

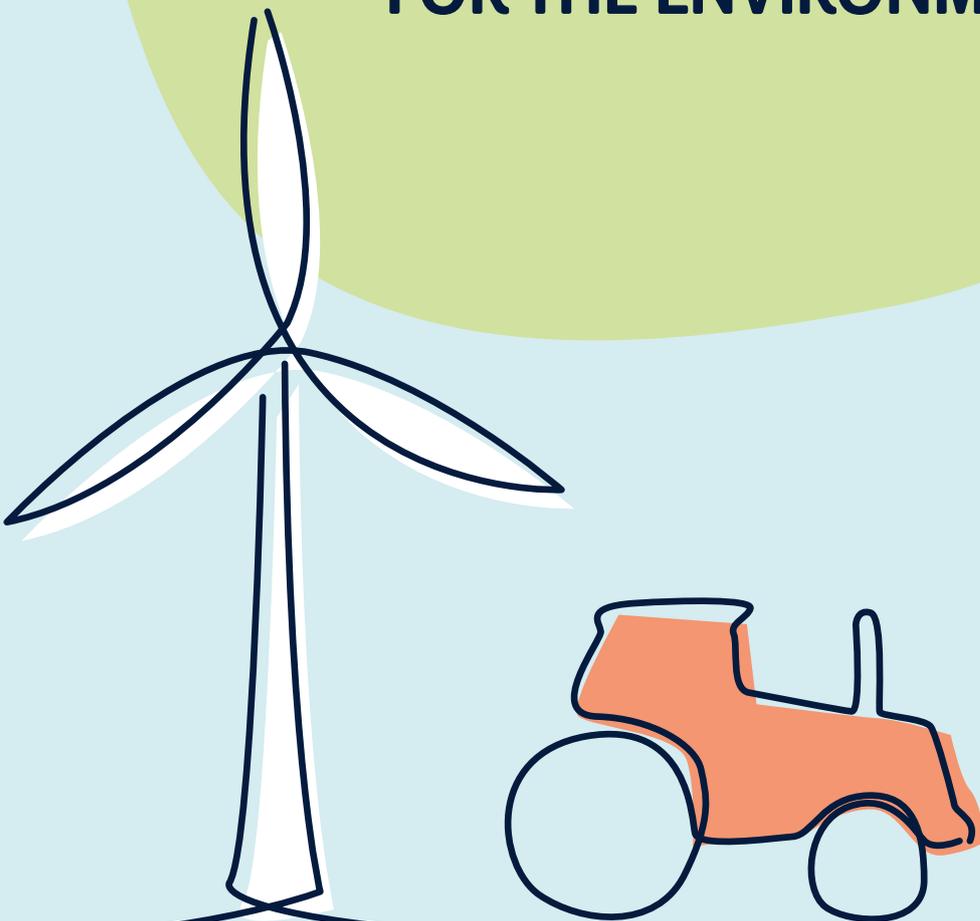
**DISCOVER
DAIRY**

YEARS
5-6

INQUIRY UNIT
**SUSTAINABLE
DAIRY FARMING**

**HOW FARMERS CARE
FOR THE ENVIRONMENT**

FROM FARM
TO PLATE



ACKNOWLEDGEMENTS



This online curriculum-linked resource was produced by Dairy Australia.

The curriculum-linked resource is designed to introduce young people to dairy foods and the dairy industry in Australia.

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The materials in the original educational resource were developed by Angela Colliver from Angela Colliver Consulting Services Pty Ltd.

