

Unit 2.1.3 and 2.1.4

Primary Production, Food Processing and Manufacturing

Key Knowledge 2.1.3

The key elements of primary food production of food in Australia, including the leading agricultural and horticultural industries, and major food-growing regions and products for local and export markets.

Key Knowledge 2.1.4

The characteristics of leading food processing and manufacturing industries in Australia.

Key Skills 2.1.2

Describe Australia's leading industries in primary food production, processing, manufacturing and marketing.

Key Skills 2.1.9

Undertake practical activities to analyse commercial food production in Australia.

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Key Terms and Definitions

Broadacre is a term used to describe farms or industries that produce grains, oilseeds, and other crops (especially wheat, barley, peas, sorghum, maize, hemp, safflower, and sunflower).

Horticulture refers to the planting and cultivating of plants, including fruits, vegetables, and ornamental plants.

Land degradation refers to a decline in the productivity of the land, particularly the soil quality.

Livestock grazing occurs when domesticated animals eat the grass or other plants growing in a particular area.

Precipitation is the term used to describe any liquid or frozen water released to the Earth as rain, sleet, hail, or snow.

Primary production involves the growing and harvesting whole foods and any basic manufacturing processes required to make these foods ready for sale and consumption or to turn them into other food products.

What is Primary Food Production?

Primary production involves the growing and harvesting whole foods and any basic manufacturing processes required to make these foods ready for sale and consumption or to turn them into other food products.

Factors Impacting Primary Food Production in Australia

Climate

Australia is a large country, and because of this, different parts of the country experience different climates. For example, the climate is generally tropical in the north of the country, with year-round hot temperatures. Yet, in the south of the country, the climate is temperate as the temperatures are cooler. As a result, different animals and plants thrive in different areas of the country. The food that is produced in Australia depends on the following factors.

Precipitation

Precipitation is the term used to describe any liquid or frozen water released to the Earth as rain, sleet, hail, or snow. The amount of precipitation in a given area can significantly influence the food produced and, ultimately, the region's food culture.

Across Australia, there is a considerable variation in the amount of rain that falls in different areas. The northern part of Australia has wet summers and dry winters, which is the opposite of the southern part of Australia. So, the amount of water a crop needs and the time of year it grows differs from one state to another—the amount of precipitation impacts the growth quality, rate, and type of crop production. In some of the drier areas of Australia where there is less precipitation, irrigation systems are needed.

Soil Type

Australia has some of the world's oldest and most nutrient-poor soils. This has occurred because very little rock has eroded over time to create new soil. The farming techniques and other human activities introduced by early European settlers have also contributed significantly to Australia's poor soil quality. Finally, climate change and the events that it is causing, such as bushfires, droughts, floods, and storms, are causing further issues, such as loss of carbon and changes in soil biodiversity, soil erosion, and pollution. A decline in soil quality is often referred to as land degradation.

Australia's shallow, high salt and low nutrient soils are more suited to growing native crops than conventional crops introduced by other settlers. Reduced soil quality and function impact the type, quality, and rate of food production in Australia.

Location of Markets

Australia is quite close to Asian markets, which have large populations. As a result, Australia does produce products specifically desired by these markets, such as high-quality beef, tropical fruits, and wine.

Watch this video about why we have different climates across Australia: <https://youtu.be/uSVef2Esn9k>

Watch this video about the environment and agriculture in Australia: <https://youtu.be/Tgfvymh5Zns>

Primary Food Production in Australia

Primary production involves the growing and harvesting whole foods and any basic manufacturing processes required to make these foods ready for sale and consumption or to turn them into other food products. Two major primary food production industries in Australia are horticulture and agriculture. Horticulture deals with flowers, fruits, nuts, shrubs, trees, turf, and vegetables. In contrast, agriculture deals with the cultivation of crops as well as animal farming.

Horticulture

Horticulture refers to the planting and cultivating of plants, including fruits, vegetables, and ornamental plants. While horticulture is a minor component of agriculture in Australia, Victoria is Australia's major exporter of horticultural products. In the Australian food system, horticulture can be done on a small scale in the family

home, on small farms, or on a much larger scale. Overall, horticulture accounts for around 18% of food produced in Australia, with fruits and nuts accounting for 8% and vegetables for 7%. Less common tropical fruits such as durian, mangosteen, rambutan, and other tropical fruits of Asian origin are starting to be produced in Australia in higher quantities to provide for the Asian market.

