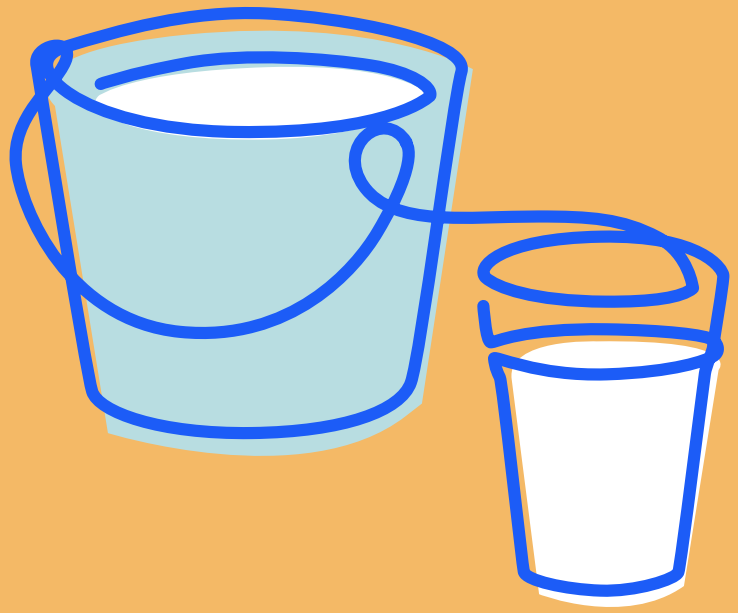
Dairy Australia

An educational resource for Years 9–10

Sustainable Dairy Production

Interactive Presentation
Stage 5 – Years 9 & 10



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Sustainable Dairy Production

Notes

Background for teachers

This interactive slideshow is for Year 9 and 10 students investigating food and fibre production in Australia. It is linked to Design and Technologies content in the Australian Curriculum and has further curriculum links to English and the Sustainability Cross-Curriculum Priority.

The included activities introduce students to sustainable dairy production in Australia. Activities include videos, a glossary, quiz and discussion questions, creative and design challenges, and student-led extension tasks.

We invite you to adapt these activities to suit your students' interests and capabilities and your learning environment.

Assessment

- Monitoring understanding in class discussions
- Informal formative assessment questions
- Collecting work samples
- Student self-assessment
- Peer assessment
- Teacher feedback

Differentiation

- **Support:** Some learning, assessment and research is conducted as a whole class.
- **Structured:** Use small group instruction to refine and redirect research and group projects.
- **Extension:** Student led independent learning and extension tasks are provided.

Connecting Home & School

Encourage students to deepen their understanding of these issues by extending class discussions into their homes. Invite students to share their families' unique perspectives.

The student-led extension tasks at the end of this presentation can be set as independent or at-home learning.

Curriculum Links
Australian Curriculum

Notes

	Year 9	Year 10
Design and Technologies	Analyse how people in design and technologies occupations consider ethical, security and sustainability factors to innovate and improve products, services and environments. **AC9TDE10K01**	
	Analyse the impact of innovation, enterprise and emerging technologies on designed solutions for global preferred futures. **AC9TDE10K02**	
	Analyse and make judgements on the ethical, secure and sustainable production and marketing of food and fibre enterprises. **AC9TDE10K04**	
	Analyse and make judgements on how characteristics and properties of materials, systems, components, tools and equipment can be combined to create designed solutions. **AC9TDE10K06**	
	Analyse needs or opportunities for designing; develop design briefs; and investigate, analyse and select materials, systems, components, tools and equipment to create designed solutions. **AC9TDE10P01**	
	Apply innovation and enterprise skills to generate, test, iterate and communicate design ideas, processes and solutions, including using digital tools. **AC9TDE10P02**	
	Develop design criteria independently including sustainability to evaluate design ideas, processes and solutions. **AC9TDE10P04**	
English	Plan, create, rehearse and deliver spoken and multimodal presentations for purpose and audience, using language features, literary devices and features of voice such as volume, tone, pitch and pace, and organising, expanding and developing ideas in ways that may be imaginative, reflective, informative, persuasive, analytical and/or critical. **AC9E9LY07**	Plan, create, rehearse and deliver spoken and multimodal presentations by experimenting with rhetorical devices, and the organisation and development of ideas, to engage audiences for different purposes in ways that may be imaginative, reflective, informative, persuasive, analytical and/or critical. **AC9E10LY07**
Cross-Curriculum Priority: Sustainability	Sustainable patterns of living require the responsible use of resources, maintenance of clean air, water and soils, and preservation or restoration of healthy environments. **SS2**	
	World views are formed by experiences at personal, local, national and global levels, and are linked to individual, community, business and political actions for sustainability. **SW2**	
	Sustainably designed products, environments and services aim to minimise the impact on or restore the quality and diversity of environmental, social and economic systems. **SD1**	
	Creative and innovative design is integral to the identification of new ways of sustainable living. **SD2**	
	Sustainable futures are achieved through informed individual, community, business and political action that values local, national and global equity and fairness across generations into the future. **SF1**	