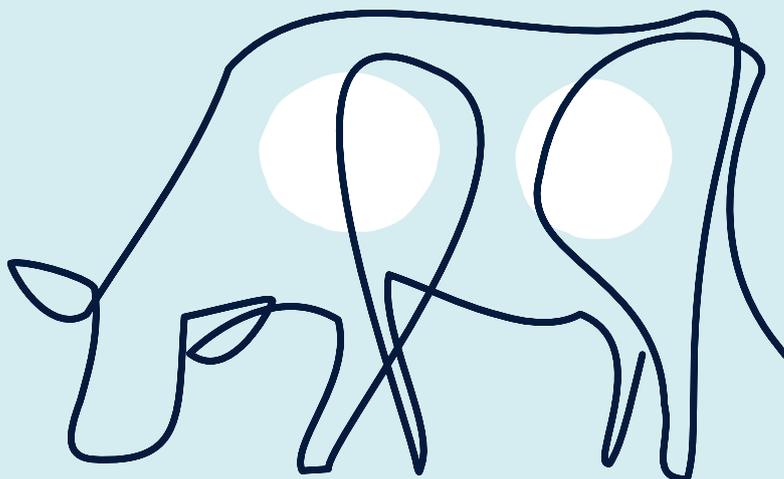
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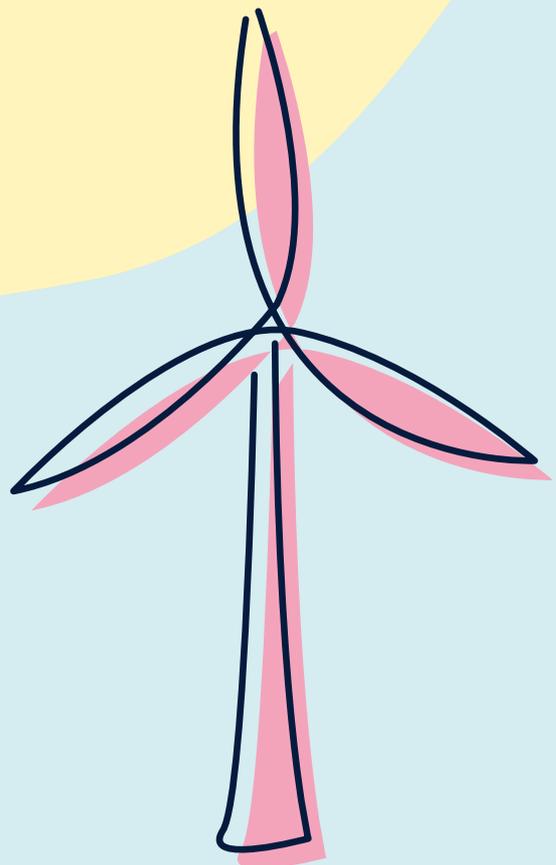
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FACT

MORE THAN \$2.3 BILLION HAS BEEN INVESTED IN FARM TECHNOLOGIES AND INNOVATION SINCE 1980, RESULTING IN MORE THAN TWICE AS MUCH MILK PER COW AND A TRIPLING IN PRODUCTION. INVESTMENT INCLUDES WAYS TO SAVE WATER, IMPROVE PASTURE, LOWER GREENHOUSE GAS EMISSIONS AND REDUCE FERTILISER USE



INTRODUCTION

This Year 5 to Year 6 unit of work aims to help teachers and students investigate and understand more about the Australian dairy industry. It follows an inquiry based approach to learning, where the goal is for students to make meaning of their learning. This resource endeavours to use information about dairy farming as stimulus for the learning journey, whereby students become internally motivated to explore, make connections and analyse.

The unit can be taught as presented, or used as inspiration to form an inquiry unit that fits with your school's scope and sequence. Teachers are provided with suggested inquiry-based learning experiences, supporting investigation into what Australian dairy farmers do to care for the environment and maintain healthy farms and healthy cows.

We encourage teachers to assess the needs of their class, adapting the content and activities in this unit accordingly. The activities provided aim to spark student curiosity and inspire them to generate their own questions to investigate.

In this unit, students will:

- Discover the processes dairy farmers use to ensure the growth and survival of their animals and pastures;
- Investigate and explore new and existing practices used on Australian dairy farms to care for the environment, sustainably manage resources, maintain healthy farms and healthy cows;
- Investigate how dairy farmers address competing considerations, including sustainability in the management of the farm and its resources;
- Explore technologies, tools, equipment, procedures and systems used on dairy farms to raise cows, produce milk and maintain healthy farms;
- Explore the ways dairy farmers might manage climate variability on dairy farms;
- Use and apply concepts and ideas about how Australian dairy farms care for the environment, sustainably manage resources, maintain healthy farms and healthy cows;
- Design and deliver a presentation to give dairy farming an update and communicate new ideas and innovations used in sustainable dairy farming in changing times; and
- Reflect and evaluate on what students know about how Australian dairy farms care for the environment, sustainably manage resources, maintain healthy farms and healthy cows.