The major horticultural areas in Australia are shown in the table below:

Major horticultural areas in Australia	Primary food production
Goulburn Valley of Victoria	Apples, pears, summer fruits, and tomatoes
Murrumbidgee Irrigation Area of New South Wales	Citrus, corn, grapes, rice, sugar plums, and tomatoes
Sunraysia district of Victoria and New South Wales	Almonds, citrus, grapes, and stonefruit
Riverland region of South Australia	Almonds, cherries, citrus, grapes, olives, potatoes, stone fruit, and vegetables
Northern Tasmania	Potatoes
Southwest Western Australia	Broccoli, carrots, potatoes, and tomatoes
The coastal strip of northern New South Wales	Avocado, bananas, blueberries, coffee, hydroponic vegetables, olives, pecans, and persimmon
The coastal strip of Queensland	Avocado, banana, capsicum, fresh tomato, mandarin, mango, pineapple, and zucchini

The Murray–Darling Basin

A number of these significant horticultural areas are within the Murray–Darling Basin. The Murray–Darling Basin is a large area of south-eastern Australia, which covers one-seventh or 13.8% of the total area of Australia (excluding Tasmania). The Basin covers most of New South Wales, some of southern Queensland, the east of South Australia, northern Victoria, and all of the Australian Capital Territory. Water flows through a system of interconnected rivers and lakes in the Basin. The two main rivers are the Murray and Darling Rivers. The Darling River begins in southern Queensland and flows into the Murray River at the border of New South Wales and Victoria.

The Murray–Darling Basin is home to over 40% of all Australian farms and produces around 40% of Australia's agricultural produce. One hundred percent of Australian rice, 80% of Australian grapes, and 28% of Australian dairy are produced in the Murray–Darling Basin.

Watch this video about the history of the Murray–Darling Basin: <https://youtu.be/iCnZrE-aXcA>

Watch this video about the Murray–Darling Basin's contribution to the economy: <https://youtu.be/Zijgj7qHLDE>

Agriculture

Australia's two categories of agriculture are broadacre crops and livestock grazing and production.

Broadacre Crops

Broadacre is a term used to describe farms or industries that produce grains, oilseeds, and other crops (especially wheat, barley, peas, sorghum, maize, hemp, safflower, and sunflower). These crops are produced on an enormous scale, using vast areas of land. Australia's biggest broadacre crops (crops grown in large amounts on large plots of land) are wheat, barley, and canola.

Grain production in Australia is divided into three major areas.

1. The northern region is in Queensland and New South Wales. Because this area is so large, it experiences different tropical and temperate climates. The soil in this area is quite fertile.
2. The southern region includes Victoria, Tasmania, and South Australia. This region has a temperate climate. There are different types of soil in this area, but generally, they are low fertile soils.

3. The western region is the cropping area of Western Australia. This region has a Mediterranean climate. Soil fertility is relatively low in this area.

Two major crops produced in Australia are barley and wheat.

Wheat

Wheat is grown throughout the 'wheat belt' of Australia. The wheat belt is a term used to describe the inland agricultural areas of Australia's southern and eastern regions. It runs from Western Australia to Queensland, New South Wales, and Victoria. Western Australia is the biggest producer of wheat, followed by New South Wales, South Australia, Victoria, and Queensland. A significant amount of wheat grain undergoes processing to turn it into flour. The flour is turned into a range of pasta, noodles, semolina, and baked goods such as cakes, biscuits, and muffins.

Barley

Barley is another broadacre crop produced in large amounts in Australia. This production occurs over 4 million ha of land in an area similar to the wheat belt. Like wheat, Western Australia is the biggest producer of barley, followed by Victoria, South Australia, New South Wales, Queensland, and Tasmania.

A lot of Australia's barley crop is used to produce malt. The primary use for malt is to make beer. It is also used to create flavouring agents, vinegar, confectionery, flavoured drinks, and breakfast cereals.

Watch this video about growing wheat in Australia: <https://youtu.be/CWVrNNy6kRs>

Livestock Grazing

Livestock grazing occurs when domesticated animals eat the grass or other plants growing in a particular area—different grazing methods are used for different animals and types of land. Grazing usually occurs on land that is unsuitable for growing crops. Livestock grazing occurs in most parts of Australia.