Sustainability Dairy Glossary

Important words

Let's brush-up on the basics of dairy production and farm management. First, let's revise a few important words related to dairy production.

Match the word on the left with its definition on the right. The definitions are jumbled. You can complete this task on your own, in pairs, or as a game with the whole class. The answers are on the next slide.

Dairy Words	Meaning
1 cows	A Liquid waste from the dairy milking shed containing manure (poo), urine and the shed wash down water. If it is managed correctly, it can be a valuable resource for farmers.
2 greenhouse gases (GHGs)	B Female cattle. They give birth to calves and produce milk.
3 dairy effluent	C Reducing water wastage by using water-saving technologies and processes.
4 water efficiency	D Living in a way that doesn't waste or damage Earth's natural resources. Making sure we provide an equal or better way of life for future generations
5 environmental sustainability	E Gases in the atmosphere that trap heat. These can be emitted (released) in dairy farming and other forms of agriculture as well as other sectors including energy and transport.

Glossary
Important dairy words

Answer

1 cows	B Female cattle. They give birth to calves and produce milk.
2 greenhouse gases (GHGs)	E Gases in the atmosphere that trap heat. These can be emitted (released) in dairy farming and other forms of agriculture as well as other sectors including energy and transport.
3 dairy effluent	A Liquid waste from the dairy milking shed containing manure (poo), urine and the shed wash down water. If it is managed correctly, it can be a valuable resource for farmers.
4 water efficiency	C Reducing water wastage by using water-saving technologies and processes.
5 environmental sustainability	D Living in a way that doesn't waste or damage Earth's natural resources. Making sure we provide an equal or better way of life for future generations

Video Introduction

Introduction to dairy processes

The video below (24 minutes) provides an in-depth look at Aussie dairy farming. It outlines:

- the history of dairy farming in Australia
- different breeds of dairy cattle
- how milk is processed into other dairy foods
- how dairy foods get from the farm to our fridges
- the different technologies and processes used to produce dairy
- sustainability on Aussie dairy farms.

Pay attention, as the video is followed by a quick quiz!

Everything you need to know about dairy

youtube.com/watch?v=v48PgjwcoOs

Quick quiz
Introduction to dairy processes

Answer the questions based on the video content. The correct answer is on the next slide.

Question 1 Multiple Choice

Cows belong to a group of animals called...

a Rheumatoids

b Equidae

c Ruminants

d Calves

Quick quiz
Introduction to dairy processes

Answer the questions based on the video content. The correct answer is on the next slide.

Question 1 Multiple Choice

Cows belong to a group of animals called...

a Rheumatoids

b Equidae

c Ruminants

d Calves

Ruminants have four stomach compartments, each of which plays a different role in digesting food. Other ruminants include beef cattle, goats, sheep, giraffes and camels.

Quick quiz
Introduction to dairy processes

Question 2 Multiple Choice

When does a cow first produce milk?

a around 5 years old

b around 1 years old

c around 2 years old

d around 3 years old

Quick quiz
Introduction to dairy processes

Answer the questions based on the video content. The correct answer is on the next slide.

Question 2 Multiple Choice

When does a cow first produce milk?

a around 5 years old

b around 1 years old

c around 2 years old

d around 3 years old

A cow begins to produce milk once her first calf is born and will continue to produce milk for as long as she is milked.

