Dairy Production as a Global Economic Activity

TEACHER GUIDE

YEAR 12

This resource has been developed by:

Primary Industries Education Foundation Australia

primezone www.primezone.edu.au

STORM & FLOOD INDUSTRY RECOVERY PROGRAM

Contents

NB: Please double click underlined text throughout the document to go directly to website link and/or page.

PIEFA'S SFIRP program is funded by the Australian and NSW Government's Storm and Flood Industry Recovery Program

AUSTRALIAN COUNCIL FOR EDUCATIONAL RESEARCH (ACER) SURVEY LINKS

- Select the teachers and career advisors weblink to complete the survey or use the QR link.
- Select the students weblink to complete the survey or use the QR link.

Your response to the survey questions will be used to continuously improve PIEFA's food and fibre education resources. Your contributions to this endeavour are greatly appreciated.

LEARNING AREAS

NSW CURRICULUM CONTENT

Learning Area | Geography | Year 12 | Stage 6
Outcomes: Evaluates responses and management strategies, at a range of scales, for sustainability. (GE-12-04)

Topic: Global Sustainability – Global Economic Activity - Agriculture

Syllabus dot points:
- evaluate the sustainability of the activity, using one or more criteria.
- examine a range of strategies for sustainability.

Dairy Production as a Global Economic Activity

Lesson objective

Students will investigate the need for monitoring and evaluating sustainability in the Global Economic Activity of Agriculture. They will focus on a study of dairy production during which they examine a range of strategies for sustainability. Students will learn to interpret stimulus material to develop their Geographical Inquiry Skills. Students will practice and develop their writing skills to answer exam-style questions.

Assumed knowledge of the Global Economic Activity of Agriculture is required before undertaking these activities.

Lesson overview

Activity 1.1 – Australia's Dairy Production Regions (20 mins) – Knowledge and Skills
Activity 1.2 – Strategies for Sustainability (70 mins) – Research, Multimedia and Comprehension

Dairy Production as a Global Economic Activity

Resources and equipment

ACTIVITY 1.1
Australia's Dairy Production Regions (20mins)

1. **Computer/digital device access.**
2. **Worksheet 1.1 – Australia's Dairy Production Regions (Knowledge and skills activity).**
3. **Paper/workbook.**

ACTIVITY 1.2
a) Strategies for Sustainability - Dairy Australia (40 mins)

1. **Computer/digital device access.**
2. **Inside the Australian dairy commitments to the environment (2:55).**
3. **Australian Dairy – Our Sustainability Promise and Commitments (3:15).**
4. **Worksheet 1.2a - Strategies for Sustainability - Dairy Australia (Research and comprehension activity).**
5. **Land management - Dairy Industry - Dairy Australia**
6. **Water efficiency - Dairy Industry - Dairy Australia**
7. **Reducing emissions - Dairy Industry - Dairy Australia**
8. **Waste reduction - Dairy Industry - Dairy Australia**

b) Strategies for Sustainability - Bega Circular Economy (30mins)

1. **Computer/digital device access.**
2. **Going circular: one regional community's drive to create a circular economy (23:13).**
3. **Worksheet 1.2b – Strategies for Sustainability - Bega Circular Economy (Multimedia and comprehension activity).**
4. **Paper/workbook.**

Lesson guide

ACTIVITY 1.1 – Australia's Dairy Production Regions

Students will develop their geographical tools and skills by interpreting a stimulus map of Australia's dairy production regions. They will then respond to exam-style short answer questions to show their understanding of the spatial distribution and locational factors relating to dairy production regions within Australia.

1. Provide students with a printed copy or online access to **Worksheet 1.1 – Australia's Dairy Production Regions.**

2. Point out and discuss with students where the major dairy production regions are located on the map. Discuss the geographical and climatic factors that characterise these regions and make them suitable for dairy production (such as temperate climate with adequate rainfall).

3. Students complete short answer exam style questions based on the stimulus map provided.

Lesson guide

ACTIVITY 1.2 – Strategies for Sustainability

Students will research strategies for improving sustainability in the Australian Dairy Industry. Students will tabulate their findings and provide links to specific Sustainable Development Goals (SDG). Evaluation criteria will involve using the SDG targets and indicators. Students will complete a multimedia case study of the Bega Circular Valley to further enhance their knowledge and understanding of sustainability strategies used within dairy production.

a) Strategies for Sustainability - Dairy Australia

1. Show students either one or both of Australian Dairy's introductory videos to their sustainability commitments. Inside the Australian dairy commitments to the environment (youtube.com) (2:55). Australian Dairy – Our Sustainability Promise and Commitments (3:15).