Supporting student and teacher resources mentioned throughout this unit can be found at dairy.edu.au



EDUCATIONAL APPROACH

The activities found in this unit follow the six phases of 'solution fluency', based on the 21st Century Fluencies model created by Crockett et al (2011).



Step one: Define

The 'Define' phase begins with lessons that mentally engage students with a challenge, problem, question and task. This phase captures their interest, provides an opportunity for them to express what they know about the topic and understandings being developed, and helps them to make connections between what they know and the new ideas.



Step four: Design

The 'Design' phase provides opportunities for students to apply what they have learned to new situations, to map production processes and so develop a deeper understanding of the challenge, problem, question or phenomenon. It is important for students to extend explanations and understanding using and integrating different modes such as diagrammatic images, written language and media.



Step two: Discover

The 'Discover' phase includes activities in which they can explore, investigate, research, read, discuss, gather, organise and compare knowledge and data. They grapple with the challenge, problem, question or phenomenon and describe it in their own words. This phase provides a context and enables students to acquire a common set of experiences that they can use to help each other make sense of the new knowledge or understandings.



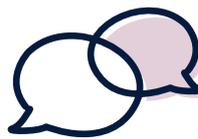
Step five: Deliver

The 'Deliver' phase has two stages; production and publication (or presentation). In the production phase the task comes to life, this is the doing phase. At the end of this phase, the student task should be completed. Next, they present or publish their work sample to an audience.



Step three: Dream

The 'Dream' phase enables students to imagine and develop possible solutions and explanations for the challenge, problem, question and task they have experienced. The significant aspect of this phase is that the students' explanations follow substantive conversations and higher order thinking experiences



Step six: Debrief

The 'Debrief' phase provides an opportunity for students to revisit, review and reflect on their own learning and new understanding and skills. This is also when students provide evidence for changes to their understanding, beliefs and skills.

CURRICULUM LINKS

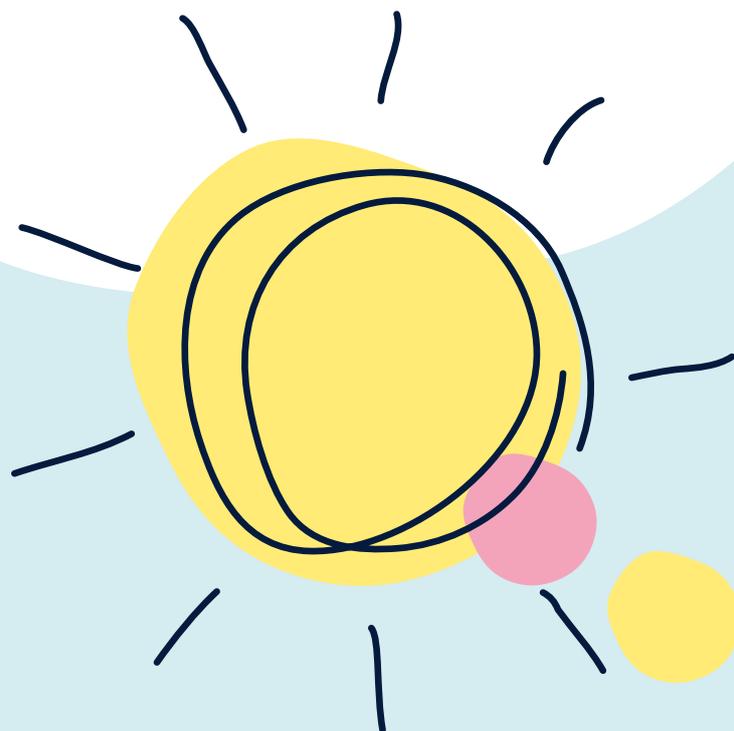


This unit of work has been designed as a series of activities based on the content descriptors of the Australian Curriculum identified in Year 5 and Year 6 Science and Design and Technologies.