Quick quiz
Introduction to dairy processes

Question 3 Multiple Choice

How was the rotary dairy cleaned as the cows were milked?

a It is sprayed with water as it rotates, both automatically and by hand.

b It uses an automated brushing mechanism.

c It is sometimes cleaned afterwards.

d Laser networks kill bacteria.

Quick quiz
Introduction to dairy processes

Answer

Answer the questions based on the video content. The correct answer is on the next slide.

Question 3 Multiple Choice

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The effluent is constantly washed off the rotary using hand-held and automated hoses to ensure a hygienic milking environment.

Quick quiz
Introduction to dairy processes

Question 4 Did you notice...?

How many different types of machines did you notice on the dairy farms in the videos? List as many as you can with a partner.

Quick quiz
Introduction to dairy processes

Answer the questions based on the video content. The correct answer is on the next slide.

Question 4 Did you notice...?

Some of the machines seen on the dairy farms in the video are:

- rotary dairy
- herringbone dairy
- milk tanker
- tractors and front-end loaders
- milking lines and suction cups
- refrigerated storage tanks (vats)
- robotic milking systems
- automated feeding and watering systems
- irrigation and sprinkler systems
- refrigerators
- computers
- quad bikes

Quick quiz
Introduction to dairy processes

Question 5 Multiple Choice

What are the biggest environmental challenges for dairy farmers?

a Managing nutrient balances in the soil

b Protecting waterways and bushland

c Reducing on-farm water use and adapting to a changing climate

d All of the above

Quick quiz
Introduction to dairy processes

Answer the questions based on the video content. The correct answer is on the next slide.

Question 5 Multiple Choice

What are the biggest environmental challenges for dairy farmers?

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b Protecting waterways and bushland

c Reducing on-farm water use and adapting to a changing climate

d All of the above

Improving water efficiency and land management are key to Aussie dairy farmers' sustainability goals. Today's dairy farmers have a far greater understanding of the impact of farming on the land so they are constantly looking for environmentally sustainable ways to manage their farms, animals and businesses.

Environmental Sustainability

Aussie dairy farmers' commitment to the environment

The videos below explain how Aussie dairy farmers are embracing the latest research and technology to reduce their impact on the land and make a positive contribution to the environment.

Copy the table on the next slide and fill it in as you watch the videos. Write a brief answer or notes for each question. You may need to pause the videos, or watch them more than once, to ensure you get all the answers.

Inside Australian dairy's commitments to the environment

youtube.com/watch?v=T-ganhdA1oY

Australian dairy – our sustainability promise and commitments

youtube.com/watch?v=x3n3iitd4Rk

Environmental Sustainability

Aussie dairy farmers' commitment to the environment

Question	Answer / Notes
How can effluent, a potential pollutant, be used in apositive way on dairy farms?	
How have dairy farmers Sandra Jefford and Wilco Droppert reduced the carbon footprint of their farm?	
How does dairy farming contribute methane to the atmosphere?	
What percentage of dairy farms implement practices to reduce their greenhouse gas emissions?	
By what percentage have greenhouse gas emissions been reduced in dairy manufacturing since 2010/2011?	

Environmental Sustainability

Aussie dairy farmers' commitment to the environment

Question	Answer / Notes
How can effluent, a potential pollutant, be used in apositive way on dairy farms?	Effluent can be used as a fertiliser to grow more pasture (grass) for the cows.
How have dairy farmers Sandra Jefford and Wilco Droppert reduced the carbon footprint of their farm?	Sandra and Wilco have reduced their carbon footprint by: • storing more carbon in the soil by maintaining and regenerating the trees and plants on their farm • using solar, wind and battery power.
How does dairy farming contribute methane to the atmosphere?	Dairy farming contributes methane, a greenhouse gas, to the atmosphere due to cows burping. Cows also release methane, to a lesser extent, through their flatulence / farting!
What percentage of dairy farms implement practices to reduce their greenhouse gas emissions?	94% of Aussie dairy farms are actively implementing practices to reduce their greenhouse gas (GHG) emissions.
By what percentage have greenhouse gas emissions been reduced in dairy manufacturing since 2010/2011?	GHG emissions in dairy manufacturing have been reduced by 27% since 2010/2011.