2. Provide students with a printed copy or online access to Worksheet 1.2a -Strategies for Sustainability - Australian Dairy Industry. Access the pdf Dairy Australia SDG alignment and each of the strategies:
Land management - Dairy Industry - Dairy Australia
Water efficiency - Dairy Industry - Dairy Australia
Reducing emissions - Dairy Industry - Dairy Australia
Waste reduction - Dairy Industry - Dairy Australia

3. Direct students to read through each strategy link along with the pdf Dairy Australia SDG alignment and complete the table of strategies for sustainability.

4. Conduct a discussion with students to reflect on the sustainability strategies by Dairy Australia. Reflection questions may include:

- How might these strategies benefit farmers, consumers, and the environment?
- Are there any potential drawbacks or limitations to implementing these strategies?
- Which strategy would you choose to implement and why?
- Which strategy would have the greatest impact on global sustainability?
- Which strategy would have the greatest impact on global sustainability?

Lesson guide

ACTIVITY 1.2 – Strategies for Sustainability

b) Strategies for Sustainability - Bega Circular Economy

1. Ask students to think about the town of Bega in NSW. Create a list in a centralised location of information they already know about Bega. Use Google Earth to provide students with the visual location of the Bega Valley. Link this location back to their knowledge from the previous lesson on the locational factors for dairy production.

2. Provide students with a printed copy or online access to **Worksheet 1.2b – Strategies for Sustainability - Bega Circular Economy.** View the Landline video Going circular: one regional community's drive to create a circular economy (23:13).

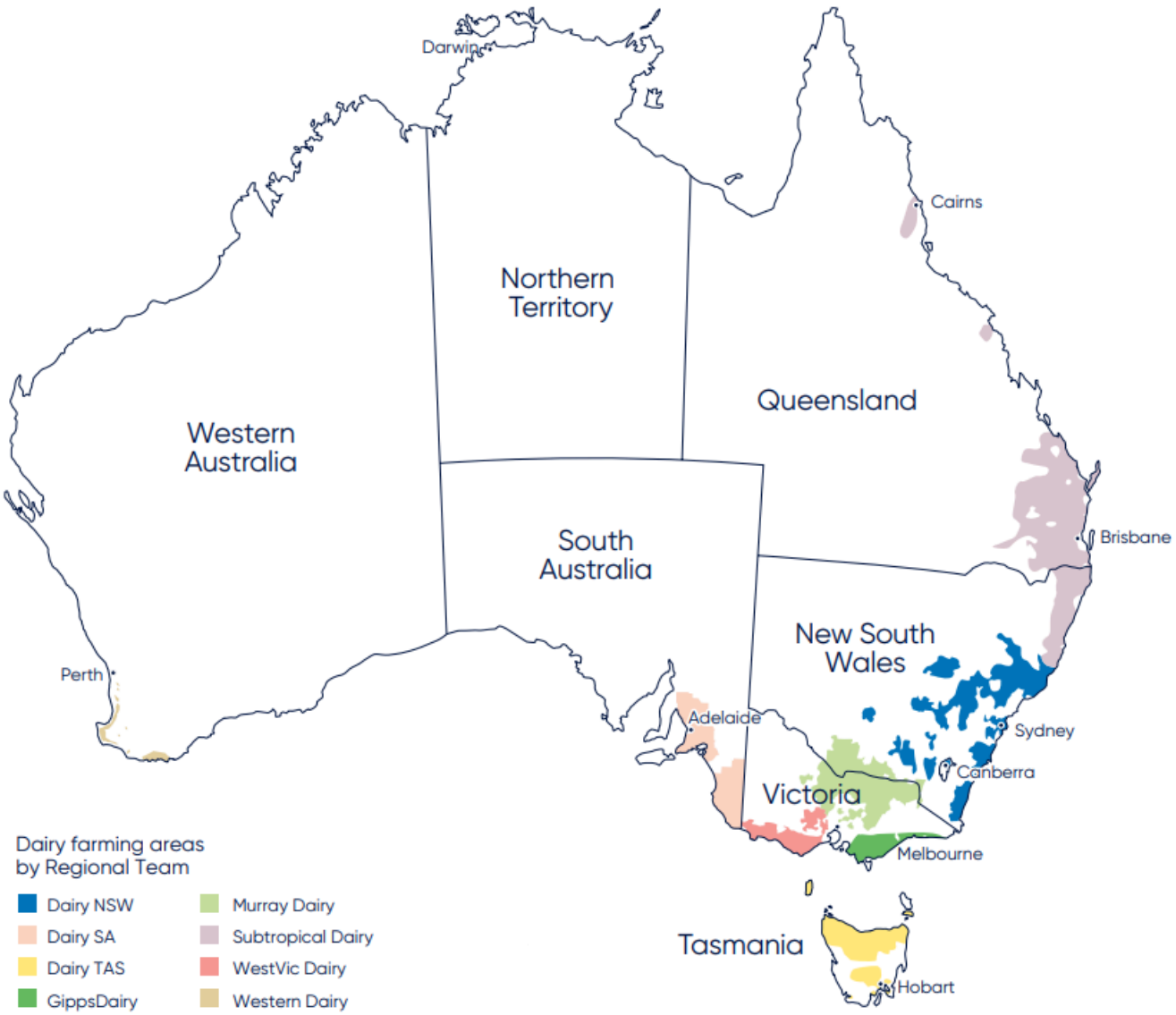
3. Students complete the comprehension questions whilst watching the video.