	Year 5	Year 6
Science	Science Understandings: Biological sciences Living things have structural features and adaptations that help them to survive in their environment (ACSSU043)	Science Understandings: Biological sciences The growth and survival of living things are affected by the physical condition of their environment (ACSSU094)
Technologies	Design and Technologies: Knowledge and Understanding Investigate how and why food and fibre are produced in managed environments (ACTDEK021) Investigate how people in design and technology occupations (dairy farmers) address competing considerations, including sustainability in the design of products, services and environments for current and future use (ACTDEK01)	
	Design and Technologies: Processes and Production Skills Generate, develop, and communicate design ideas and processes for audiences using appropriate technical terms and graphical representation techniques (ACTDEP025) Develop project plans that include consideration of resources when making designed solutions individually and collaboratively (ACTDEP028)	
Cross-curriculum priorities	Sustainability All life forms, including human life are connected through ecosystems on which they depend for their wellbeing and survival (01.2) Sustainable patterns of living rely on the interdependence of healthy social, economic and ecological systems (01.3) Actions for a more sustainable future reflect values of care, respect and responsibility, and require us to explore and understand environments (01.7) Designing action for sustainability requires an evaluation of past practices, the assessment of scientific and technological developments, and balanced judgments based on projected future economic, social and environmental impacts (01.8)	
General capabilities	Literacy Information and Communication Technologies (ICT) Capability Critical and Creative Thinking	

FACT

**40% OF DAIRY FARMS
HAVE A RENEWABLE
ENERGY SYSTEM SUCH
AS SOLAR PANELS OR
SOLAR HOT WATER**



STEP 1: DEFINE



Purpose

To provide students with opportunities to:

- Gather information about student's prior knowledge about the things dairy farmers do to care for the environment, maintain healthy farms and healthy cows
- Share ideas and collaborate with others
- Express what is known about sustainability
- Set directions for an investigation
- Provide data for assessment purposes

How does our school care for the environment?

Dairy farmers do lots of things to care for the environment and maintain healthy farms and healthy cows. Talk with students about the ways they care for the environment at home and at school.

Ask questions such as: To what extent has our school considered?

- Reducing energy use by becoming more aware of where energy is used and taking steps to ensure that fans, lights and electrical appliances are turned off when not in use
- Identifying areas of energy savings at the school
- Replacing or supplementing the school's energy supply with renewable energy sources such as wind power or photovoltaics
- Monitoring water usage in the school
- Mulching gardens to reduce water loss through evaporation
- Installing flow control devices to reduce the amount of water flowing from taps
- Using a landscape design to reduce the consumption of resources e.g. planting shade trees near buildings, adding mulch to garden beds, or installing drip irrigation
- Putting water conservation signs in the toilets, urinals, hand basins, sinks, showers and any other water outlets in and around school buildings
- Reducing, re-using and recycling classroom and school waste
- Building a worm farm to recycle food scraps and breed worms to enhance the soil in garden beds
- Creating a compost heap and using compost to add organic matter to the soil
- Enhancing or expanding habitats around the school for native fauna

Ask similar questions to prompt thinking about what actions are undertaken at home.

What do farmers do to care for the environment?

Have a discussion to find out what students know about the ways dairy farmers might care for the environment; maintain healthy farms, and healthy cows. Encourage students to contemplate what dairy farmers have to do every day. Ideas could include:

- Rear healthy cows
- Handle livestock
- Rear newborn calves
- Operate tractors, quad bikes, motorbikes, trucks and utes
- Install and maintain fences
- Care for the health and wellbeing of the cows
- Manage and protect water on the farm
- Monitor water supplies
- Monitor pastures and grazing areas
- Provide feed and shelter for the cows
- Coordinate milking processes
- Operate dairy recycling programs
- Operate irrigation systems
- Manage the farm's soil health
- Maintain natural habitats on farms
- Assess and monitor weeds and pests on the farm

Further explore the processes dairy farmers use to ensure the growth and survival of their cows and the pastures they need to graze and feed on. Ask students to share their ideas with a partner. After sharing students' ideas, make a list of sentences and phrases as a whole class.