Cattle

Meat is produced on a large scale in Australia, mainly beef and lamb. Australian beef is highly valued due to its clean, disease-free reputation. As more countries become wealthier and increase their red meat consumption, the Australian beef industry could become highly profitable in the future.

Cattle are grazed in all states and territories of Australia; however, Queensland tends to have the most cattle, followed by New South Wales and Victoria.

The Australian beef industry can broadly be divided into the northern and southern production systems. In these systems, different breeds are grazed, depending on their ability to endure different climates. Northern cattle are not 'fed;' they forage for feed over large areas. Consequently, the meat from these cattle is of lower quality compared to southern beef. Breeds that can cope with the harsh, warm, and dry environments in the north include the Brahman, Droughtmaster, and Santa Gertrudis. Farms in the southern regions of Australia generally rear grazing breeds that can gain weight rapidly and produce high-quality meat, such as Angus, Hereford, and Shorthorn.

Watch this video about a cattle farm in Victoria: <https://youtu.be/e--bjUmGFZg>

Watch this video about a cattle farm in Queensland: <https://youtu.be/hcXXPSBBd6Q>

Sheep

Three major groups of sheep are bred in Australia: those that produce wool, those grown for meat, and dual-purpose sheep that are raised for wool and meat. In Australia, sheep are raised in a wide range of climates—from the arid and semi-arid parts of the inland region to the high-rainfall areas of New South Wales, Victoria, South Australia, and Tasmania.

The southwest corner of Western Australia is also an important lamb-producing region. Merinos are the most prominent breed in the Australian sheep industry. Merinos are suitable for meat production, mainly for export markets in the Middle East.

Watch this video about the Western Australia sheep industry: <https://youtu.be/Fi4FvVqMnBk>

Watch this video about the lamb industry in Australia: <https://youtu.be/cbftHn4qDwM>

Food Processing and Manufacturing Companies in Australia

The Australian manufacturing sector is an integral part of the Australian food system. It is the largest manufacturing sector in Australia. Australia's major food processing and manufacturing companies produce various products, including beef, chicken, dairy goods, baked goods, and beverages.

Here is a list of food manufacturing companies that are foreign-owned but produce food locally in Australia:

Food and beverage company	What is it?	Who owns it?	Where is the food produced?
Arnotts	A biscuit company that began in a bakery in Newcastle	Campbell Soup Company, USA	New South Wales, Queensland, and Victoria
Bushells	This tea was founded by Alfred Bushell in 1883 when he opened a tea shop in Queensland	British-Dutch company Unilever	Originally, Australian tea was used to make Bushells tea; however, this is no longer the case
Coca-Cola Amatil	Coca-Cola Amatil Limited was an Australian bottler of non-alcoholic beverages from 1904 to 2021	Coke's European branch	There are a total of nine production facilities and 18 warehouses in Australia
Fonterra	This is a New Zealand multinational dairy company	Over 10,500 New Zealand dairy farmers own it	Fonterra operates ten manufacturing sites across Australia, including five in Victoria
Golden Circle	Golden Circle began as a Queensland grower cooperative in the 1940s	Golden Circle is a subsidiary of US-based Kraft Heinz	The company has factory outlets in Capalaba to the east of Brisbane and Morayfield to the north of Brisbane
Murray Goulburn	It has been a processor of a significant slice of Australia's milk supply	Initially formed by a group of dairy farmers in the 1950s, it is now owned by a Canadian dairy company called Saputo	Devondale Murray Goulburn has nine manufacturing plants located in Victoria and Tasmania
Tassal	For over 35 years, it was Australia's largest salmon producer. It was sold in 2022	Canadian seafood company called Cooke	Tassal has five processing facilities in Australia
Uncle Toby's	This company produces breakfasts, snacks, and milk	Controlled by Nestle Australia, which is a subsidiary of the Switzerland-based food and beverage manufacturer	Uncle Toby's Oats are sourced from Australian farmers and are manufactured on home soil. Its main factory is in Victoria

Written Activity One

Instructions:

1. Divide into small groups and select one of the videos to watch.
2. Work together to answer the questions and report your findings to the class.

