teaspoon peanut oil


3 okra, cut into slices


½ onion, chopped


1 stick celery, chopped


¼ green capsicum, chopped


1 clove garlic crushed


250 ml chicken stock


250 ml beef stock


1 chicken thigh, sliced thinly


¼ teaspoon tabasco sauce


1 cup cooked rice for serving

Method

1. Melt butter in a small saucepan. Add the flour and make a dark roux. Be very careful not to burn it.
2. Add tomatoes slowly so the roux does not become lumpy. Stir continuously.
3. Add bacon, thyme, basil, bay leaf and curry powder. Simmer over a low heat.
4. Using a frying pan, heat half the peanut oil. Add the okra and sauté for approximately 10 minutes.
5. In a large saucepan, heat remaining ¼ teaspoon peanut oil. Sauté onion, celery, green pepper and garlic. Add chicken and beef stock and bring to the boil.

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6 Add chicken thigh and tomato roux mixture. Simmer for 30 minutes.
7 Stir in Tabasco sauce (if you like it hot!).
8 Serve over cooked rice in a large bowl.

Evaluation questions

1 Which methods of heat transfer were used in this recipe?
2 Outline how the cooking techniques used affect the final food product.
3 Outline the function of the okra in this recipe. (Hint: cooked okra's physical properties.)
4 Justify the reason why the cooking techniques identified in your previous answer best suit these ingredients that were combined in this recipe.
5 Analyse the sensory properties of your final product. Include a discussion of appearance, aroma, taste and texture.

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Mechanical action

Mechanical action brings about a change in the physical properties of food. The term 'mechanical' can be misleading, but it simply involves an action, either human or machine, creating the force and motion that causes a change to the properties of the food. The mechanical actions change structure, mix ingredients including air, and separate and extract components. The overall aim is to prepare food for cooking and serving, and to improve texture and taste.

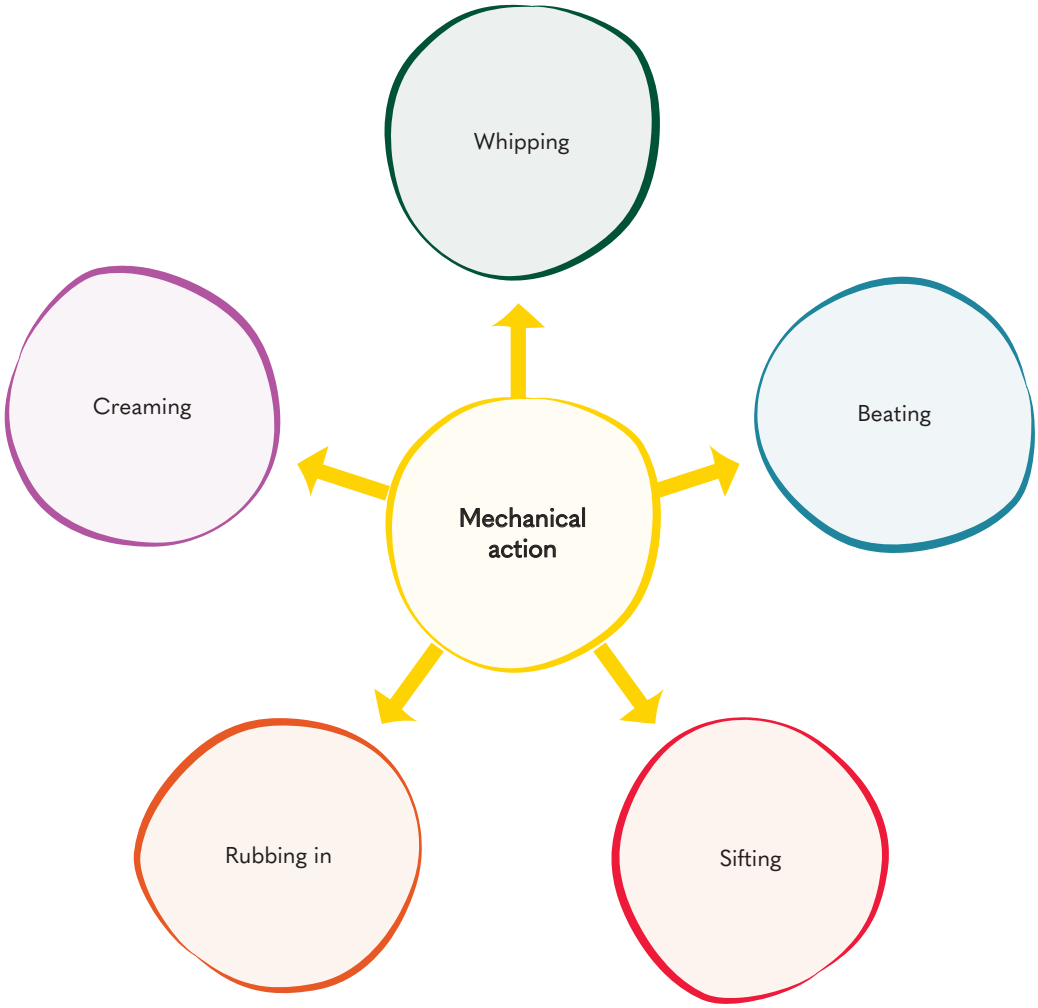

Figure 11.30: How mechanical action is used in food processing

Let's talk

For each of the examples in Figure 11.30, name a recipe or food product that uses this type of mechanical action. Can you describe the physical changes that occur because of this action?

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Figure 11.31: Have you ever whipped an egg white? It is the mechanical action of the whipping denaturing the protein, coating the air to make air pockets. This increase the volume of the egg white, known as aeration.

Figure 11.32: Creaming fat with sugar traps air. This is another example of mechanical action.

Figure 11.33: Sifting or rubbing in flour is another example of mechanical action, incorporating air into a food product.

Figure 11.34: Kneading stretches a dough, developing the gluten strands that trap air, helping the bread to rise when baked. Kneading is a mechanical action.

Let's talk

Describe the difference between an egg that is cracked into a frying pan and cooked, and an egg that is whisked and then cooked. How is mechanical action involved in this process? How does this mechanical action change the physical properties of the egg?

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Enzymes

Enzymes are proteins that are catalysts – that is, they enable chemical reactions and speed them up. Most reactions in living things would not happen, or run too slowly, without enzymes.

Enzymes are the key that makes the digestive process happen. Without enzymes, our bodies would not be able to break down food to make use of the nutrients found in the food we eat.

Enzymes are found in all living organisms, and may still be active in some foods – especially raw fruits and vegetables.

Enzymes
Proteins that act as biological catalysts in living organisms. They bring about and speed up chemical reactions in foods without being changed themselves.

Figure 11.35: Pineapple and kiwi fruit contain the enzyme bromelin. If they are able to break down proteins, what is their function in a marinade for meat?

Figure 11.36: Papaya contains papain, which breaks down protein. How could this enzyme be used in food production?

Effect of enzymes on the properties of food

Today enzymes are used in a variety of food preparation and processing applications. When preparing foods that contain enzymes, it is important to remember that the action of enzymes is affected by temperature and pH. This is why acids are often added to delay the action of enzymes in fruits and vegetables, such as the browning of cut apples.

Enzyme use in bread-making

Amylase is an enzyme used in bread-making. It is used to break down flour into soluble sugars, which are transformed by yeast into alcohol and carbon dioxide. This makes bread rise.

Enzyme use in milk preparation and processing

When **rennin** and enzymes are added to milk, they:

- initiate the first stage of clotting or formation of a gel
- promote coagulation – if moderate temperature is applied, this coagulated milk can then be made into cheese.

Rennin
An enzyme used in cheese production.

Hydrolysis
A chemical reaction whereby a chemical compound is broken down by a reaction involving water. This allows the molecules to react more readily with enzymes.

Enzyme use in syrup production

In the production of invert syrup used mainly in baking, sucrose sugar is broken down in a **hydrolysis** reaction brought on by enzymes called invertases. This can also be done in sucrose-containing foods.

Role of enzymes in ripening

Enzymes control the ripening of fruit. This ripening process continues until the fruit is spoiled or rotten. This is caused partly by enzymes in the fruit and partly by micro-organisms.

When a fruit or some vegetables such as potatoes and avocadoes are cut, the enzymes in the plant tissues are exposed to oxygen in the air and they initiate a reaction that turns the fruit a brown colour. This is called enzymatic browning. The addition of an acid, such as citric acid found in lemon juice, deactivates the enzymes and delays browning. Lemon juice is often added to fruit salad in order to delay this process and improve the appearance of the fruit.

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Figure 11.37: Look at the cut apple – what do you notice? Can you see the enzymes working?

Figure 11.38: Enzymes are control ripening.

Figure 11.39: Lemon juice is often added to fruit salad in order to delay enzymatic browning and improve the appearance of the fruit.

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Activity **11.8** (Practical): Understanding enzymes

Enzymatic browning occurs rapidly in many fruit and vegetables. A banana taken out of its skin today would not look very appealing tomorrow. Carry out an experiment to learn more about enzymes and the function of acids.

You will need:


½ banana


1 small piece of pineapple


½ small potato


½ apple


½ lemon, juiced

Method

1. Cut the banana, pineapple, potato and apple into halves.
2. Label one plate 'enzymatic browning' and place one piece of each food item onto this plate and take a 'before' photo of it.
3. Label the second plate 'addition of acid' and place the other pieces of food onto this plate. Sprinkle the lemon juice over the pieces of food on this plate. Take a 'before' photo of it.
4. Place both plates in the fridge and leave overnight.
5. The next day:
   a. Take an 'after' photo of both plates of food.
   b. Annotate both 'after' photos to explain the changes that have occurred.
6. Prepare a report on your findings that explains what has happened to both plates of food. In your report, include the terms:
   - enzymes
   - enzymatic browning
   - lemon juice
   - acids.

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Changes to pH

The pH scale measures the hydrogen ion concentration in a solution of a substance in water. A pH of 7, that of pure water, is termed neutral, while pH readings above 7 are alkaline and below 7 are acidic. pH values affect the reactions that take place during the cooking process.

Acids

Acids are sour in taste, cause blue litmus paper to turn red and have a pH reading of below 7. Table 11.4 shows a number of acids and the food items in which they are found.

Acid
Any chemical compound that, when dissolved in water, gives a solution with a hydrogen ion concentration greater than pure water. Acids may be present naturally in foods or added during processing.

Table 11.4: Acids in food

Acid	Source
Citric acid	Citrus fruits: lemons, oranges, limes, grapefruit; and raspberries and cranberries
Malic acid	Apples, apricots, grapes, peaches, pears, plums, rhubarb, strawberries and tomatoes
Tartaric acid	Grapes, pineapples, potatoes and carrots
Acetic acid	Vinegar
Oxalic acid	Tea, cocoa, pepper, rhubarb, pineapples and spinach
Tannic acid	Tea
Benzoic acid	Cranberries, prunes and plums
Butyric acid	Decomposition of butter and cheese
Lactic acid	Milk, cheese and yoghurt

Many preserved foods, dressings, sauces, marinades and similar food products depend on their acidity to prevent spoilage. They may consist of naturally acidic foods, such as fruit juice or tomatoes, or they may be formulated by combining acid foods with other foods to achieve the desired acidity. Some foods, such as vinegar and certain pickled vegetables, may develop acidity from **microbial fermentation**.

Microbial fermentation
The chemical decomposition of food by microbes.

Figure 11.40: Pickled foods, dressings, sauces, marinades and similar food products depend on their acidity to prevent spoilage.