Ask questions about what it might mean to use resources 'sustainably'? Check students' understanding of terms like 'sustainable use', 'sustainable resource management', 'sustainable water use', 'water conservation', 'sustainable energy use', 'energy conservation', 'waste management', 'natural vegetation replenishment', 'restoration of vegetation cover' etc.

Extending understanding of sustainability

Talk about the word **sustainability**. As a class consider the differences between 'environmental sustainability', 'economic sustainability' and 'social sustainability'. For example:

- When a dairy farmer thinks of being economically sustainable, they might ask themselves a question like; 'Are we sustainably profitable?' or 'What do we need to do to ensure that the dairy farm continues to provide a living for our family into the future?'
- When a dairy farmer thinks of being socially sustainable, they might ask themselves a question like; 'Are we behaving in a way that the community will be happy to support us into the future?' or 'How should we be involved in our community to ensure a mutually supportive relationship?'
- When a dairy farmer thinks of being environmentally sustainable, they might ask themselves a question such as; 'Are we maintaining our farms and their natural assets for future generations?' or 'How can we see and connect with the farm's natural habitat so that future dairy farmers can continue to succeed.'

Expand the topic and talk about other sustainable practices used on dairy farms. Consider irrigation practices, pasture rotations, waste management, water re-use, resource recovery, fencing off rivers and streams, planting trees and shrubs near rivers to stop erosion.

Ask students to visualise what sustainable dairy farming might look, sound and feel like? Think about issues such as the farm's environmental footprint, sustainable management systems to conserve soils, limit chemical usage, improve water use efficiency, reduce and re-use waste, recycle effluent and minimise energy usage.

As a class, build understanding by sharing and recording ideas around how a dairy farmer might address sustainable farming on the land and in their business. Encourage students to find real life examples of practises dairy farmers are implementing to address sustainable farming. Students are to report their findings back to class. Share these to build a bigger picture of what is happening in the industry.

Setting the task

Note This is a suggested assessment task.

Working in pair or small groups, students are to research, record and collect information about dairy farms and their farm practices that manage resources sustainably.

Present the following scenario to students and ask them to design and produce a poster and an e-Brochure.

Each pair or small group will also be asked to present their work to an audience later in the unit.

The scenario

You work at an advertising company that has been approached by Dairy Australia to create a poster and e-Brochure to raise awareness about sustainable practices in the dairy industry used to care for the environment, and maintain healthy farms and cows.

Your team should develop a campaign demonstrating understanding of:

- What dairy cows need to grow and survive, and produce milk
- How Australian dairy farmers raise and produce dairy cows, maintain healthy farms and care for the environment
- The resources used on dairy farms
- The sustainable practices used on Australian dairy farms

What happens when Australian dairy farmers strive to farm sustainably?

Learning logs

Learning logs are useful for assessment purposes. Students can complete an entry at the beginning of the unit and then revisit it regularly during, and again at the end of the unit to demonstrate their changed understandings.

At the end of the activities in the 'define phase', invite students to draw/write/scribe ideas and questions about their task using a table like the one below.