A Banana Farm in Tully

Watch the video about banana processing: https://youtu.be/bC_nCm-l7Gw

Answer the questions.

Primary processing involves the growing and harvesting of whole foods and any basic manufacturing processes required to make these foods ready for sale and consumption or to turn them into other products.

1. What was the main idea in this video?

2. Identify the key manufacturing processes demonstrated in the video that were necessary to prepare the bananas for sale, consumption, or further processing into other products.

3. What safety regulations did the workers in the video follow, and why did they need to follow these safety protocols?

4. What might be some environmental challenges faced by primary banana producers, and how could they overcome these challenges?

5. Identify various food products that can be made using bananas as a primary ingredient.

South Australia is leading the way with the humble potato

Watch the video about potato farming: <https://youtu.be/oHTuHqRYEcA>

Answer the questions.

Primary processing involves the growing and harvesting whole foods and any basic manufacturing processes required to make these foods ready for sale and consumption or to turn them into other products.

1. What was the main idea in this video?

2. How do the potato producers use technology to improve production processes and ensure consistent quality? In what ways does this benefit primary producers, manufacturers, and consumers?

3. How could potato producers and manufacturers work to reduce waste and promote sustainability?

4. Create a timeline that outlines the processes that potatoes undergo during primary production, processing, and manufacturing.

5. Identify various food products that can be made using potatoes as a primary ingredient.

Meet the Citrus Farmer

Watch the video about citrus farming: <https://youtu.be/LcpcB91d8IY>

Answer the questions.

Primary processing involves the growing and harvesting whole foods and any basic manufacturing processes required to make these foods ready for sale and consumption or to turn them into other products.

1. What was the main idea in this video?

2. Create a timeline that outlines the processes that citrus fruit undergoes during primary production, processing, and manufacturing.

3. What are some factors that make primary production of citrus fruit challenging? Why are these factors a problem?

4. How do these citrus producers use technology to overcome the challenges they face?

5. The producer explains that he puts his 'heart and soul' into producing citrus fruit. What ethical and environmental concerns might this producer have about food wastage in the home?

6. Identify various food products that can be made using potatoes as a primary ingredient.

Written Activity Two

Is it really an Australian company?

Some of the most successful manufacturing companies in Australia are listed below. Just because these are the most successful companies with significant revenue does not necessarily mean that they are Australian companies.

Instructions:

Conduct research that will enable you to find out more about the companies below:

1. Select one of these top 10 companies in Australia in 2021:

Fonterra	Coca-Cola Amatil	Inghams
San Remo	Tey's Australia	George Weston
JBS	Haigh's	Sanitarium
Patties	Saputo	

2. Answer the following questions:
 - a. Is this an Australian company?
 - b. Where is the company based?
 - c. How many people does the company employ?
 - d. What product/s does the company produce?
 - e. What are some of the well-known brands produced by this company?
 - f. Is this company Australian owned?

Practical Activity One

Peachy Pie

Read about the Coles/SPC products below:

Coles partners with struggling SPC cannery to create new Australian-grown products

By Mahalia Dobson Posted Tuesday 16 April 2019 at 5:54 pm

Supermarket giant Coles has partnered with canned fruit company, SPC, based in Shepparton in Victoria's north, to produce a new range of locally farmed peaches, pears and apricots.

Four new products, including canned peaches, pears, apricots and fruit salad, all valued at two dollars per 825g, were today made available in Coles supermarkets.

"Coles is proud to work with an iconic Australian company such as SPC and local growers to offer products with Aussie-grown fruit," said Head of Coles Brand, Mark Field.

"It's an opportunity for us to bring products into the market that we know our customers want but at the same time support an Australian business and Australian farmers."

SPC managing director, Reg Weine, welcomed the deal and said the newfound partnership would be a great boost for SPC, which has been preserving fruit grown by Australian farmers for more than 100 years.

"It's great to see Coles continue to support local businesses and growers. The Coles brand volume will improve our factory utilisation and will also provide our growers with an additional outlet for their quality fruit," he said.