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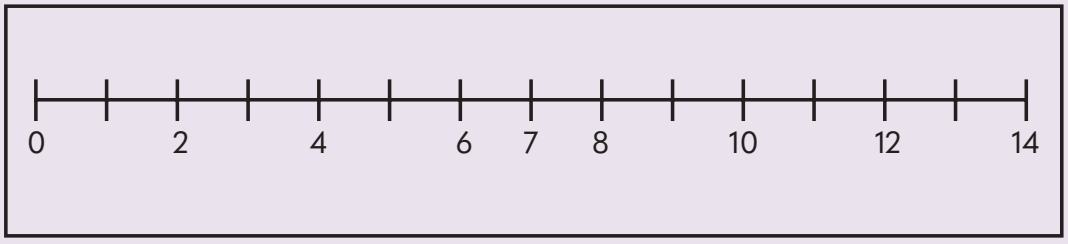
Activity **11.9** (Inquiry): Where does it fit on the pH chart?

- Apples
- Bananas
- Beans (e.g red kidney beans)
- Butter
- Buttermilk
- Cabbage
- Capsicums
- Chocolate
- Coffee
- Eggs
- Fish
- Green beans
- Honey
- Lemons
- Margarine
- Meat
- Milk
- Mineral water
- Oils
- Oranges
- Plums
- Potatoes
- Prunes
- Pumpkin
- Red wine
- Sour cream
- Spinach
- Sugar
- Sweetcorn
- Tea
- Tomatoes
- Vinegar
- Watermelon
- White wine
- Yoghurt with active cultures

Functional properties

The physical and chemical properties of ingredients that impact food preparation and processing. For example, a functional property of starch is that it enables gelatinisation or thickening to occur when making a cheese sauce.

1 Research the pH of the foods in the bullet lists above. Draw a copy of the pH chart shown below horizontally through the centre of a sheet of A4 paper turned sideways. Label the foods in the correct position on it. Add labels and arrows to show the position and value of neutral pH, the acidic range and direction of increasing acidity, the alkaline range and direction of increasing alkalinity. For some foods such as vinegar you may have to show a range of pH, or indicate the particular variety of the food that the pH value comes from.



2 Explain the difference between an acid and a neutral food.

3 Will foods that are neutral have the same **functional properties** as acidic foods? Explain the reason for your answer.

4 In the food industry, foods with a pH of 4.6 and above are classified as 'low-acid foods'. The significance of pH 4.6 is that the bacterium that causes the dangerous food poisoning botulism can grow in low-acid foods so these need more careful food preservation techniques particularly in canning and bottling. Label pH 4.6 on your scale and indicate the low acid food range. List two low-acid foods, one at each end of the range.

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Function of acid in food preparation and processing

Cream of tartar and citrus juices, such as lemon juice and vinegar, are the main acids used in food preparation and processing. The concept maps help to summarise the function of each of these in food preparation and processing.

Cream of tartar is purified, crystallised potassium bitartrate, which is used as the acid component of baking powders.

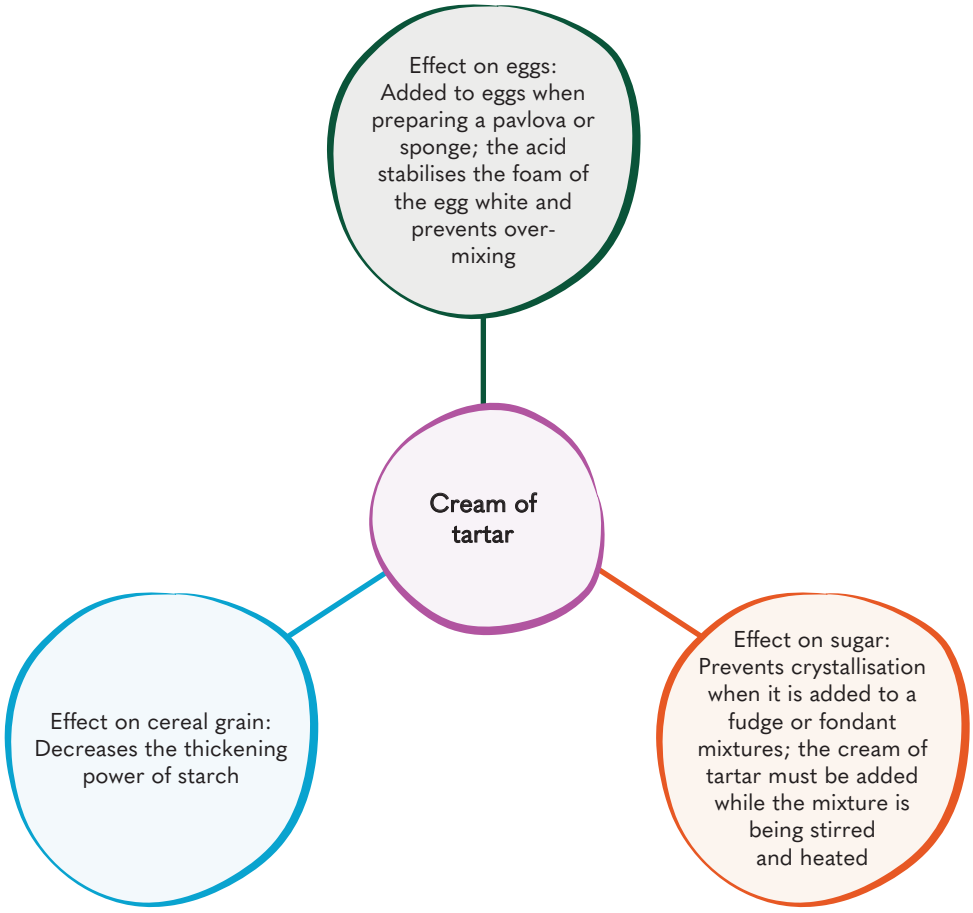

Figure 11.41: Functions of cream of tartar in cooking.

Fruit acids such as malic acid, citric acid, tartaric acid and oxalic acid assist with the release of pectin (a starch-like compound in fruit and vegetables) and help with **gel formation**. An example of this is when lemon juice is added to strawberry jam. The function of the citric acid found in the lemon juice is to allow gel formation and the texture of jam as we know it.

Gel formation
The thickened product produced when starch softens and absorbs moisture.

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Figure 11.42: Effects of acids on different food products

Activity **11.10** (Practical): Egg poaching – using acid in cooking

In order to understand how vinegar (an acid) functions to alter the rate of coagulation, prepare a poached egg using a small saucepan half filled with water and then carry out this activity again using 2 teaspoons of vinegar added to the water.

1. Explain the term 'coagulation'.
2. Outline how the process of coagulation occurred in the egg with the vinegar.
3. Discuss the sensory properties of the two eggs.
4. Make a judgement about the most suitable preparation and processing technique to prepare a poached egg.

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Strawberry jam

Ingredients

250 g strawberries (fresh or frozen)

1 cup sugar

Juice of ½ lemon

Method

1. Wash jar and sterilise.
2. Wash strawberries and hull. If strawberries are large, cut in half.
3. Place strawberries, sugar and lemon juice into a saucepan.
4. Stir continuously while bringing to the boil. Boil for approximately 4 minutes.
5. Perform a gel test by placing a spoonful of jam onto a chilled saucer. If the cooled jam wrinkles and forms a gel, remove from heat.
6. Cool jam slightly. Pour jam into jars and cover.
7. Clean any jam from the outside of the jar. Label and store in a cool dry place.

Figure 11.43: The function of the citric acid creates the texture of jam.

Evaluation questions

1. Explain the function of the acid in this recipe.
2. Outline the purpose of the sugar.
3. Why is a gel test performed?
4. Discuss why it is important to label the jar.

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Alkalis

Alkalis are basic ionic salts. These chemical compounds are also called bases, and they dissolve in water. An alkali or a base is a compound with a pH greater than 7. Unlike acids, alkalis have a very low concentration of hydrogen ions when dissolved in water.

Alkalis
Ionic salts used in food preparation and processing as a raising agent.

The pH value of alkalis is above 7. Alkalis have a slimy mouthfeel and are bitter to taste. The most common alkali used in food preparation and processing is bicarbonate of soda (bicarb).

Functional properties of alkalis in food preparation and handling

Alkalis such as bicarbonate of soda are used in food preparation and processing as a raising agent. On heating, bicarb produces sodium carbonate, steam and carbon dioxide. The carbon dioxide gas is released and leavens the mixture. This process leaves sodium carbonate as a by-product or residue. This by-product produces a distinct slimy alkaline taste and a dark yellow colour. If sodium bicarbonate is put into a recipe in too large an amount, the sodium carbonate residue will make the product taste unpleasant, almost metallic/bitter.

However, there is a way around this disadvantage, which also increases the leavening effect of sodium bicarbonate, as used in the formulation of baking powders. If a dry acidic powder such as monocalcium phosphate is combined with sodium bicarbonate to form baking powder, when wetted in the bread or cake mixture it will produce carbon dioxide and water from an acid-base neutralisation reaction. Then as it is baked, more carbon dioxide is produced as described above, and little carbonate is left as residue.

Let's talk

What is the difference between baking powder and bicarbonate of soda?

Activity 11.11 (Practical): Investigate alkalis

Investigate the use of alkalis in food preparation and processing.

1. Use the internet or recipe books to find five recipes that use bicarbonate of soda.
2. Explain the function of the alkali in each of the recipes.
3. Prepare one of the recipes and evaluate its sensory properties. Is the slimy mouthfeel apparent and can you taste the alkali?

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Chapter revision

- When food is cooked, its digestibility, appearance and taste are improved. Micro-organisms are inhibited and spoilage is delayed.
- There are three principles of heat transfer: conduction, convection and radiation. Cooking techniques employ at least one of these, or two or more in combination.
- Food can also be cooked through the action of microwaves, a form of electromagnetic radiation but this is not through heat transfer. Heat is produced inside the food by conversion of the energy in the electromagnetic waves.
- A number of different cooking techniques can be used to cook foods. Dry techniques of cooking include roasting, baking, grilling and frying. Moist cooking techniques require liquid – water, stock or wine. The moist cooking techniques are boiling, simmering, stewing, poaching, steaming, and blanching.
- Mechanical actions bring about changes in the physical properties of food. Mechanical actions change structure, mix ingredients including air, and separate and extract components. The overall aim is to prepare food for cooking and serving, and to improve texture and taste.
- Enzymes are responsible for enabling, controlling and speeding up the chemical reactions in foods. When the tissues of some fruit and vegetables are exposed to air, enzymes use the oxygen to produce brown compounds. This is known as enzymatic browning.
- pH refers to the acidic, alkaline or neutral property of a food. The pH level can assist in food preservation, inhibit enzymatic browning and assist raising agents.

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Apply your knowledge

1 Describe the difference between dry and moist methods of cooking.
2 Explain why microwave cooking is time efficient and what effects it has on the properties of the food.
3 Outline two important safety considerations when using the moist heat technique of cooking.
4 Identify the methods of heat transfer that occur in two dry cooking techniques and explain how heat is able to cook the food.
5 Select two moist cooking techniques and suggest three food items that can be prepared using each method.
6 Outline the physical and sensory changes that occur in a potato that has been baked compared with one that has been boiled.
7 Different foods and different ingredients require the use of various techniques of cooking. The technique selected depends on a number of factors and the accurate selection will determine the quality of the final food item.
Below are a number of different food items. Select a cooking technique for each food item. Justify the reason for your selection by considering the chemical, physical and sensory changes that occur.
   a chuck steak – a tough cut of meat
   b egg
   c julienned strips of carrot
   d large whole potato
   e milk
   f chickpeas – a legume
   g apple cut into slices
   h pasta.
8 Define the term 'acid'. Explain how an acid is different from an alkali.
9 List two examples of:
   a acidic foods
   b neutral foods
   c base/alkaline foods.
10 Explain the function of an acid in food preparation and processing.
11 Suggest how enzymatic browning can be delayed.