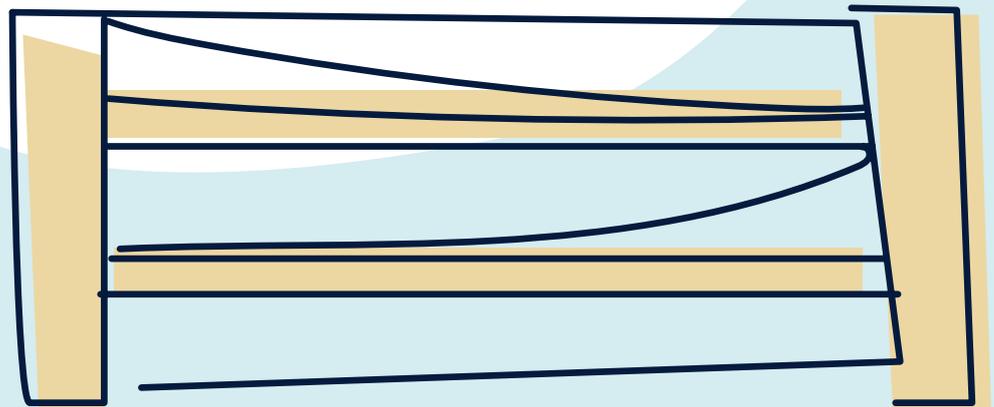
What I know

What I'm not sure about

What I want to know

FACT

**72 % OF DAIRY FARMS HAVE
FENCED OFF SOME OR ALL
WATERWAYS TO PROTECT
RIVER HEALTH**



STEP 2: DISCOVER



Purpose

To provide students with opportunities to develop their understanding of:

- Where Australian dairy farms are located
- How raising dairy cows and milk production can be affected by seasonal rainfall patterns
- How to write a simple bibliography
- Sustainable practices used to raise cows and produce milk on Australian dairy farms
- The technologies, tools, equipment, procedures and systems used to raise, milk dairy cows and produce milk
- A focus for the forthcoming experiences in the 'Dream' stage of the inquiry.

Where are dairy farms located in Australia?

Research and discuss with the class where dairy farms are located in Australia.

Introduce students to a [map](#) showing examples of where Australia's dairy farming areas are located. Ask students why they think dairy farms are situated where they are? Why are there no dairy farms in the Northern Territory? What does this mean for people living there? Where do they get their milk and other dairy food?

Talk about how dairy farms are typically located in medium to high rainfall areas due to dairy cows feeding on native pastures and vegetation, as well as pastures that have been grown by the farmer, which need good seasonal rainfall.

Explore maps to find the connection between climate and rainfall, and where dairy farms are located. Visit the Bureau of Meteorology's [website](#) to look at climate zone maps.

Ask students to discover the climate type most suitable for dairy farming, and to discover whether dairy farms typically need high, medium or low rainfall each year. Using **Resource 1.1** (found at the end of this guide) ask students to identify dairy farming regions in Australia.

Explore deeper

Brainstorm ways dairy farmers address competing considerations including economic, environmental and social sustainability in the design of their farms and the practices they use.

Model how they can select the student navigation button and their year level to find images, videos, games and information about how dairy farmers raise cows, care for the environment, maintain healthy farms, including the technologies, equipment, procedures and systems used on dairy farms. Encourage to research information on this and other websites on:

- What dairy cows need to grow and survive and produce milk
- How Australian dairy farmers raise and produce dairy cows, maintain healthy farms and care for the environment
- The resources used on dairy farms
- The sustainable practices used on Australian dairy farms such as fencing off waterways, planting trees and vegetation, irrigation management, energy and water conservation, pest and weed management.
- Climate change risk

Ask students to record information they might need for their posters and e-Brochures.

Introduce students to a simple bibliography. Talk with the class about the purpose and basic features - helping the audience to know where students got their information from and providing credit for their sources of information.

Talk about what to include in a bibliography.

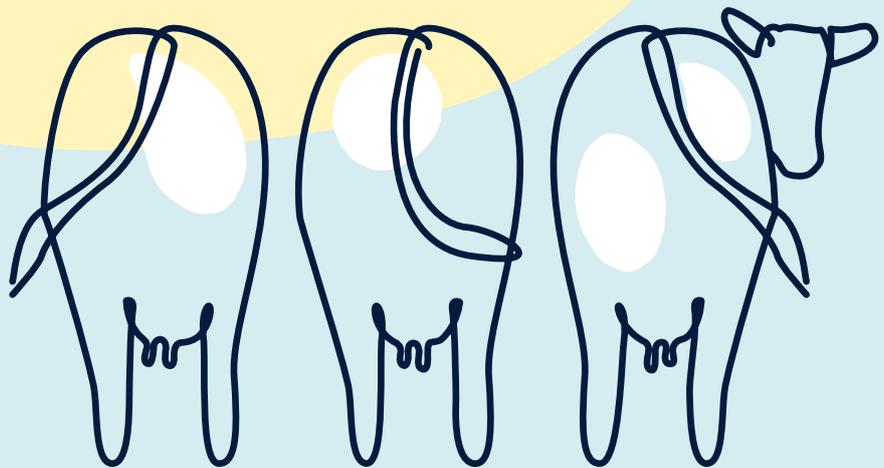
For example, a bibliography should list every primary source of information you use such as a book, a movie, a website, an interview, or any information that did not come from yourself.