<https://www.abc.net.au/news/2019-04-16/coles-partners-with-struggling-spc-to-stock-australian-grown/11020636>

About the Task

Fruit is a large part of the horticultural industry in Australia. A large volume of fruit is produced, and not all of it can be consumed fresh. Often fruit that is not aesthetically pleasing is canned, frozen, or dehydrated. It is also made into other products like fruit pies and muffins. Coles supermarket stores sell canned fruit produced by SPC, a well-known Australian fruit processing company.

Your task is to:

- Design a pie or tart recipe using canned fruit that serves two people.
- Use the new varieties of canned peaches, pears, apricots, and fruit salad made by SPC and sold at Coles supermarkets.
- Fill in the recipe template provided for your fruit filling.
- Decorate your pie creatively.

This website may give you some ideas about how to decorate your pie:

<https://www.youtube.com/watch?v=O84C-LOAyQg>

A basic recipe for pastry has been provided.

Please note: You only need enough filling to make two small individual pies.

Here are a few websites that you might find helpful:

<https://www.taste.com.au/recipes/apple-peach-pie/dad79bfc-9b09-4af8-9ddf-e8cfa8abe618>

<https://app.ckbk.com/recipe/prof36725c35s001ss001sss003ssss003r001/-apple-pie-filling-canned-fruit->

<https://cakewhiz.com/how-to-make-peach-pie-filling-recipe/>

<https://www.food.com/recipe/fruit-cocktail-pie-282254>

Let's Plan

Complete the recipe template provided.

Submit a copy of your food order to your teacher.

Here is a copy of the basic pastry recipe.

Pastry Recipe

Preparation Time: 30 minutes

Cooking Time: 20 min cooking + 10 min cooling and decorating

Serves: Makes two pies

Pastry Ingredients:

¾ cup (125g) plain flour
65g shortening
½ to 1 tablespoon cold water
Egg for glazing

Decorating Ingredients:

Whipped cream
Icing sugar for dusting
Flaked almonds
Fresh mint
Small pastry cutter shapes

To make the pastry:

1. **Preheat** oven to 200°C fan-forced.
2. **Grease** 2 x 10cm tart tins.
3. **Sift** flour.
4. **Combine** the shortening into the flour by rubbing in the butter until it resembles breadcrumbs.
5. **Sprinkle** the ice-cold water into the flour mixture. You might only need ½ tablespoon.
6. **Stir** with a butter knife until the dough comes together into a ball.
7. **Knead** for about 30 seconds until smooth.

To make the pies:

1. **Divide** the dough into four pieces.
2. **Lightly** flour your bench and **roll out** each piece of dough into a round shape large enough for your pie tin.
3. **Line** pie tin with pastry.
4. **Fill** with filling and brush the edges of the pie with water.
5. **Cut a round shape for the top of the pie using another piece of dough. Decorate** as desired.
6. **Place** the pastry onto the top of the pie. Then, **repeat** steps 3 to 6.
7. **Brush** lightly with beaten egg.
8. **Place** on a baking tray.
9. **Bake** at 220°C until lightly golden brown for 15 to 20 minutes. **Observe** them so they do not burn.
10. **Remove** from the oven and **cool** for 5 minutes before removing from the tin and presenting.



Let's Cook**Make** your dish in class.**Recipe Template**

Student Name:		
Recipe Name:		
Source/ Weblink:		
Serves:		
Preparation Time:		
Cooking Time:		
Specialised Equipment:		
Ingredients: (include the quantities required for one or two serves only)		
Method:		
Process/ Term and Definition:		
Principles of safe and hygienic food handling practices:		

Summary Activity

Complete the following tasks.

What is the main idea about this key knowledge and key skills?	
Write two or three sentences in your own words.	
What do each of the industries below involve?	
Primary Food Production	Food Manufacturing and Processing
List some factors that impact primary food production in Australia and outline their influence.	
Factors	Influence
Define the following terms and provide examples.	
Horticulture	
Agriculture	

Complete the table below:

What kind of manufacturing industries exist in Australia?	What food do these businesses manufacture?

Exam Preparation

Multiple-Choice Questions (5 marks)

Choose the response that is correct or that **best answers** the question.

Question 1

The Murray Darling Basin is important to Australia because:

- a. Rainfall is high and drought does not occur.
- b. It is the only place in Australia that cattle are grazed.
- c. The water from its rivers provides irrigation for all Australian wheat producers.
- d. It produces 40% of Australia's agricultural products.