4. Conduct a discussion with students to reflect on the sustainability strategies from the video. Reflection questions may include:

- How might these strategies benefit farmers, consumers, and the environment?
- Are there any potential drawbacks or limitations to implementing these strategies?
- Which strategy would you choose to implement and why?
- Which strategy would have the greatest impact on global sustainability?

WORKSHEET 1.1
(Page 1 of 2)

Australia's Dairy Production Regions



Source: https://www.dairy.edu.au/resources/photo-resource/dairy-regions-of-australia

WORKSHEET 1.1 continued
(Page 2 of 2)

Australia's Dairy Production Regions

Use the stimulus map of Australia's Dairy Production regions to answer the following short answer questions.

1 - Identify the spatial distribution of the major dairy production regions in Australia. (3 marks)

2 - Account for the location of dairy production regions within Australia, providing specific examples. (4 marks)

WORKSHEET 1.2a

Strategies for Sustainability - Dairy Australia

Access each of Dairy Australia's strategies for sustainability below, along with the pdf Dairy Australia SDG alignment to complete the table of strategies for sustainability.

Land Management Dairy Australia
https://www.dairy.com.au/sustainability/reducing-environmental-impact/land-management

What is the Goal of the strategy?	
How will this be achieved?	
Which Sustainable Development Goal/s does this align with?	
Provide a statistic or diagram to support.	

WORKSHEET 1.2a continued (Page 2 of 4)

Strategies for Sustainability - Dairy Australia

Water Efficiency Dairy Australia
https://www.dairy.com.au/sustainability/reducing-environmental-impact/water-efficiency

What is the Goal of the strategy?		
How will this be achieved?		
Which Sustainable Development Goal/s does this align with?		
Provide a statistic or diagram to support.		

WORKSHEET 1.2a continued

(Page 3 of 4)

Strategies for Sustainability - Dairy Australia

Reducing Emissions Dairy Australia
https://www.dairy.com.au/sustainability/reducing-environmental-impact/reducing-emissions

What is the Goal of the strategy?	
How will this be achieved?	
Which Sustainable Development Goal/s does this align with?	
Provide a statistic or diagram to support.	

WORKSHEET 1.2a continued

Strategies for Sustainability - Dairy Australia

Waste Reduction Dairy Australia
https://www.dairy.com.au/sustainability/reducing-environmental-impact/waste-reduction

What is the Goal of the strategy?	
How will this be achieved?	
Which Sustainable Development Goal/s does this align with?	
Provide a statistic or diagram to support.	

WORKSHEET 1.2b

Strategies for Sustainability - Bega Circular Economy

Watch the Landline video Going Circular: one regional community's drive to create a circular economy (23:13) **and answer the questions below.**

1 - What business do Joselyn and Tom McMillan run in the Bega Valley?

2 - Why did the McMillans have to operate their business on other people's land?

3 - How does the McMillans' business benefit the landowners?

4 - What impact has the McMillans' egg operation had on local demand and their ability to meet it?

5 - How did Barry Irvin of Bega Group help the McMillans expand their business?