Explain how a bibliography is placed at the end of a work sample.

Model how to source the images and information students may have selected on the Discover Dairy website.

FACT

**47 % OF DAIRY FARMS
HAVE SOME LEVEL OF
IRRIGATION AUTOMATION
FOR MORE EFFICIENT
WATER USE**



STEP 3: DREAM



Purpose

To provide students with opportunities to:

- Develop a project plan and ideas about how their investigations will be conducted
- Brainstorm and share ideas
- Explore possibilities
- Explore ways dairy farmers might manage 'climate risk' on dairy farms
- Imagine and visualise their presentation products

Framing the project plan

Ask students in their teams to close their eyes and visualise how dairy farmers might:

- Improve irrigation systems and their performance
- Design automated water trough filling systems
- Improve the recycling of wastewater
- Reduce methane emissions
- Generate onsite power
- Manage land for biodiversity conservation
- Manage native habitats
- Prevent wind and water erosion
- Protect their stock from sun and heat
- Redesign production sheds on the dairy farm for energy efficient cooling
- Improve water capture and recycling
- Ask students to list and order the key concepts that feature in their poster and e-Brochure. Whilst listing the concepts encourage the students to:
 - visualise how to incorporate these ideas into their presentations
 - discuss different ideas on how the concepts will be incorporated into their presentations
 - document their ideas and plans

In their chosen groups, ask students to describe for each other what they have visualised.

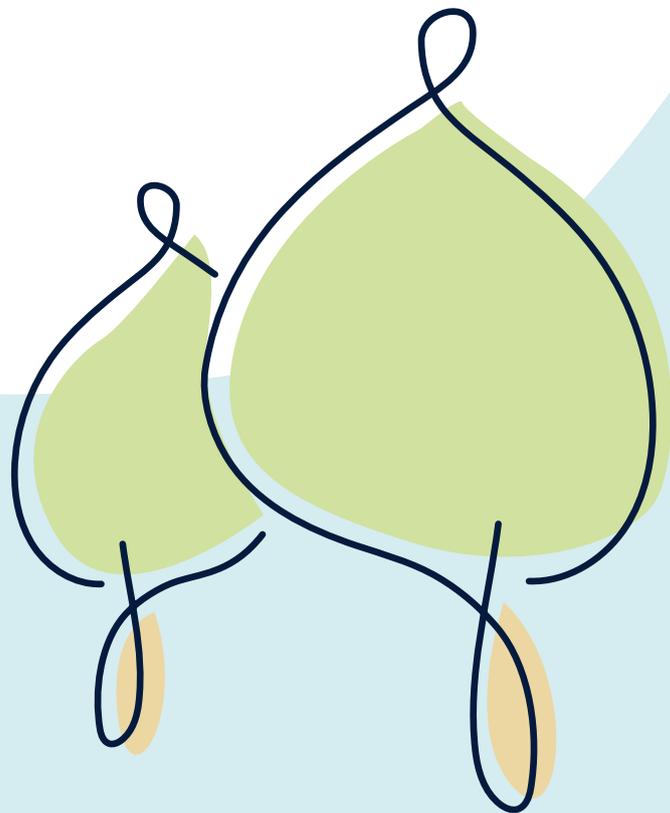
Visualise

Encourage the students to frame their project plan, refine their questions, and clarify how their investigations will be conducted. For example:

- Listing and categorising what information they will collect under headings – what dairy cows need to grow and survive and produce milk; how Australian dairy farmers raise and produce dairy cows, maintain healthy farms and care for the environment; the resources used on dairy farms; and actions they take to use sustainable management practices; solutions available today; emerging innovations/inventions;
- Preparing a project plan to outline information that needs to be gathered, who is responsible, and where they will seek information, how it will be gathered. The plan should also include identifying the materials, tools and equipment and planning and production steps required for making the poster and e-Brochure. Hand out **Resource 1.2** (found at the end of this guide) for students to make a start on their project plan.