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Practice exam questions

Question 1

Which of the following are moist methods of cooking?

A Steaming, boiling and baking.
B Steaming, grilling and baking.
C Steaming, blanching and frying.
D Steaming, stewing and blanching.

1 mark

Question 2

Explain the difference between conduction and convection. **4 marks**

Question 3

An egg is a versatile food that can be cooked in a variety of ways. Identify one moist and one dry cooking technique suitable for an egg and explain the effects of the cooking technique on the sensory properties of the egg.

	Dry	Moist	Heat produced inside the food
Cooking technique			
Explanation of the effects of cooking technique on the sensory properties of the egg			

3 + 6 marks = 9 marks

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Chapter 12
The science of food

Key knowledge

- The functional properties of fats and oils, protein, starch and sugar in food, and the physical and chemical changes that occur to these components during preparation and cooking, including aeration, caramelisation, coagulation, dextrinisation, emulsification, denaturation, gelatinisation and the Maillard reaction.

Key skills

- Use accurate food science terminology and techniques to describe and demonstrate, through practical activities, chemical and physical changes to the properties of food.

Video 12.1: Chapter Overview

Fats and oils, protein, starch and sugar are the natural food components found in the food we eat. These food components all go through different changes to their physical and chemical properties when prepared and cooked. When carrying out food processing and preparation techniques, it is important to consider the ways in which the food behaves and the science behind the food. Understanding the science of food and why it behaves as it does enables us to prepare a wide variety of food items. Being able to understand and work in a practical situation with the functional properties of food allows us to enhance and maximise these components.

Get knowledge ready

1. **List different examples of proteins and describe how their physical properties change during food preparation and cooking.**
2. **Explain why it is possible to aerate an egg white but not an egg yolk.**
3. **Caramelisation and dextrinisation both result in a colour change, but the science behind the colour change is different. Can you explain this?**

Let's talk

What do you know about food science? Is there really any science to it?

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Figure 12.1: As we prepare a food item, we are able to bring about changes to the physical and chemical properties of the food using their functional properties. The functional properties of food include aeration, caramelisation, coagulation, dextrinisation, emulsification, denaturation, gelatinisation and the Maillard reaction.

Fats and oils

Fats and **oils** have the same basic chemical structure, a mixture of fatty acids and glycerol. The different properties of the various fats and oils – for example, whether they are liquid or solid, their flavour and their smoking point – will depend on the type of fatty acids they contain.

There are three different types of fatty acids:

1 *Saturated fats:* These are found in all animal products and in some nuts. In terms of chemical structure, they have no double bond between the carbon atoms. These types of fats are often referred to as 'bad fats' because they contain cholesterol, which is stored in the arteries and can cause heart disease.

2 *Unsaturated fats:* These are predominantly from plant sources. Their chemical structure consists of two or more double bonds between the carbon atoms. These are considered good fats because they do not collect in the arteries and cause heart disease. There are two different types of unsaturated fats:
   - **a** *Monounsaturated fats*: These fats contain one double bond and are found in key foods such as avocado and olive oil.
   - **b** *Polyunsaturated fats:* These fats contain two or more double bonds and are found in plant products.

3 *Trans fats:* These can occur naturally in meat and dairy, or artificially in fats and oils altered by industrial processes.

Fats
Compounds, usually derived from an animal source, that are solid at room temperature and liquid when heated.

Oils
Compounds that are liquid at room temperature and often come from plant sources – for example, nuts and seeds.

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Olive oil:

- is liquid at room temperature
- has a golden colour, often pale
- has an oily aroma that can vary depending on the oil from weak to strong (olive oils)
- has an oily texture.

Butter:

- is solid at room temperature but will soften and eventually melt into a liquid state when exposed to heat
- is a pale yellow or cream colour
- has a subtle aroma
- has a greasy texture.

Figure 12.2: Oils are fats that are liquid at room temperature, so they are easy to pour, but will run when heated.

Figure 12.3: Fats are solid at room temperature, so they are easy to cut and measure but may be hard to work with when cold.

Let's talk

How do you eat your toast? Why do most of us prefer to have something spread on our toast? Think about the sensory properties created.

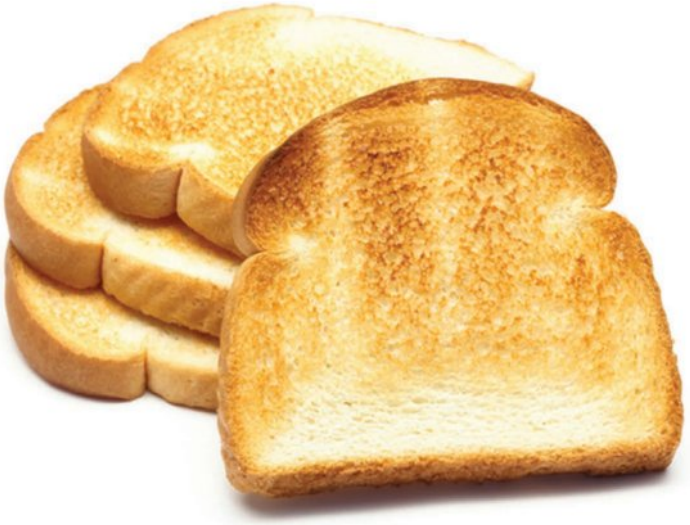

Figure 12.4: Fats and oils provide a wonderful mouthfeel and flavour to food items. Imagine eating toast without butter!

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Functional properties and changes to fats and oils during food preparation and cooking

In addition to being a vital nutrient and a concentrated source of energy for the body, fat performs a number of functions in food preparation and cooking:

- *Texture* – fat particles surround the **gluten** in flour to keep pastry and cakes tender and crumbly or 'short'.
- *Moisturise or lubrication* – fat makes food moist and lubricates it, such as olive oil on a salad. It provides a rich flavour and silky mouthfeel or texture that most people find very enjoyable and satisfying.

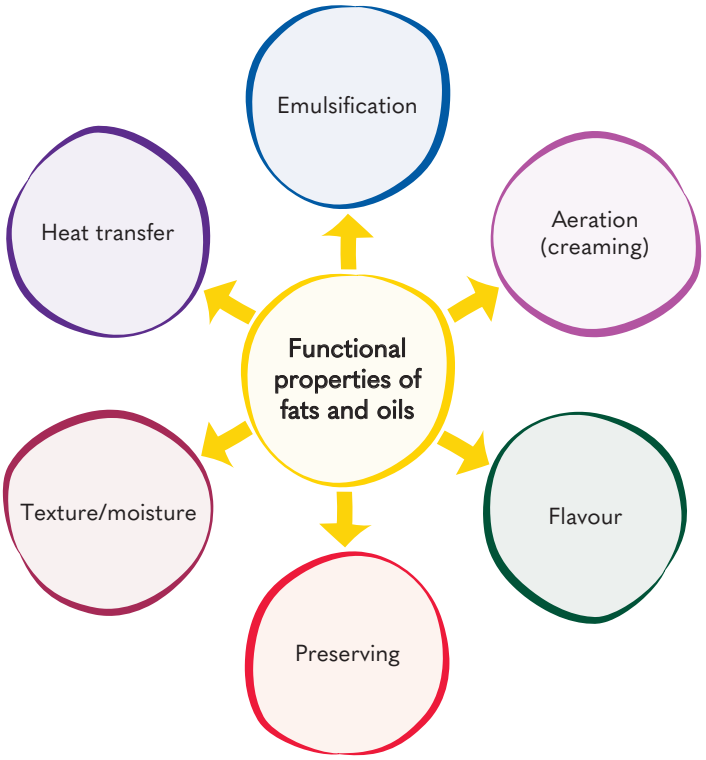

Figure 12.5: The functional properties of fats and oils

Figure 12.6: Quiche uses a shortcrust pastry as the base. This pastry is short and crumbly in texture. It is the fat that creates this characteristic texture by coating the small cells of the flour in fat. This is done through the mechanical process of **rubbing in**.

Figure 12.7: Olive oil is often used in a salad dressing or for drizzling on food before serving. The *Australian Guide to Healthy Eating* suggests using small amounts of 'healthy fats'.

Gluten
The protein found in flour. Gluten forms the framework needed to create raised food items, such as biscuits, cakes and bread.

Rubbing in
A cooking method whereby flour grains are coated with fat by gently rubbing between the fingertips and thumbs. This 'rubbing in' continues until the mixture resembles coarse breadcrumbs.

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Let's talk

Have you ever eaten carrot cake? Describe its sensory properties. Guess what fat or oil is used in its preparation. Suggest why a carrot cake lasts longer in the cake tin compared with a tea cake.

- *Flavour* – different fats and oils add distinctive rich flavour to food as they melt in the mouth when eaten. Fat also carries and blends the flavours of other foods and makes available to us flavour compounds and nutrients that are soluble only in fat.
- *Frying* – fat transfers heat to foods and prevents them from sticking.

Figure 12.8: Marbling in meat refers to the fat that appears within the muscle of red meat. The marbling of the fat adds flavour and when cooked melts into the meat. This can also add tenderness and mouthfeel.

Figure 12.9: Butter has the richest flavour of the fats.

Figure 12.10: Each type of fat or oil has its own flavour and provides flavour to the dish prepared using it.

Figure 12.11: When solid fat is creamed with sugar, it supports the web of air that is beaten into the two ingredients, which lifts and leavens our baked goods. Butter also contains a percentage of water that evaporates when it is baked, creating lift. It turns to steam, steam has a greater volume than water and the extra volume leads to lift.

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- *Baking functions* – fat performs a multitude of chemical functions, such as tenderising, **leavening**, aiding in moisture retention and creating a flaky or crumbly texture.
- *Aeration* - beating butter with sugar traps air, which expands during cooking
- *Emulsification* – combining two liquids that don't usually mix together into a suspension known as an **emulsion**. By adding an emulsifier (such as lecithin found in egg yolk), these particles will surround the two liquids (often oil and vinegar) and prevent them from separating.

Aeration

- **Aeration** helps products to have a light and open texture.
- Fats aerate mixtures during beating or creaming with sugar.
- Aeration increases the volume of a product by incorporating air.
- Beating, whipping, creaming and whisking are methods that help aeration.

During preparation:

- The fat and sugar are creamed together, trapping air (aeration).
- The mixture becomes pale.
- An air in fat foam is formed.

During cooking:

- Trapped air expands.
- The cake rises.

Let's talk

Aeration usually uses saturated fats. Why do we not see unsaturated fats being aerated? Can you substitute unsaturated fats for butter?

Aeration
To incorporate air into food by a mechanical process such as beating or whisking.

Leavening
Causing expansion of doughs and batters by the release of gases within such mixtures, producing baked products with a porous structure.

Emulsion
A suspension of small globules of one liquid (oil) in a second liquid (vinegar) with which the first will not mix.

Figure 12.12: Oils and fats are good conductors of heat because they can be heated to high temperatures. They also help prevent food from sticking when being cooked.

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Figure 12.13: Oil and water don't mix, but if you agitate them by whisking or shaking, you can form a temporary emulsion, which will separate out again in time.