Question 2

The following food items are examples of products produced using horticulture:

- a. Wheat, rice and barley.
- b. Rice, barley and tomatoes.
- c. Rice, tomatoes and avocados.
- d. Tomatoes, avocados and potatoes.

Question 3

70% of the food produced by Australia is:

- a. Imported.
- b. Exported.
- c. Consumed by Australians.
- d. Wasted.

Question 4

What is primary food production?

- a. The manufacturing of processed foods
- b. The packaging of food products
- c. The growing and harvesting of whole foods
- d. The transportation of food products.

Question 5

What is the difference between horticulture and agriculture?

- a. Horticulture deals with fruits, nuts, and vegetables, while agriculture deals with the cultivation of crops as well as animal farming
- b. Horticulture involves animal farming, while agriculture involves the cultivation of crops
- c. Horticulture deals with flowers and vegetables, while agriculture deals with fruits and nuts
- d. There is no difference between horticulture and agriculture

Short Answer Questions (16 marks)

Question 1 (2 marks)

Explain how the climate impacts primary food production in Australia. 2 marks

Question 2 (5 marks)

a. Identify one major food-growing regions in Australia. 1 mark

b. Describe this area and explain how it contributes to food production in Australia. 4 marks

Question 3 (5 marks)

Explain why cattle breeds such as Braham, Droughtmaster and Santa Gertrudis are raised in Northern Queensland compared to the Angus, Hereford and Shorthorn breeds that are raised in southern regions of Australia. 5 marks

Question 4 (4 marks)

Explain how climate change might impact the primary food production and food manufacturing industries in Australia in the coming years. 4 marks

Exam Preparation

Multiple-Choice Questions (5 marks)

Choose the response that is correct or that **best answers** the question.

Question 1

The Murray Darling Basin is important to Australia because:

- a. Rainfall is high and drought does not occur.
- b. It is the only place in Australia that cattle are grazed.
- c. The water from its rivers provides irrigation for all Australian wheat producers.
- d. It produces 40% of Australia's agricultural products.

The correct answer is D. The Murray-Darling Basin is an important agricultural region in Australia, producing a significant portion of the country's food and fibre crops such as wheat, cotton, citrus, and grapes.

Question 2

The following food items are examples of products produced using horticulture:

- a. Wheat, rice and barley.
- b. Rice, barley and tomatoes.
- c. Rice, tomatoes and avocados.
- d. Tomatoes, avocados and potatoes.

The correct answer is D. Horticulture is the cultivation of fruits, vegetables, flowers, and ornamental plants. Wheat, rice, and barley are not typically considered horticultural crops, while tomatoes, avocados, and potatoes are commonly grown using horticultural practices.

Question 3

70% of the food produced by Australia is:

- a. Imported.
- b. Exported.
- c. Consumed by Australians.
- d. Wasted.

The correct answer is B. According to the Australian Bureau of Statistics, approximately 70% of the food produced in Australia is exported to other countries, while the remaining 30% is consumed domestically or wasted.

Question 4

What is primary food production?

- a. The manufacturing of processed foods
- b. The packaging of food products
- c. The growing and harvesting of whole foods
- d. The transportation of food products.

The correct answer is C. Primary food production is the initial stage in the food production process, which involves the growing and harvesting of whole foods such as fruits, vegetables, grains, and animal products. It includes any basic manufacturing processes required to make these foods ready for sale and

consumption or to turn them into other food products. Primary food production is the foundation of the food system and provides the raw materials for further processing and manufacturing of food products.

Question 5

What is the difference between horticulture and agriculture?

- a. Horticulture deals with fruits, nuts, and vegetables, while agriculture deals with the cultivation of crops as well as animal farming
- b. Horticulture involves animal farming, while agriculture involves the cultivation of crops
- c. Horticulture deals with flowers and vegetables, while agriculture deals with fruits and nuts
- d. There is no difference between horticulture and agriculture

The correct answer is A. Horticulture and agriculture are both types of primary food production, but they differ in the types of products they produce. Horticulture mainly deals with the cultivation of fruits, nuts, and vegetables, while agriculture involves the cultivation of crops such as grains, oilseeds, and other crops, as well as animal farming.