6 - What is "Enterprise stacking," and how does it relate to the McMillans' farming method?

WORKSHEET 1.2 continued

(Page 2 of 2)

Strategies for Sustainability - Bega Circular Economy

7 - Define the concept of circularity.

8 - How did Barry Irvin come to adopt circularity for the Bega Valley?

9 - What are some key goals and benefits of the Bega Circular Valley project?

10 - How does the Bega Group practice circularity in its cheese production operations?

11 - What future projects are planned under the circular economy principles in the Bega Valley?

WORKSHEET 1.1 ANSWERS

ACTIVITY 1.1
Australia's Dairy Production Regions

Question 1 - Identify the spatial distribution of the major dairy production regions in Australia. (3 Marks)

CRITERIA	MARKS
Recognises and names two or more major dairy production regions in Australia. Demonstrates an understanding of the geographical spread of dairy production areas across Australia, indicating whether they are concentrated in particular states or distributed across multiple regions.	3
Names two or more dairy production regions or towns in Australia.	2
Provides some relevant information about dairy farming in Australia.	1

Sample answer:

Australia's major dairy-producing regions are primarily located in areas with favorable climates, reliable water supply, and proximity to markets. Victoria leads as the top producer, with key regions in South-Western Victoria, Gippsland, and Northern Victoria. New South Wales contributes significantly from the North Coast, South Coast, and Central West regions, while Tasmania's North-West and Northern Midlands are also important. South-East South Australia, South-Western Western Australia, and South-East Queensland are other notable dairy regions. These areas are typically coastal or near the coast, benefiting from higher rainfall, fertile soils, and moderate temperatures.

WORKSHEET 1.1 ANSWERS

ACTIVITY 1.1
Australia's Dairy Production Regions

Question 2 - Account for the location of dairy production regions within Australia, providing a specific example. (4 Marks)

CRITERIA	MARKS
Detailed account provided for the location of dairy production regions within Australia. Provides a specific located example of a region. Demonstrates an understanding of the geographical factors needed for dairy production in Australia.	3 - 4
States one or more reasons for the location of dairy production regions within Australia. May provide a relevant example.	2
Provides some relevant information about dairy farming in Australia.	1

Sample answer:
Dairy production regions in Australia are primarily located in areas with favorable environmental conditions such as adequate rainfall, fertile soils, and moderate temperatures, which support high-quality pasture growth and reliable water supply for cattle. For example, South-Western Victoria, including areas like Warrnambool and Camperdown, is a major dairy region due to its consistent rainfall, temperate climate, and rich volcanic soils, which provide ideal conditions for year-round pasture-based dairy farming. Additionally, its proximity to Melbourne allows efficient access to processing facilities and markets, reducing transportation costs and ensuring fresh milk supply.

WORKSHEET 1.2 ANSWERS

ACTIVITY 1.2
Strategies for Sustainability

Land Management

What is the goal of the strategy?	Protecting waterways; implementing nutrient, soil, plant and animal biodiversity action plans; and committing to net zero deforestation.
How will this be achieved?	- Tree planting including shelter belts to increase shade for the cows in the summer to help with milk production, for pest control and aesthetics. - The Barossa Improved Grazing Group has rehabilitated degraded watercourses in the Barossa Valley in order to reduce erosion, improve water quality, provide livestock shelter, and increase biodiversity. They created a demonstration site, fenced off areas, removed weeds, and planted native species. The project, supported by local grants, serves as a model for sustainable watercourse management and is monitored to identify effective restoration methods. - Effective effluent management can contribute to sustainability by keeping nutrients on the farm and using them to grow more pasture. Thus, the farm can have a positive environmental impact. This approach allows other areas to be preserved for native vegetation.
Which Sustainable Development Goal/s does this align with?	SDG's 2, 8, 15.
Provide a statistic or diagram to support.	A range of statistics or diagrams may be provided based on student choice.