Creative challenge 1
Caring for animals on dairy farms

Explore & create
Dairy 2050! Design a Dairy Farm of the Future

How will sustainable Aussie Dairy farms look in 2050? What amazing technologies and processes will Aussie dairy farmers use to achieve environmental sustainability?

For this activity, you will create a concept plan for environmentally sustainable dairy farm of the future.

As a class, discuss the current environmental sustainability challenges faced by Aussie dairy farmers. What technologies and processes are currently in use for overcoming each of these challenges? Some topics to discuss include effluent management, emissions and climate change, water use and protecting native bushland and animals. You will find lots of helpful research links on the "Resources and Links" page of this resource.

Chew the cud! Chat with a partner about how you will integrate sustainable technologies and processes into your dairy farm concept plan. What futuristic innovations will you include to meet sustainability challenges?

Do a draft sketch. Don't get caught up in smaller details at this stage. Consider the main dairy farm activities you have observed in the videos and make sure you include space for all these activities. Have you carefully considered the location of the buildings, animal movement, open spaces, water and effluent storage, animal welfare and farmer wellbeing?

Reflect on your design and get feedback from your partner. Does your design respond to the sustainability challenges you originally identified?

Start your sketch! Make sure you also annotate your creation when you have finished sketching.

Present your concept to your class or group and seek further feedback on how you can improve your design.

Creative challenge 2
Sustainable dairy farming

Activity

Analyse & communicate

Develop an advertising campaign showcasing aussie dairy farmers' environmentally sustainable practices

For this activity, you will develop an online advertising campaign to communicate the sustainable technologies and processes currently used by Aussie dairy farmers. You should also research and include some newer technologies and methods that will help Aussie dairy farmers become more sustainable in the future.

You will conceptualise and design campaign materials, including short format videos, to communicate your message.

1. Research and make notes on the following dairy production processes:
   - milk production
   - processing into different dairy products
   - packaging

   How can each of these processes be improved to be more environmentally sustainable?
2. Consider the message of your campaign. What are the core ideas you are trying to communicate? How will you distill complex, nuanced ideas into short format videos?
3. Decide on the audience for your campaign. How will you capture the attention of younger Australians such as your friends?
4. Plan and create several short videos to communicate your message.
5. Share your films with your classmates! BYO popcorn!

Student led tasks
Independent and extension learning

This matrix provides extra student-led activities that can be completed independently, in small groups, or as homework tasks. Some activities will require further teacher scaffolding.

Create	Imagine	Research & present
Design, sketch and annotate a storyboard for a "Farm-to-Plate" video game based on the dairy industry. Include milk production, processing of different dairy products, packaging, transport and sales in your game. Integrate your growing knowledge of how the dairy industry functions. Ensure one of the aims of your game is for characters to use sustainable technologies and processes. Hint: Investigate how video game designers use storyboards to create their games. Like film directors, game designers plan how all the elements of their game will interact, including the characters, action and plot.	Write an in-depth narrative from the perspective of a drop of water or a blade of grass on a dairy farm. As part of your planning, research and consider the water cycle, the life cycle of plants, cow digestion, water and effluent management on dairy farms and anything else that might impact your story. Add some magic to your plot! What challenges will your character face? How will you resolve them? How can you make your narrative not only engaging but also informative?	Find out which parts of the world are experiencing increased demand for dairy products and other healthy, fresh Aussie foods. Why? How will increasing demand for dairy products impact environmental sustainability in the dairy industry? Create an engaging slideshow, including several infographics, which outlines your findings. Present your research to the class.

Resources & links
Sustainable dairy production

Australian Curriculum

Australian Dairy Farmers - Natural Resources

Dairy Australia - Dairy Manufacturers

Dairy Australia - Dairy Products & Sustainability

Dairy Australia - History Of The Australian Dairy Industry & Its People

Dairy Australia - Reducing Environmental Impacts

Dairy Australia - Sustainability

Dairy Australia - YouTube

Dairy Matters - You Ask, We Answer

Discover Dairy - Australian Dairy Education Resources

Discover Dairy - YouTube

30 Ways Australian Dairy is Tackling Climate Change

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