Figure 12.14: Not only does egg yolk contain fat, but it is also an emulsifying agent. When agitated (whisked or shaken), the yolk particles wrap around the oil in a mayonnaise or salad dressing, stopping it from separating and forming a permanent emulsion. Mayonnaise and Hollandaise sauce are examples of emulsification.

Figure 12.15: Fat helps to create a crisp texture when used for frying or roasting.

Figure 12.16: Preservation – oils are used to prevent food from coming into contact with oxygen and therefore help to extend the shelf life of food.

Let's talk

Describe the changes to the physical properties of potato wedges as they cook.

Activity 12.1 (Practical): Make your own emulsion

Try mixing oil and water and you'll get – oil and water! With the addition of an egg yolk, oil and water can blend together into a smooth mix.

In mayonnaise, oil and water (in vinegar) form a creamy mixture. Tiny droplets of the oil are dispersed in the water, creating an emulsion.

A substance that helps two liquids remain in this state is called an emulsifier. Egg yolks contain a number of emulsifiers. Prepare your own mayonnaise, then take it home and serve it for dinner on a burger or with a salad – delicious!

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Mayonnaise

Ingredients

1 egg yolk

1 tablespoon white wine vinegar (or you can substitute with lemon juice)

1 teaspoon Dijon mustard

½ cup olive oil

Method

1. Whisk the egg yolk in a bowl.
2. Add mustard and whisk together.
3. Gradually add half the oil, whisking rapidly until thick and creamy.
4. Whisk in the vinegar, beating well until combined.
5. Continually add the remaining oil, whisking continuously.

Evaluation questions

1. Define the term 'emulsion'.
2. Is this mayonnaise a permanent or temporary emulsion? Explain the reason for your answer.
3. State the emulsifier in this recipe. Describe its function.

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Protein

Protein is an essential part of the diet and is made up of various combinations of small organic chemicals called **amino acids**. When we eat foods containing protein, it is broken down during digestion into amino acids. These amino acids are absorbed by our bodies and are used to produce new proteins and other necessary substances. Protein is part of the structure of the body, so a continual supply of amino acids is needed. Our bodies are able to put these basic amino acid units together, using different arrangements of amino acids, to produce specific proteins, which can only be produced if all the necessary amino acids are available. Different food sources contain different groups of proteins, which are made up of various arrangements and amounts of amino acids.

Protein
Organic compounds made up of amino acids.

Amino acids
Long-chain protein molecules.

Edible animal material, including muscle, offal, milk and egg white, contains substantial amounts of protein. All vegetable matter (in particular, legumes and seeds) also includes proteins, although generally in smaller amounts.

Cooking can alter the amino acid composition of protein, which usually results in desirable flavour and browning development.

Figure 12.17: Good sources of protein include lean meat, fish, dairy foods, legumes/pulses, eggs and mushrooms.

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Functional properties and changes to proteins during food preparation and cooking

Proteins serve a number of functions in food preparation and processing. They:

- become **denatured** when heat is applied, with the addition of acid or with mechanical action such as beating
- alter the composition of foods by their ability to bind food and water
- undergo **coagulation** with the addition of correct temperatures
- undergo a Maillard reaction, the browning reaction that occurs when proteins are combined with sugar during the application of dry heat.

Figure 12.18: When proteins are heated, they become denatured and change texture. In many cases, this causes the structure of the material to become softer and meat is then cooked.

Coagulation of proteins

Coagulation is the permanent transformation or irreversible change from a liquid to a solid state. It changes the structure of the proteins present in foods such as milk, eggs and meat when they are subjected to:

- heat – such as custard
- agitation – the beating of an egg.

Denature
To bring about a permanent structural change in protein molecules. This can occur as a result of heat, mechanical action or the addition of acid.

Coagulation
A permanent change in protein from a liquid into a thick mass as the result of heat or the addition of acids.

Figure 12.19: Ricotta cheese – casein in milk is easily coagulated when acid or the enzyme rennin is added in the cheese-making process.

Figure 12.20: When heated, the protein in the egg white denatures, then starts to thicken and coagulate.

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Let's talk

Did you ever pour yourself a cup of milk only to find it came out in clumps instead of a smooth liquid? This is generally a sign that the milk has gone off, especially if it smells sour. Coagulation is the mechanism that occurs when proteins in the milk aggregate. You do not necessarily want this in your milk, but we use coagulation (or curdling) to make cheese and yoghurt, which is why this is an important process in the food industry.

Figure 12.21: Have you noticed that meat shrinks a little when it is cooked? As it is exposed to heat, the proteins coagulate and shrink, with the muscle fibres losing water, giving them a firmer structure.

Denaturation of proteins

The denaturation of proteins occurs when the structure of the original protein is changed.

Denaturation is a structural change in a protein that results in the loss (usually permanent) of its physical properties.

Because the way a protein folds determines its function, any change of the structure will alter its activity and impact on the final food product. Denaturation of proteins can usually be caused by two key conditions: temperature and pH, as explained in Chapter 11.

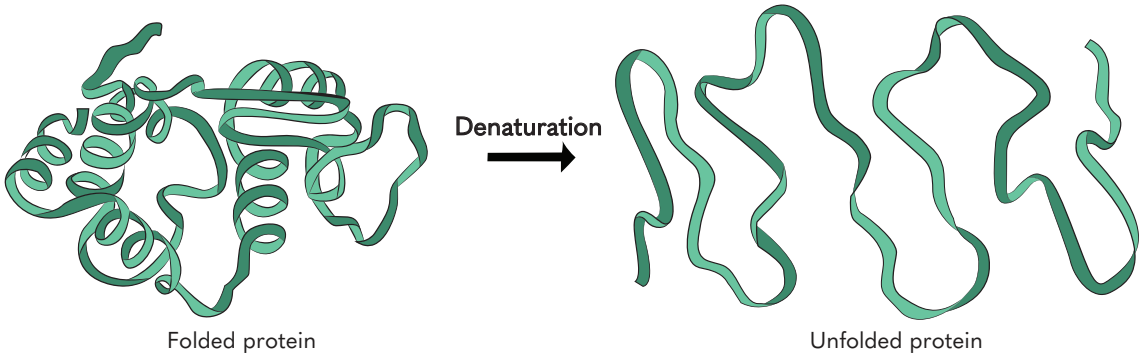

Figure 12.22: The denaturation process

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The molecule unfolds and is changed into a random form by this unfolding. A number of factors can influence denaturation:

- High temperatures readily denature proteins:
  - Think about the changes in an egg as it is cooked. Once the protein in an egg is denatured, the process cannot be reversed.
  - The change to meat fibres during cooking is another example of denaturation.
  - The setting of a dough during bread-making to form a loaf of bread is another example of denaturation.

Figure 12.23: The beating of egg whites when making an egg white omelette, sponge or meringue denatures the protein, causing the physical properties of the egg white to change from a liquid to stiff peaks.

- Agitation, or the process of whipping and beating, results in denaturation. The agitation causes an increased surface area, which partially denatures the proteins.
- The addition of sugar elevates the temperature at which proteins will coagulate.
- The addition of salt weakens the bonds that hold the structure of the protein together.

Hydrolysis of proteins

The process of hydrolysis involves the chemical breakdown of the complex protein molecule to a simpler one. When a protein food – for example, meat – is cooked with a marinade that contains an acid such as vinegar or lemon juice, tenderisation of the meat occurs because of hydrolysis.

Figure 12.24: In order to tenderise calamari (a protein food), slices of kiwi fruit can be used. The bromelin, a proteolytic enzyme, is responsible for tenderising or breaking down the protein structure of the calamari.

Maillard reaction

A Maillard reaction or browning occurs when an amino acid of a protein reacts with sugar to produce a brown colour. Dry heat is required for this process to occur.

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Figure 12.25: The golden brown colour of baked goods is caused by the Maillard reaction.

Activity **12.2** (Practical): Understanding changes to the physical properties of proteins

Cook a small portion of each of the proteins listed in the table.
Copy the table and complete to describe the physical properties of each before and after cooking.

Protein source (How to be prepared)	Physical properties before cooking	Physical properties after cooking	Name the functional property that may have caused the changes observed
Chicken tenderloin (fried)			
Legumes such as chickpeas, lentils or beans (boiled)			
Small portion of fish, calamari or prawn (fried)			
Egg (fried)			
Egg (poached)			
Smoked salmon (add tablespoon lemon juice)			
Egg white (beaten)			

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Starch

Starch is found in the key food: cereals. It is the storage form of carbohydrates in plants. Starch is found in the endosperm of the cereal grain.

Starch is produced by all green plants as an energy store. It is the most important carbohydrate in the human diet and is found in such staple foods as rice, wheat, maize (corn), potatoes and cassava. Starch is often referred to as a polysaccharide (poly = many and saccharide = sugars). Starch is many sugar molecules attached together.

Starch
A carbohydrate made in plants, which provides energy to the human body.

Activity **12.3** (Inquiry): Starch search

Search your home or school pantry for examples of different starches such as flour, cornflour and rice flour.

- Copy and complete the following table to compare their physical properties.
- Brainstorm ways in which each starch is used in food preparation.
- Hypothesise what the changes to the physical properties of each starch could be when cooked.

Starch example	Physical properties	Application in food preparation and cooking	Hypothesis – changes to physical properties once cooked

Functional properties and changes to starch during food preparation and cooking

Starches used in food preparation and processing are any flour from grains, such as wheat, rice and corn, potato flour and arrowroot. The changes that occur to the starch grain vary with dry heat and moist heat.

When heat is applied to any starch grain, the grain swells. This enables starch to be used as a thickening ingredient and as the structure in breads and other baked goods. The concept map in Figure 12.27 outlines the functions of starch in food preparation and processing.

Figure 12.26: Have you ever wondered what would happen if you forgot to include the flour when making baked goods such as bread and cakes? They would have no structure. The starch and gluten allow the product to hold its shape once cooked.