Short Answer Questions (16 marks)**Question 1 (2 marks)**

Explain how the climate impacts primary food production in Australia. 2 marks

Any one of the following answers were accepted:

- The climate in Australia impacts primary food production because different areas of the country experience different climates, which affects the type of crops and animals that can thrive in each area. For example, the northern part of Australia has a tropical climate with year-round hot temperatures, while the south of the country has a temperate climate with cooler temperatures.
- The amount and timing of precipitation impacted by the climate. It also varies in different parts of Australia, impacting the growth quality, rate, and type of crop production. Overall, the climate influences the food produced and, ultimately, the region's food culture.

Question 2 (5 marks)

- a. Identify one major food-growing regions in Australia. 1 mark

Murray-Darling Basin

- b. Describe this area and explain how it contributes to food production in Australia. 4 marks

The Basin covers most of New South Wales, some of southern Queensland, the east of South Australia, northern Victoria, and all of the Australian Capital Territory. The region is responsible for producing around 40% of Australia's agricultural produce, including 100% of Australian rice, 80% of Australian grapes, and 28% of Australian dairy.

This area contributes to food production significantly in Australia because water flows through a system of interconnected rivers and lakes in the Basin, with the two main rivers being the Murray and Darling Rivers. The area's fertile soil and water supply make it an ideal region for farming, and it plays a crucial role in feeding the Australian population and contributing to the country's economy through the export of agricultural products.

Question 3 (5 marks)

Explain why cattle breeds such as Braham, Droughtmaster and Santa Gertrudis are raised in Northern Queensland compared to the Angus, Hereford and Shorthorn breeds that are raised in southern regions of Australia. 5 marks

A sample answer is recorded below.

To gain full marks the student must make a comparison between the cattle from the two regions.

Cattle breeds such as Braham, Droughtmaster, and Santa Gertrudis are raised in Northern Queensland because they can endure the harsh, warm, and dry environments in the north, where the cattle forage for feed over large areas. Consequently, the meat from these breeds is of lower quality compared to the southern breeds. On the other hand, the southern regions of Australia generally rear grazing breeds that can gain weight rapidly and produce high-quality meat, such as Angus, Hereford, and Shorthorn. These breeds are not suitable for the harsh, warm, and dry conditions of northern Queensland. Therefore, different breeds are raised depending on their ability to endure different climates.

Question 4 (4 marks)

Explain how climate change might impact the primary food production and food manufacturing industries in Australia in the coming years. 4 marks

This is a higher-order thinking question that requires students to have some understanding of climate change and its impact on the environment.

For two marks, students needed to explain the impact of climate change on food production.

Several possible answers are provided below:

- Climate change is causing events such as droughts, floods, bushfires, and storms that are leading to soil erosion, loss of carbon, changes in soil biodiversity, and pollution. These events are likely to lead to a decline in soil quality, which will impact the type, quality, and rate of food production in Australia.
- As temperatures rise, some crops may become less productive or not able to grow in certain areas, while other crops may become more productive in new areas. This will require farmers and food manufacturers to adapt to new conditions and may lead to changes in the types of foods produced and consumed in Australia.

For another two marks, students needed to explain the impact of climate change on food processing and manufacturing.

One possible answer is provided below.

- The frequency and intensity of extreme weather events may disrupt supply chains and impact food processing and manufacturing. To mitigate the impacts of climate change on primary food production and food manufacturing, it will be important to invest in sustainable farming practices, improve soil quality, and develop resilient supply chains.

Short Answer Questions (15 marks)**Question 1** (2 marks)

- a. State one characteristic of a food system that promotes food sovereignty. (1 mark)

- b. State one characteristic of a food system that promotes food security. (1 mark)

Question 2 (9 marks)

- a. Identify one environmental trend in the food system and discuss its impact on food security. (3 marks)

- b. Identify one economic trend in the food system and discuss its impact on food security. (3 marks)

- c. Identify one social trend in the food system and discuss its impact on food security. (3 marks)

Question 5 (4 marks)

Every Tuesday afternoon at Wallaroo Primary School in Hastings, a group of 25 students and six parents come together to participate in a weekly Community Kitchen Program. The Community Kitchen Program provides a safe and fun place for them to come together to share knowledge and skills about cooking healthy food and budgeting. The program enables participants to connect and collaborate.

Discuss this program's contribution to food security.