WORKSHEET 1.2 ANSWERS

ACTIVITY 1.2
Strategies for Sustainability

Water Efficiency

What is the goal of the strategy?	Increase water use efficiency by improving water productivity, active monitoring of water consumption, using recycled water and developing water security management plans.
How will this be achieved?	- Andrew Murphy's farm in Kyabram (VIC) is using ground moisture meters to determine when the soil needs irrigating and choosing more water efficient crops. - Dairy Australia's Smarter Irrigation for Profit (SIP) aims to enable irrigators to improve their productivity and profit. - A Dairy Innovation Hub has been established by Dairy Innovation Australia Ltd (DIAL) and the University of Melbourne. Its aim is to address the major technical challenges faced by the Australian dairy manufacturing industry, while also focusing on improving environmental sustainability, including increasing water use efficiency. - In WA, a new code of practice for dairy farm effluent has been released cementing WA dairy farmers commitment to reducing the industry's environment footprint.
Which Sustainable Development Goal/s does this align with?	SDG's 2, 6, 9.
Provide a statistic or diagram to support.	A range of statistics or diagrams may be provided based on student choice.

WORKSHEET 1.2 ANSWERS

ACTIVITY 1.2
Strategies for Sustainability

Reducing Emissions

What is the goal of the strategy?	Reduce GHG emissions intensity by 30% by 2030.
How will this be achieved?	- Incremental and transformational adaptations e.g. herd reductions or climate shelters for feedlotting. - Increased vegetation on-farm eg. Improve shade and shelter for managing heat stress, as well as carbon sequestration. - Extreme events preparedness eg. resilience and recovery from storms, fires, floods and drought. - Smarter energy use eg. reduce energy demand, increase energy efficiency, on-farm renewables/ bioenergy. - Future forage alternatives eg. establishment of alternative forages in response to changing soil moisture availability and increasing water stress. - Reducing nitrous oxide eg. new technologies and improved on farm practices for nitrogen fertiliser use to reduce nitrous oxide losses. - Reducing enteric methane eg. breeding for low methane genes, improved rumen function through high quality feed, diets and vaccines. - Good business management eg. skills and training for climate risk preparedness and adaptation.
Which Sustainable Development Goal/s does this align with?	SDG's 2, 9, 13.
Provide a statistic or diagram to support.	A range of statistics or diagrams may be provided based on student choice.

WORKSHEET 1.2 ANSWERS

ACTIVITY 1.2
Strategies for Sustainability

Waste Reduction

What is the goal of the strategy?	Reduce food waste across the dairy supply chain, and support the Australian dairy industry's goal in the Australian Dairy Sustainability Framework to halve food waste by 2030.Dairy has a target of 100% packaging to be recyclable, compostable or reusable by 2025, in line with government targets.
How will this be achieved?	Dairy farms use 5,000 to 10,000 tonnes of plastic annually for silage bales and covers to preserve animal feed. Currently, only about 5% of this plastic is recycled. The dairy industry aims to recycle 100% of silage wrap waste by 2030. A $965,400 grant from the Commonwealth Government in November 2020 will support the development of a collection and recycling system for farm plastics in Australian dairy regions, helping to reduce environmental impact over the next decade.
Which Sustainable Development Goal/s does this align with?	SDG's 2, 6, 9, 12.
Provide a statistic or diagram to support.	A range of statistics or diagrams may be provided based on student choice.

WORKSHEET 1.2 ANSWERS

ACTIVITY 1.2
Strategies for Sustainability

Bega Circular Economy

<u>Worksheet 1.2b – Sustainability Strategies- Bega Circular Economy</u> (Research and comprehension activity)

1. They run a pasture-raised egg operation.
2. They started out young and were cash and land poor, with no family land to use.
3. The mobile coops provide free fertiliser with zero carbon footprint, making the land more productive and helping to grow more grass.
4. Their 5,000 hens produce 32,000 eggs a day, and for the past two years, they have been unable to meet the high demand.
5. Barry Irvin found a solution to his problem of an unproductive grazing paddock by allowing the McMillans to use it, which helped them expand their business and improve the land.
6. Enterprise stacking is when farmland serves multiple uses for multiple users. In the McMillans' case, their chickens improve the land while producing eggs, benefiting both them and the landowners.
7. Circularity involves recovering, recycling, and reusing finite resources.
8. Barry adopted circularity after a Dutch banker explained that adopting circular economy practices was essential for reaching sustainability and Net Zero goals.
9. The project aims to make the Bega Valley a leading circular economy by 2030, with goals of economic, environmental, and social transformation through circular practices.
10. They use waste products such as wood waste to fuel their boilers, recycle plastic and cardboard packaging, and beneficially reuse factory wastewater for irrigation.
11. Planned projects include turning organic waste into biogas, growing seaweed, and expanding onshore seaweed farms using beneficially reused wastewater.

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Dairy Production as a Global Economic Activity

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