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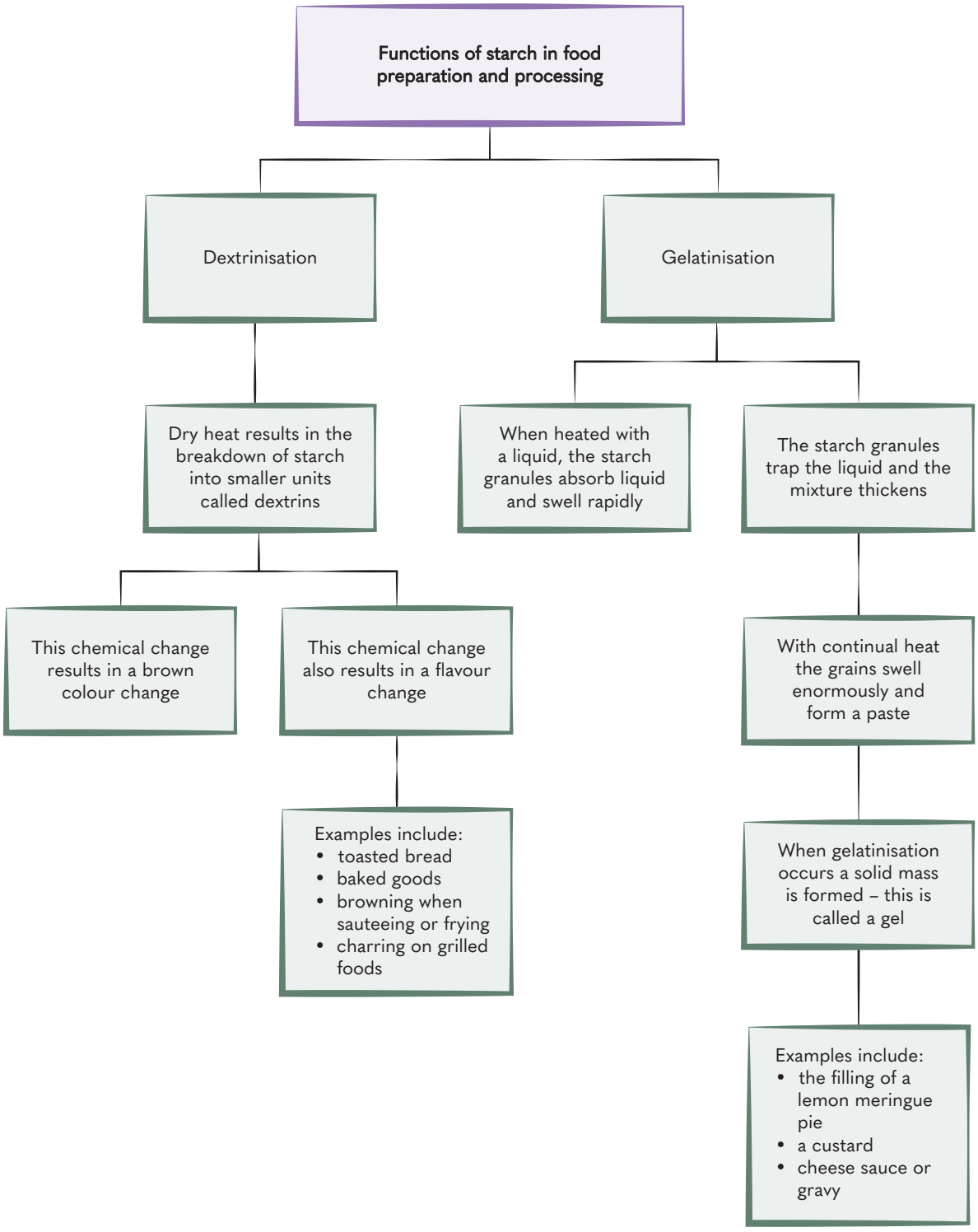

Figure 12.27: Functions of starch in food preparation and processing

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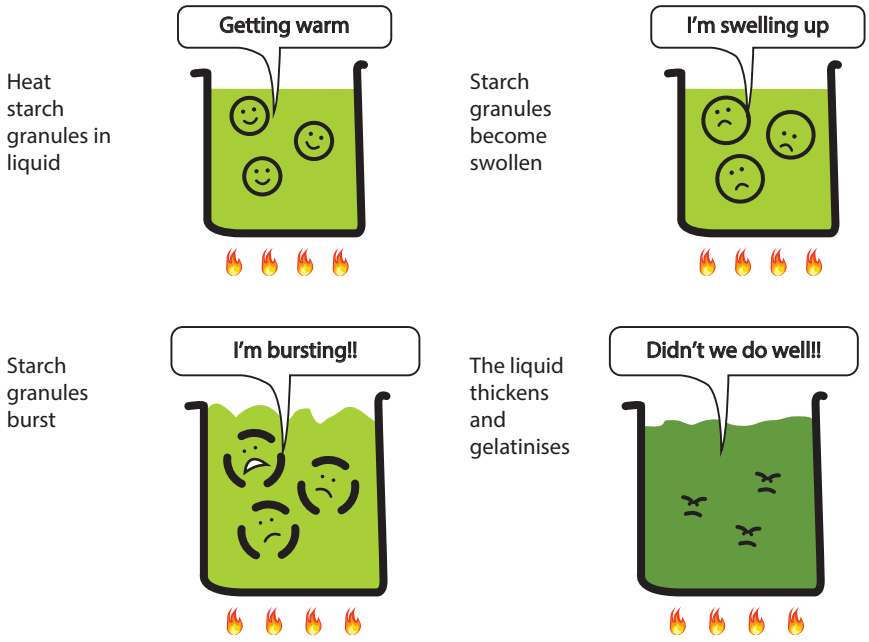

Starch gelatinises when heated in a liquid, producing a thickened liquid

Figure 12.28: Gelatinisation is the thickening of a starch caused by the presence of heat and water. The starch in the process swells as it becomes exposed to the heat and water. After a while, the starch particles burst as they reach their swelled peak, which causes the mixture to become thicker. In this process, water is dissolved.

Gelatinisation
The thickening of a starch caused by the presence of heat and water.

Activity 12.4 (Practical): The science of gelatinisation

Prepare the following pancake recipe to see gelatinisation in action.

With the science

Pancakes are using gelatinisation as they gradually swell the starch particles over the frypan. This causes the pancake to go from a thick liquid to a thick solid. The granules cause the liquid to become ridiculously thick and then become a very soft solid.

Without the science

These pancakes would be a liquid without the gelatinisation. If they were not solid, they would be unappealing and hard to eat. The pancakes have a thick and soft feel and a sense of sweetness.

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Pancakes

Ingredients

Pancakes


1½ cups of milk


1 egg

2 teaspoons of vanilla extract


2 cups of self-raising flour


¼ tsp of bicarbonate of soda


⅓ cup of caster sugar


25 g melted butter

Topping


Blueberries


Sour cream

Method

1. Whisk the milk, egg and vanilla together in a jug.
2. Sift flour and bicarbonate of soda into a bowl.
3. Stir in sugar.
4. Make a well in the centre and add milk mixture. Whisk well.
5. Heat a large non-stick frypan over a medium heat and brush the pan with butter.
6. Using ¼ cup of mixture per pancake, cook 2 pancakes for 3–4 minutes or until bubbles appear on the surface.
7. Flip over and repeat until completely cooked through.
8. Repeat steps 6–7 as desired.
9. Add sour cream on top and then the blueberries.

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Chicken and vegetable risotto

Ingredients


½ red capsicum


500 mL vegetable stock


125 mL water


Chicken breast


1 tablespoon olive oil


½ brown onion, finely diced


1 garlic clove, crushed


3 button mushrooms, sliced


½ cup Arborio rice


⅛ butternut pumpkin, diced into 2 cm cubes


2 tablespoons sundried tomatoes, sliced


¼ cup parmesan cheese


30 g spinach


1 tablespoon parsley, shredded


1 tablespoon basil, shredded


Salt and pepper, to taste

Method

1. Preheat grill to 200°C. Spray capsicum with oil and place skin side up on a foiled baking tray. Grill for 10–15 minutes or until skin starts to blacken and blister. Remove from oven and place in freezer bag. Once cool to touch, peel off all of the blackened skin and slice thinly.
2. Heat the stock and water in a small saucepan. Keep saucepan lid on.
3. When the stock is simmering, place chicken breast in the liquid and poach until cooked through. Remove the chicken from the stock and set aside. Once cool enough to handle, slice the chicken thinly against the grain.
4. Heat the olive oil in the large saucepan over a medium-low heat. Sauté the onion until translucent – do not brown.

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5. Add the garlic and mushrooms and cook until mushrooms start to soften.
6. Add the rice and stir to coat the grains with oil.
7. Stir in the pumpkin and sundried tomatoes.
8. Add in the hot stock, one ladle at a time. Continue to stir until most of the stock has been absorbed. The mixture should be barely simmering as the stock is being absorbed.
9. Continue this process until the rice is al dente. Add more water to the stock if required.
10. Season with salt and pepper.
11. When the rice is al dente, remove from heat and stir through the chicken, capsicum, spinich, herbs and cheese. Reserve some of the herbs and cheese for garnish. Place lid on saucepan and let the risotto stand for 3 minutes.
12. Serve and garnish with parmesan cheese, parsley and basil.

Evaluation questions

1. Identify and describe the methods of heat transfer used in making the chicken and vegetable risotto.
2. State why Arborio rice is the best variety for making a risotto.
3. Describe the physical and chemical changes occurring to the chicken during cooking.
4. Identify and describe the chemical change that occurs when the rice is cooked in the stock.
5. Describe how to avoid cross-contamination when preparing the chicken and vegetable risotto.

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Dextrinisation

Dextrinisation occurs when starch is toasted or cooked by dry heat. It is a result of the starch breaking down by the dry heat to form **dextrins**. The properties of starch are altered as a result of heat application. This is also known as non-enzymic browning.

Dextrins taste sweeter than starch and add flavour to toasted, charred or baked goods. Dextrins are **hygroscopic**, absorbing moisture from the air. Characteristic of dextrinization are golden colours, browning, sweeter taste and crispness.

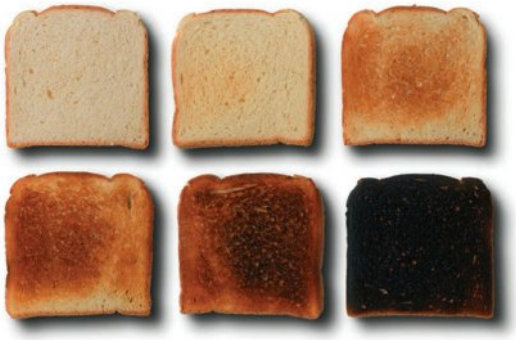

Figure 12.29: The stages of dextrinisation. As well as changing the appearance, dextrinisation also changes the flavour and the aroma.

Dextrin
A soluble gummy substance used as a thickening agent.

Hygroscopic
A substance that absorbs moisture from the air.

Activity **12.5** (Practical): Dextrinisation

Cook six pieces of bread so they are prepared to the stages of dextrinisation shown in Figure 12.29. Complete a sensory analysis of each piece of bread. Copy and complete the table below to comment on taste, texture, appearance, aroma and flavour.

Bread – toasted	Taste	Texture	Appearance	Aroma	Flavour
					
					
					
					
					
					

Evaluation

Explain how the degree of dextrinisation can impact the physical properties of a food item.

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Sugar

Sugar is a simple carbohydrate (saccharide) that performs a variety of functions in food preparation and processing. Sugar contributes to the sweetness, taste and flavour of food items. Sugars can vary in their level of sweetness. Fructose found in fruit is one of the sweetest sugars, while lactose found in milk is not so sweet.

Sugars are classified according to the number of sugar molecules that make up the structure.

Sugar
An energy-dense carbohydrate mainly made of sucrose.

Table 12.1: Classification of sugars

Sugar classification	Explanation	Examples
Monosaccharides	Simple sugars consisting of single saccharide units	Fructose, glucose and galactose
Disaccharides	Simple sugars that have two sugar units	Lactose, maltose and sucrose
Polysaccharides	Complex carbohydrates that have many sugar units	Pectin and starch

Let's talk

How many different types of sugar are there? Can you list them? Don't forget sugar syrups.

Describe the changes to the physical properties that occur when sugar is used in food preparation and when it is used in cooking.

Figure 12.30: The presence of sugar (natural or added) adds colour to food when cooked. It melts and goes brown when heated, which is referred to as caramelisation. The process also enhances the aroma of food.

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Functional properties and changes to sugar during food preparation and cooking

Sugar is a popular ingredient in food preparation as it has many functions.

Figure 12.31: There is a wide range of functional properties and changes to sugar during food preparation and cooking.

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Figure 12.32: Caramelisation also occurs when dry heat is applied to fruit and vegetables with a high naturally occurring sugar content. This browning process is evident with baked potatoes, baked apples and fried onions.

Let's talk

Have you ever eaten a raw onion? Why do cooked onions and raw onions taste so different? Think about the process of caramelisation.

Activity **12.6** (Practical): Caramelised onions

Prepare the caramelised onions in the following recipe and serve them on toast.