FACT

**47 % OF DAIRY FARMS
MANAGE PART OF THEIR
LAND FOR BIODIVERSITY
CONSERVATION**



STEP 4: DESIGN



Purpose

To provide students with opportunities to:

- Explain sustainable practices used on dairy farms
- Design and create their presentation
- Gather information from a range of sources
- Develop skills of formulating questions and gathering data
- Develop communication and design skills
- Share their posters and e-Brochures

Designing the presentation

Using the information gathered, each team prepares their presentation featuring the sustainable practices used to care for the environment, maintain healthy farms, raise cows and produce quality milk on Australian dairy farms.

Invite students in their groups to begin designing their poster and e-Brochures. If the class has digital devices available, revisit digital tools that can be used to create their presentation.

Encourage students to use their collected information, case studies and creativity as part of their presentations.

Explanations

Ask students in their chosen team to begin drafting their explanation of sustainable practices that are used to care for the environment; maintain healthy farms and healthy cows.

Remind them to go back and interpret the evidence they have viewed, read and talked about in previous activities, and to keep an accurate bibliography.

STEP 5: DELIVER



Purpose

To provide students with opportunities to:

- Share their posters and e-Brochures
- Apply what they have learned and communicate how the presentations were produced
- Plan their presentation
- Share investigation findings

Almost time to present!

Invite students to confirm the ideas planned for their posters and e-Brochures that aim to raise awareness about the sustainable practices used to care for the environment; maintain healthy farms and healthy cows.

Ask students to finalise their presentations. Invite them to summarise what they have learned in a journal log or reflection.

Delivering the presentation

Note This is the suggested assessment activity.

Invite students to put their plan into action and present their posters and e-Brochures to an audience!

STEP 6: DEBRIEF



Purpose

To provide students with opportunities to:

- Revisit and reflect on their final products and process used to determine what was done well and what could have been improved
- Provide a source of data for assessment

To provide teachers with:

- Insights into students' understandings and attitudes, as well as their perceptions of their own strengths and areas for improvement

Evaluate the presentation

Involve students in a debrief and ask them to review their final products and the processes they used to design and create them.

Ask questions like:

- What worked well?
- What didn't?
- How could it have been improved?
- What were the strengths?
- Were there any limitations in the processes you used?
- What could be done differently next time?

Reflections

Ask students to complete a self-assessment using the following questions as a guide.

- What did you learn in this unit?
- What questions did it make wonder?
- How well did you understand the task that was set?
- What do you now know about the sustainable practices used by Australian dairy farmers to care for the environment; maintain healthy farms and healthy cows?
- What do you now know what dairy farmers need to know and do to produce their products?
- How could you have extended your learning further?

FROM FARM TO PLATE MIDDLE/UPPER PRIMARY STUDENT WORKSHEET

Dairy farming regions in Australia

On the map of Australia below, mark where the main dairy farming regions are found and briefly explain what makes these locations suitable.



Resource 1.2 Project plan

What do we need to do?	Who is going to do it and how?	How will we gather the information?	How can our products and processes be improved?
Create a poster and e-Brochure to raise awareness about the sustainable practices used to raise cows and produce milk on Australian dairy farms			
Find out what dairy cows need to grow and survive and produce milk; how Australian dairy farmers raise and produce dairy cows, maintain healthy farms and care for the environment; the resources used on dairy farms; and actions they take to use sustainable management practices; solutions available today; emerging innovations/inventions Record information and sources/references			
Decide on what tools to use to create our poster and e-Brochure			
Draft the poster and e-Brochure			
Edit the poster and e-Brochure			
Present the poster and e-Brochure			

DISCOVER DAIRY

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