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Caramelised onions on toast

Ingredients


1 teaspoon olive oil


½ brown onion, sliced thinly


1 teaspoon brown sugar


1 teaspoon balsamic vinegar


1 slice bread, toasted

Method

1. Heat oil in a large frypan over low heat. Add the sliced onions, cook very slowly for 15–20 minutes, stirring occasionally to prevent them from sticking.
2. When onions are softened and tinged golden, add the sugar and balsamic vinegar; this will start the caramelisation process.
3. Cook onion over low heat for a further 5–10 minutes, stirring occasionally, until sticky and caramelised.

   Serve immediately on toast.

Evaluation questions

1. Describe the changes of physical properties of the onion as a result of cooking.
2. Identify and outline the process responsible for the colour change of the onion.
3. Suggest what would occur if the onion were cooked without sugar.
4. Name and describe the chemical change that occurs when bread is exposed to dry heat.
5. Name and describe the process that occurs if you cook a sausage to serve with your onions.
6. Gravy is thickened through the process of gelatinisation. Using gravy as the example, outline this process.

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Big breakfast

Okay, let's pull all of this together into a big breakfast. As you prepare the components of your big breakfast, consider where the emulsion is occurring, what physical changes are happening to the egg, and which ingredients have dextrinisation occurring. What else is going on as you cook your big breakfast?

Hollandaise sauce

Ingredients

1 egg yolk

2 teaspoons lemon juice

⅛ teaspoon cayenne pepper

80 g salted butter, melted

Method

1. Melt the butter in a microwave.
2. In a bowl, whisk together the egg yolk, lemon juice and pepper.
3. Place the bowl above a small saucepan of simmering water, ensuring the water does not touch the bowl.
4. Slowly add in the melted butter, making sure you whisk throughout to avoid scrambling. If the sauce becomes too thick then add a teaspoon of water.
5. Whisk until you have a creamy smooth texture. Taste the sauce before serving and add extra seasonings accordingly. Set aside.

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Sweet potato rosti

Ingredients


½ sweet potato, grated


1 egg white, whisked


½ teaspoon paprika


Salt and pepper to taste


1 tablespoon olive oil

Method

1. In a bowl, combine the grated sweet potato, egg, paprika, salt and pepper.
2. Mould into a burger shape – one or two depending on desired size.
3. Warm 1 tablespoon of olive oil in a frying pan over a medium heat. Add the sweet potato patties and cook until brown and crispy on the outside and cooked through in the centre. This should take around 10–12 minutes.

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Sides

Ingredients


1 Portobello mushroom


2 teaspoons parmesan cheese, grated


½ teaspoon dried thyme


1 small garlic clove, crushed


1 truss tomato


¼ avocado


1 slice shortcut bacon


1 tablespoon oil


Salt and pepper to taste

Method

1. Heat oven to 200°C. Prepare baking tray with baking paper.
2. Wipe the mushroom clean and remove the stem.
3. Combine the crushed garlic, thyme, 2 teaspoons oil, salt and pepper in a small bowl.
4. Cut the tomato in half.
5. Drizzle the garlic mixture from step 3 over the inside of the mushroom and the cut sides off the tomatoes.
6. Bake the mushroom and tomatoes for around 15 minutes then top the mushroom with parmesan cheese and return to the oven for another 5 minutes.
7. Meanwhile, heat 2 teaspoons of olive oil in the frypan and cook bacon until golden brown.
8. Slice the avocado into thin strips before serving.

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Poached eggs on toast

Ingredients

1 slice wholemeal bread

1 egg

2 teaspoons vinegar

Method

1. Heat water in a small saucepan, around 8 cm deep. Add vinegar.
2. Bring water to just below simmering point.
3. Meanwhile, toast bread until desired browning level has been reached.
4. Crack egg into measuring cup to make it easier to place into water.
5. Gently stir the water to create a whirlpool; this will help the egg white to wrap around the yolk.
6. Slowly tip the egg into the centre of the whirlpool.
7. Cook for 3–4 minutes until the egg white is set and the yolk is runny.
8. Serve on toast, top with Hollandaise sauce and present with side dishes.

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Evaluation questions

1 Describe the physical and chemical changes that occur to the egg when it is poached.

2 Outline how the change in water pH impacts the egg during poaching.

3 Copy and complete the table below, identifying and describing the method of heat transfer occurring in each step.

Step	Method of heat transfer	Description
Melting the butter in the microwave		
Frying the potato rosti		
Toasting the bread		
Poaching the egg		

4 Copy and complete the table below, identifying and describing the chemical changes occurring in each step.

Step	Chemical change	Description
Whisking the egg		
Creating the Hollandaise sauce		
Browning the bacon		
Toasting the bread		

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Chapter revision

- Cooking changes the physical and chemical properties of key nutrients in foods. These changes include aeration, caramelisation, coagulation, dextrinisation, emulsification, denaturation, gelatinisation and the Maillard reaction
- Fats are a vital nutrient that performs a number of functions in food preparation and processing. These functions include texture, moisture or lubrication, flavour, visual appeal, aeration, emulsification, preservation and crispy coating.
- Protein is broken down during digestion into amino acids. Proteins serve a number of functions in food preparation and processing. Cooking can alter the amino acid composition of protein, which usually results in desirable flavour and browning development. When proteins are heated, they become denatured and their texture changes.
- Starches used in food preparation and processing are any flour from grains, such as wheat, rice and corn, and potato flour and arrowroot. The changes that occur to the starch grain vary with dry heat or moist heat. When heat is applied to any starch grain, the grain swells. This enables starches to be used as a thickening ingredient and to provide structure to baked goods.
- Sugar contributes to the sweetness, taste and flavour of food items. It has a large number of functions in a variety of food items, in both the home and commercial settings.

Apply your knowledge

1. Describe the difference between denaturation and coagulation.
2. Egg whites are an extremely functional component. Outline the physical and chemical changes that occur to egg whites when they are whisked.
3. Describe the physical changes that occur when flour is added to water and cooked.
4. Using an example, explain how an emulsion occurs.
5. Produce a concept map that summarises the function of sugar in food preparation and processing.
6. Describe the difference between the colouring reactions of dextrinisation and the Maillard reaction.
7. Name the chemical change that occurs when onion is cooked in a frypan.
8. Describe one chemical change that occurs to an egg when it is cooked.

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Practice exam questions

Question 1

The name of the process where an amino acid of a protein reacts with sugar to produce a brown colour in the presence of dry heat is:

A Maillard reaction.
B Dextrinisation.
C Coagulation.
D Aeration.

1 mark

Question 2

A State the name of the chemical change in the pictures above. (1 mark)
B Describe how this chemical change occurs, referring to the pictures in your response. (2 marks)

3 marks

Question 3

Describe **one** physical change to starch when cooking. **2 marks**
Describe **one** chemical change to starch when cooking. **2 marks**

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Area of study 2: Extended response question

Question 1
Cooking food at home involves significantly more practical food skills than required in a commercial setting.
Discuss this statement.

8 marks

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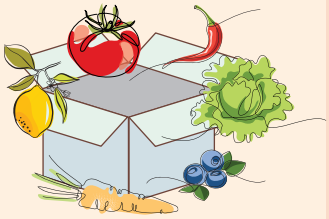
Let's unpack it



Refer to the **How to unpack exam questions** section on page xvi as a guide to the question breakdown below.

Question 1

Cooking food at home involves significantly more practical food skills than required in a commercial setting.
Discuss this statement.

8 marks

A Annotate the command word

Discuss: Provide a clear, considered and balanced argument or prose that identifies issues and shows the strengths and weaknesses of, or points for and against one or more arguments, concepts, factors, hypotheses, narratives and/or opinions.

B Parts of question

Cooking food at home
Significantly more
Practical food skills
A commercial setting

C Count the marks – holistically marked

8 marks:
Include opinion and examples of both sides, final judgement or conclusion.

D Determine key words to use

Cooking food
Commercial setting
Home compared to commercial settings
More practical skills
Practical skills plus knowledge?
Opinion – yes or no. Why?

E Evidence

Use your knowledge to provide evidence to support your statements made.
Provide clear in-depth examples to support your point of view.
Provide opinion with examples to demonstrate a deeper understanding.
Show both sides with a final judgement/conclusion.

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Glossary

Abattoir

A processing centre where livestock are slaughtered for food.

Acid

Any chemical compound that, when dissolved in water, gives a solution with a hydrogen ion concentration greater than pure water. Acids may be present naturally in foods or added during processing.

Acquisition

The act of obtaining or gaining a new skill.

Activism

The action of using vigorous campaigning to bring about social or political change.

Aeration

To incorporate air into food by a mechanical process such as beating or whisking.

Agrarian

A place or country that uses land for cultivation and farming, and grows its economy based on what is produced.

Agricultural industries

Production of crops and livestock such as grains, fruits and vegetables, nuts, meat and dairy.

Agriculture

The practice of farming, which involves cultivation of land for growing crops and feeding, breeding and raising livestock.

Albumin

A water-soluble protein found in egg whites and blood.

Alkalis

Ionic salts used in food preparation and processing as a raising agent.

Allergic reaction

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

Amino acids

Long-chain protein molecules.

Anaphylaxis

Extreme sensitivity to a food product; can be life-threatening.

Aquaculture

Farming of aquatic organisms, including fish, molluscs, crustaceans and aquatic plants.

Asylum seeker

A person who has fled their country and is seeking international protection from persecution and human rights violations, and whose claims for refugee status have not yet been determined.

Bacteria

Single-celled micro-organisms responsible for decay, fermentation and ultimately food spoilage.

Baking

Cooking of food in an oven by currents of hot air surrounding food with no oil or fat coating the surface.

Bar code

A machine-readable code on a product consisting of numbers and parallel lines of varying widths, and used for stock control and entering data into a computer system.

Biodiversity

The variety of plant and animal life in a particular habitat or the world.

Biogas

Fuel, predominantly composed of methane and carbon dioxide, that is produced from raw materials such as agricultural waste.

Blanching

Submerging food in boiling water for a short period of time.

Body image

Refers to how you perceive, think and feel about your body, as well as how you think others see you. This can refer to your general appearance, size, weight and shape.

Boiling

Cooking of food in water or liquid with the water bubbling at or above 100°C.

Boiling point

The temperature at which water or a liquid changes to steam.

Broth

A stock made from simmering any of the following for a relatively short time: bones, meat, fish and/or vegetables.

Caffeine

A natural chemical that has a stimulating effect on the body and is found in coffee, tea and cacao plants.

Caramelisation

The heating of sugar or foods containing sugar until a brown colour and characteristic flavour develop.

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Cellulose

One of the main components of plant cell walls. An indigestible carbohydrate and an important source of insoluble fibre.

Cholesterol

A fatty substance found in our cells.

Climate change

Any long-term trends or shifts in climate over many decades (CSIRO).

Coagulation

A permanent change in protein from a liquid into a thick mass as the result of heat or the addition of acids.

Coeliac disease

Disease of the small intestine that results in permanent intolerance to gluten, inflammation of and damage to the lining of the small intestine and medical complications.

Compost

Decaying organic material that can be used as fertiliser for growing plants.

Conduction

The transfer of heat between substances that are in direct contact with each other – for example, a frying pan.

Considerations

Issues or aspects to be considered when designing options for a product – for example, the weather or equipment available. They provide some restrictions, but have some flexibility. Considerations are included in design brief specifications.

Constraints

Restrictions or fixed factors that are non-negotiable and affect the development of a new product. The designer has little control over these – for example, allergens, legislation and food safety requirements. Constraints are included in design brief specifications.

Convection

The transfer of heat through circulation of hot fluid (water, oil, air or steam) that surrounds the food. As the fluid warms, it becomes less dense and rises. Cooler, denser fluid above then sinks down towards the heat source, creating circular convection currents.

Criteria for success

Questions developed from the design brief that are used during the evaluation process to ensure the specifications of the brief have been met.

Crops

Plants or plant products that can be grown for food.

Cuisine

Ingredients, techniques and dishes that represent a style of cooking associated with a particular culture.

Cultivation

The planting, tending, improving, or harvesting of crops or plants and the process of fostering their growth.

Cultural background

The beliefs, customs and practices of a particular group of people that influence food choice.

Culture

Characteristics, knowledge, behaviours, attitudes and practices of a particular group of people.

Dark roux

A darkened mixture of equal proportions of butter or other fat and flour, used as a base for thickening sauces for making gravy.

Denature

To bring about a permanent structural change in protein molecules. This can occur as a result of heat, mechanical action or the addition of acid.

Design brief

A vital step in transforming ideas into creative, practical and commercial realities. Design optimises the value of products and systems, and is therefore an important key to economic and social development.

Design process

Problem-solving that draws on experience, research, invitation, imagination and creativity.

Dextrinisation

The process that occurs when starch is exposed to dry heat; the starch is broken down to dextrin, resulting in a change in colour to golden brown.

Dextrin

A soluble gummy substance used as a thickening agent.

Discretionary foods

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

Domesticated

Transition from a wild or natural state to a farmed and/or cultivated environment that humans manage and from which they benefit.

Dry methods of cooking

Cooking techniques where the heat is transferred to the food without moisture. These methods of cooking involve high temperatures.

Ecologically

Study of the relationship between living organisms and their interaction with their environment.

Egalitarian

A belief that all people and resources are equal, and that all people are entitled to the same rights and opportunities as each other.

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Electromagnetic radiation

A type of energy that takes many forms, including visible light. In cooking, microwave and infra-red radiation are its main applications.

Emulsion

A suspension of small globules of one liquid (oil) in a second liquid (vinegar) with which the first will not mix.

Environmental health officers

People employed by local government who are responsible for inspecting food premises and advising on public health standards.

Environmental sustainability

Protecting and maintaining environmental resources for future generations.

Enzymes

Proteins that act as biological catalysts in living organisms. They bring about and speed up chemical reactions in foods without being changed themselves.

Epoch

A unit of geological time that measures the history of the Earth; it is less than a period and greater than an age.

Equitable

Fair distribution to enable positive outcomes for all.

Fairtrade

A labelling system specifying that fair trading standards are met at every stage of production, and that a certain portion of profits is returned to the producers and communities.

Fats

Compounds, usually derived from an animal source, that are solid at room temperature and liquid when heated.

Feedlot

A location where livestock are confined and fed high-energy grain to maximise growth for the purpose of slaughter.

Feedstock

Raw material that can be used in the production of fuel.

Fertilisers

Substances that provide nutrients to help plants grow or improve soil; used to produce more crops.

FODMAP

An acronym used to describe the group of fermentable short-chain carbohydrates: fermentable oligosaccharides, disaccharides, monosaccharides and polyols.

Food allergy

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

Food-borne illness

Illness caused by eating food that has harmful micro-organisms in it – for example, gastroenteritis ('gastro').

Food citizenship

The practice of encouraging food-related behaviours that support the development of democratic, socially and economically just, and environmentally sustainable food systems.

Food fusion

A form of cooking combining cuisines that have originated in different countries, regions or cultures.

Food insecurity

A lack of regular access to enough safe and nutritious food for normal growth and development and an active and healthy life. This may be due to unavailability of food and/or lack of resources to obtain food. Food insecurity can be experienced at different levels of severity.

Food intolerance

A chemical reaction in the body to particular foods; it is not an immune response. Food intolerance is much more common than food allergy – for example, gluten intolerance.

Food laws

Rules and regulations that cover all foods produced, imported and sold in Australia.

Food literacy

A set of knowledge, skills and attitudes that impact food behaviours.

Food recall

'An action taken to remove from distribution, sale and consumption food which may pose a health and safety risk to consumers' (FSANZ).

Food safety plan

A documented system in place to ensure that food sold to Australian consumers is safe for consumption.

Food security

'When all people at all times have physical and economic access to sufficient, safe and nutritious food to meet dietary needs and food preferences for an active and healthy life' (The Prime Minister's Science, Engineering and Innovation Council (2010), *Australia and Food Security in a Changing World*, p. 1).

Food service industry

A sector that encompasses all the activities, services and business involved in preparing and serving food to people eating away from home.

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Food sovereignty

The right of people to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems.

Food Standards Australia New Zealand (FSANZ)

The national authority that develops the laws and practices regulating food production in Australia and New Zealand.

Food systems

All the elements and activities related to producing and consuming food, and their effects, including economic, health, and environmental outcomes (OECD).

Food standards

A collection of individual standards for all foods sold in Australia.

Food Standards Code

A code that lists requirements for foods, such as additives, food safety, labelling and genetically modified (GM) foods.

Foraging

Gathering of wild food to eat. This form of hunting and gathering was a way of life for hunter-gatherers.

Free trade agreements

International agreements between countries that reduce or eliminate barriers to trade and investment such as tariffs.

Frying

The cooking of food by conduction of heat in fat or oil. The food is cooked until crisp and golden.

Functional foods

Foods that provide health benefits beyond basic nutrition – for example, adding omega 3 to a food that does not normally contain this nutrient, or decreasing the fat content of a traditional food, such as milk.

Functional properties

The physical and chemical properties of ingredients that impact food preparation and processing. For example, a functional property of starch is that it enables gelatinisation or thickening to occur when making a cheese sauce.

Gel formation

The thickened product produced when starch softens and absorbs moisture.

Gelatinisation

The thickening of a starch caused by the presence of heat and water.

Ghee

Butter that has had the impurities removed or clarified.

Globalisation

Integration of local and national economies and industries. It involves the movement of goods and services and increases in the flow of processing and production of food systems on a global scale.

Gluten

The protein found in flour. Gluten forms the framework needed to create raised food items, such as biscuits, cakes and bread.

Grilling

The cooking of food by placing the food under the heating element of the griller, using dry heat.

Gumbo

A traditional Southern American stew. Creole cooking uses a wet method of cooking. The base ingredients, or 'holy trinity', are an onion, celery and bell pepper (capsicum).

Halal

Meat that has been slaughtered in a ritual way according to Islamic law.

Health star rating

A front-of-pack labelling system whereby a rating is given for a product's overall nutrition content from half a star to five stars.

Horticultural industries

Sub-components of the agricultural industry comprising fruit, vegetables, nuts, flowers, turf and nursery products.

Hunter-gatherer

A person who lives a nomadic life by hunting and gathering food that is found in the wild.

Hydrolysis

A chemical reaction whereby a chemical compound is broken down by a reaction involving water. This allows the molecules to react more readily with enzymes.

Hygiene

The practice or principles of cleanliness in order to preserve health and prevent the spread of disease.

Hygroscopic

A substance that absorbs moisture from the air.

Immigration

Travelling to another country in order to take up permanent residence.

Immune system

The body's defence against infection. It is made up of cells and proteins that create a complex network. When the body senses foreign substances (antigens) and perceives them as threatening, it will stimulate an immune response to fight off the invader.

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Industrialisation

A social and economic process of transition from an agrarian and artisanal lifestyle to one controlled by manufacturing and trade.

Intensive farming practices

Removing animals from their natural habitats and social structures in order to confine them to small, restrictive environments.

Internet of Things (IoT)

A network of physical objects (things) that are embedded with sensors and/or software in order to gather data. This information is interconnected with other systems and devices via the internet.

Irrigation

A system used to water crops to supplement low rainfall or water from other areas.

Kosher

Food that has been prepared so it is fit to eat under the food requirements of the Jewish religion.

Lactose intolerance

A condition whereby the body is unable to digest lactose.

Landfill

A tip or rubbish dump where waste is sent.

Lard

A saturated fat used in pastry and dough or for shallow and deep frying. It produces a crisp texture.

Leavened bread

Bread made by adding gas to the dough before or during the baking process to produce a lighter bread.

Leavening

Causing expansion of doughs and batters by the release of gases within such mixtures, producing baked products with a porous structure.

Leavening

The ability to form gases (air, carbon dioxide, steam) that expand on heating, so that a food can rise, set and become light.

Lifestyle diseases

Diseases associated with our lifestyle, including obesity, cardiovascular disease, type 2 diabetes, hypertension and some forms of cancer.

Live exports

Livestock that are shipped internationally.

Maillard reaction

Browning that occurs when an amino acid of a protein reacts with sugar to produce a brown colour.

Market research

The activity of gathering information about consumers' needs and preferences.

Marketing

The action or business of promoting and selling products or services, including market research and advertising.

Media

Mass communication such as broadcast, print and online media.

Microbial fermentation

The chemical decomposition of food by microbes.

Microbiome

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

Microbiota

The wide variety of micro-organisms, including fungi, yeast and bacteria, that live in the gut.

Migration

Movement of people from one place in the world to another.

Moist methods of cooking

Cooking techniques which use liquid (such as water, stock or wine) or steam to transfer heat to food.

Neolithic Revolution

A period that saw the beginning of agriculture. Humans made the transition from hunter-gatherer lifestyles to farming and settled villages.

Nomadic

Moving from one place to another, with no fixed home location. An individual is called a nomad.

Obesity

Having a BMI of 30 or over; being 20 per cent or more above your ideal weight according to height and sex.

Objective

Something that can easily be measured on the basis of facts and is not emotionally based or determined.

Oils

Compounds that are liquid at room temperature and often come from plant sources – for example, nuts and seeds.

Organoleptic properties

The aspects of food experienced by the senses.

Percentage daily intake

The percentage of an average adult's dietary requirements that the food product provides.

Pesticides

Chemical substances used in agriculture to kill pests.

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Phytochemicals

Chemicals found in plants that can help prevent disease.

Poaching

A cooking method in which food is gently simmered in liquid to seal it, and to retain its juices and flavour.

Precipitation

Water that forms in the atmosphere and falls to the ground, such as rain, hail and snow.

Primary processing

Involves a range of processes to make food safe to eat so it can be consumed individually or used to make other food products. Examples include harvesting, slaughtering, washing, grading, sorting, transporting, blending, milling, packaging and distribution. Primary processing involves minimal impact on the food's physical properties.

Primary production

Agricultural and horticultural industries that cultivate plants and animals.

Protein

Organic compounds made up of amino acids.

Quarantine

Removal or isolation of pests and other items that are dangerous to plant and animal life.

Radiation

The indirect transfer of heat by electromagnetic waves, which behave like light, heating the surface of food but not penetrating it. The interior of the food is heated by conduction from the surface. Radiation is used in grilling, barbecuing and microwaving.

Recycling

Converting waste into new materials for use in new products.

Reduction

A process of decreasing the amount of liquid in a sauce, stock or stew, by simmering or boiling uncovered. In a stew this is done to make the sauce thicker.

Rennin

An enzyme used in cheese production.

Resilient

Able to recover quickly or withstand difficult situations.

Roasting

The cooking of food by a very hot air current that circulates around the food which is coated in fat or oil.

Roux

A mixture of equal proportions of butter or other fat and flour, used as a base for thickening sauce or making gravy.

Rubbing in

A cooking method whereby flour grains are coated with fat by gently rubbing between the fingertips and thumbs. This 'rubbing in' continues until the mixture resembles coarse breadcrumbs.

Salinity

The presence of salt in soil due to a rising water table, bringing natural salts to the surface of the land.

Secondary processing

Methods of turning primary processed food into other food products, either on their own or mixed with other ingredients. The physical form of the original food can change quite significantly as a result of secondary processing.

Sedentary

Describes a lifestyle that involves little or no physical activity. It is usually characterised by spending long periods of time sitting.

Semi-arid

Climate of regions that receive minimal precipitation. They tend to have extreme to hot summers and warm to cool winters. These are not desert regions because they receive more rainfall than a desert.

Sensory properties of food

The characteristics of food that are detected by the five senses.

Sensory testing

Tests carried out to determine the sensory qualities of a product, such as appearance and aroma.

Serving suggestions

Ideas for the best way to consume or present a product.

Simmering

Bringing water or water-based liquid to a temperature just below boiling point, 85°C, with that temperature is maintained during cooking.

Social factors

Factors including education, income, location, accommodation, available time and cultural norms that influence responses to food information, food accessibility, food choices and healthy eating.

Social media influencers

Online content creators who have built a large following across their social media platforms. Their wide reach, reputation, knowledge and relationships enable them to persuade others to act on the basis of their recommendations.

Soil acidification

A process whereby soil pH decreases.

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Specifications

Constraints and considerations or issues that will need to be thought about when coming up with a solution.

Starch

A carbohydrate made in plants, which provides energy to the human body.

Steaming

The cooking of food in hot water vapour or steam.

Stewardship

Careful and responsible management; taking care of something.

Stewing

A slow moist method of cooking. The food is cooked at low temperatures in a closed dish.

Subjective

A judgement made on the basis of individual preference rather than facts.

Sugar

An energy-dense carbohydrate mainly made of sucrose.

Sustainable

Able to be continually used without depletion; something that can be ensured for both current and future generations.

Target market

A group of customers or consumers who are considered likely to buy a particular product.

Tariffs

Taxation imposed by a country on imported and exported goods.

Technologies

New machinery and equipment created to improve processing and production, using scientific knowledge.

Temperate climate

Weather or climate free from extreme temperatures or conditions.

Tenderising

A technique for breaking down collagens in meat to make it more palatable and tender.

Topography

The surface of the Earth's land mass. Examples of land surfaces include mountains, valleys, rivers, craters, flats and swamps.

Umami

A Japanese word translated as 'pleasant savoury taste'. This is one of the five basic tastes.

Villi

Finger-like projections that extend along the small intestine and absorb nutrients during digestion.

Viruses

Microscopic parasites that are food or water borne; they cause viral infections that result in illnesses in humans.

Viscosity

Used to describe the sticky, thick consistency between a liquid and a solid.

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Florescu / 500px (Currants) / Creativ Studio Heinemann (Curry powder) / fcafotodigital (Dairy) /Brian Hagiwara (Dairy products) / Suzifoo (Dijon mustard) / jirkaejc (Dijon mustard) / AtlasStudio (Dips) / kyoshino (Edamame0 / macida (Egg fried) / J U N E-1989 (Egg) / domin_ domin (Egg/yolk /broken) / David Burton (Eggs) / PicturePartners (Endive) / Brian Hagiwara (Energy drink) / HUIZENG HU (Fish) / Floortje (Fish variety) / Lauren Burke (Flour/jar/spoon) / baibaz (Flour/plain) / Remains (Flour/self-raising) / KrimKate (Freekeh) / Peter Dazeley (Fruit & vegetables box) / lunanaranja (Garam Masala) / Oksana Ermak (Garlic minced) / Nattawut Lakjit (Garlic + cloves) / Afrumgartz (Ginger ground) / Tim UR (Ginger pickled) / Tetra Images (Ginger) / Simon Murrell (Grains/beans) / Simon Murrell (Grains) / Picture Partners (Harissa paste/green /red/chillis) / Lena_Zajchikova (Healthy fat foods) / JoKMedia (Herbs/dry/basil) / JoKMedia (Herbs mixed) / Science Photo Library (Herbs + spices) / Yevgen Romanenko (honey) / Dorling Kindersley:Dave King (Hummus) / Luis_Molinero (Jar) / Dimitris66 (Kefir glass and bowl) / bedo (Kimchi) / Jimmy Alim (Kiwi fruit) / AlisLuch (Kombucha) / Antoniu Rosu / 500px (Lassi) / Martin Barraud (Leafy green vegetables) / SimicVojislav (Leek) / Nattawut Lakjit / (Lemon) / Brian Hagiwara (Lemon zest) / Jenny Dettrick (Lentils) / ManuWe (Lentils red) / Andrzej Siwiec (Lettuce leaf) / mikroman6 (Lettuce iceberg) / Isabelle Rozenbaum (Lime) / Mr.nutnuchit Phutsawagun (Lime quartered) / Hamid Ebrahimi (Lime/Lemon juice bottle) / Peter Dazeley (Lollies) / stray_cat (Macadamia nuts) / ma-no (Macaroons matcha) / ALEAIMAGE (Margarine) / hdagli (Mayonnaise) / EddWestmacott (Meat-Kangaroo) / Creativ Studio Heinemann (Meat-lean steak) / Firn (Meat-plant based) / robynmac (Meats) / eAlisa (Meats-lean) / anmbph (Meats-processed) / Tetra Images (chicken/beef/seafood) / Jeffrey Coolidge (meat/ beans/seafood) / L Callvetti/SPL (Milk/glass) / Chris Stein (Milk-measuring cup) / Mo Semsem (Milk-skim) / Fascinadora (Milkshake) / Floortje (Mince-Beef) / Claudia Totir (Mint-bunch) / Floortje (Miso Soup) / Michelle Lee (Molasses) / egal (Muffin papers) / sanapadh (Muffin tray) / Jamakosy (Mustard) / Creativ Studio Heinemann (Nuts) / Nora Carol (Oats) / Neosiam (Oil – Macadamia nut) / stuartbur (Oil sunflower) / Brian Hagiwara (Oil olive tbs) / Okea (Oil olive tsp) / Victoriano Izquierdo (Olive oil bottle) / Image Studios (Olives) / Image Studios (Olives preserved) / Juanmonino (Olives) / AlxeyPnferov (shallot) / Floortje (Artichoke hearts) / Picture Partners (capers) Nenov (Onion brown) / Nicole Lienemann (Onion red) / Science PL (Orange juice) / Richard Clark (Oregano) / Richard Clark (Paprika) / Massimiliano Clari (Parmesan) / mescioglu (Parsley) / PicturePartners (Parsnips) / anilakkus (Pasta) / R.Tsubin (Pasta spiral) / (Peas frozen) Oksana Ermak / Sergio Delle Vedove (Pepper) / Joff Lee (Pickle) / Lena_Zajchikova (Pies) / timsa (Pine nuts) / Isabelle Rozenbaum (Pineapple) / AYImages /(Pineapple/glass) / Taras Dovhych (Pineapple/ pieces) / Taras Dovhych (Pineapple/ ring) / Melanie Hobson (Pistachio) / Juanmonino (Pita bread) / Brian Hagiwar (Pomegranate/cut) / Creativ Studio Heinemann (Pomegranate seeds) / Ivaylo Ivanov (Pomegranate) / Basilios1 (Pork loin) / Yevgen Romanenko (Potato) / Douglas Sacha (Potato black) / Ekaterina Kapranova (Probiotic) / Dmitriy Sidor (Probiotic/fermented foods) / R.Tsubin (Prunes) / Brian Hagiwara (Pumpkin) / YuanruLi (Pumpkin peices) / Jon Stokes (Pumpkin seeds) / sarahdoow (Quinoa) / Happycreator Kong-Im (Red kidney beans) / Barcin (Rice Basmati) / Nattawut Lakjit (Rice brown) / (AlasdairJames (Rice white) / Kondor83 (Rice wild) / Picture Partners (Rice vinegar) / ConstantinosZ (Saffron) / (Salami) esemelwe / Jonathan Kantor (Salmon) / The CrimsonMonkey (Salsa sauce) / Nattawut Lakjit (Salt) / MirageC (Salt rock) / MediaProduction (Salt tsp) / Glowimages (Salt & Pepper) / spline_x (Saltbush) / hydrangea100 (Sauerkraut) / omersukrugoksu (Seaweed) / Melanie Hobson (Seeds) / sunstock (Sesame oil) /John White Photos (Shellfish/seafood) / levkr (Silver beet) / fcafotodigital (Sliced ham) / Creativ Studio Heinemann (Snack foods) / Sean Gladwell (Sourdough bread) / design56 (Soy sauce) / Creativ Studio Heinemann (Soy sauce) / lunanaranja (Spices) / Science

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PL (Spices) / Aitor Muñoz Muñoz (Spices sesame) / Poh Kim Yeoh (Spinach) / Creativ Studio Heinemann (Spinach leaves) / Tom Blizzard (Sugar/brown) / AlasdairJames (Sugar) / trigga (Sugar/cup) / Jon Sotkes (Sunflower seeds) / Yevgen Romanenko (nori sheet) / Alasdair James (Sushi rice) / Floortje (Sweet potato) / Kwanisik (Tahini) / xamtiw (Tahini) / sarahdoow (seasoning) / Nikhil Patil (seasoning/spoons) / Floortje (Thyme) / koosen (Tofu) / Membio (tomato) / Richard Coombs (Tomato/chopped) / PicturePartners (Tomato paste) / Mayamo (Tomato Sauce) / masa44 (Tomato tinned) / Jimmy Alim (Tomatoes/cherry) / Jim Cochrane (Tomato sundried) / Brian Hagiwara (Tuna) / Nattawut Lakjit (Turmeric) / Chakri Wachiprasri (Turmeric powder) / SvetlanaK (vinegar/oil) / Liudmila Chernetska (Vegetable stock) / PicturePartners (rice vinegar) / SvetlanaK (white vinegar) / Brian Macdonald (Vinegar – balsamic) / Candy_Vandy (Wasabi) / Sean Gladwell (Water) / frahaus (Water/glass) / kyoshino (Water/ measuring jug) / Alina555 (Wattle seed) / robynmac (Wheat) / robynmac (Wholegrain /mustard) /Wombok (Oat_Phawat) / kuppa_rock (Worcestershire sauce) / timsa (Yeast) / videofe (Yeast tsp) / Magone (Yogurt Greek) / Han Van Vonno (Yogurt/bowl) / Pacharee Watanakul (Zucchini) / Eskay Lim (Ground Coriander) / Dimitris66 (Arborio rice) / pejft (Peas/corn) / M Arnold (Mustard powder) / Westend61 (Eggplant) / StockFood (Cranberries) / M Feenstra (Dried Basil) / fcafotodigital (Legumes) / Peter Dazeley (Chocolate) / bonchan (Fufu) / Matthias Kulka (Ice cream cone) / Basilios1 (custard) / J Gollop (soft cheese) / Angela Bax (Cake/dessert) / deepblue4you (Lactose free/yogurt) / klenova (Lactose free products) / BWFolsom (protein bar).

Text: FAO https://www.fao.org/pulses-2016/news/news-detail/en/c/429320/ References: A. M. De Ron (ed.), Grain Legumes, Handbook of Plant Breeding 10, Springer Science+Business Media, New York 2015, Activity 2.8; Used with permission from Rosella, Activity 4.25; FAO Extract derives from https://en.wikipedia.org/wiki/Ancient_Egyptian_agriculture/CC By 3.0 License, Activity 2.6; Utensils: Native Australia 6 Sep 2013 © SBS, Activity 4.7.

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