

The dairy supply chain



An educational
resource for

**Years
7–8**

Discover Aussie Dairy



Learning areas and Australian curriculum content



Design and technologies

Analyse how food and fibre are produced in managed environments and how these can become sustainable. (AC9TDE8K04)

Analyse how properties of foods determine preparation and presentation techniques when designing solutions for healthy eating. (AC9TDE8K05)

Generate, test, iterate and communicate design ideas, processes and solutions using technical terms and graphical representation techniques, including using digital tools. (AC9TDE8P02)

Lesson Objective

Students will explore the Australian dairy industry through a 360-degree virtual farm tour, providing insight into the journey of milk from paddock to plate. Collaboratively, they will create a flowchart that outlines the key stages in the dairy sector supply chain to develop an understanding of the processes involved. Students will use their creativity to design a recipe card for a dairy product, using their knowledge of the dairy supply chain and the production and processing methods used in the Australian dairy industry. A case study of an innovative dairy farm will be used to illustrate how automation technology is shaping the future of Australian dairy.

Lesson Overview

Activity 1 – Dairy sector supply chain (20 mins)

Activity 2 – Dairylicious design (40 mins)

Activity 3 – Case study: Chittick Dairy Farm (20 mins)

Contents

- Australian curriculum content | Page 2
- Resources and equipment | Page 4
- Lesson guide | Pages 5–6
- Answers | Page 7–9
- References | Pages 10
- Student activities | Pages 11–13

Note: Schools are responsible for generating their own risk assessments for activities. Risk assessments should address the potential hazards associated with using dairy products in the classroom, including foodborne illnesses, allergies, slips/falls, and cross-contamination, and propose control measures such as allergy awareness, accident prevention, and hygiene practices to ensure a safe learning environment for students.



ATTRIBUTION, CREDIT & SHARING



This resource was produced by Primary Industries Education Foundation Australia (PIEFA) in collaboration with Dairy Australia. Primary Industries Education Foundation Australia's resources support and facilitate effective teaching and learning about Australia's food and fibre industries. We are grateful for the support of our industry and member organisations for assisting in our research efforts and providing industry-specific information and imagery to benefit the development and accuracy of this educational resource.



While reasonable efforts have been made to ensure that the contents of this educational resource are factually correct, PIEFA and Dairy Australia do not accept responsibility for the accuracy or completeness of the contents and shall not be liable for any loss or damage that may be occasioned directly or indirectly from using, or reliance on, the contents of this educational resource.

Schools and users of this resource are responsible for generating their own risk assessments and for their own compliance, procedures and reporting related to the use of animals, equipment and other materials for educational purposes.



This work is licensed under Creative Commons BY-NC 4.0.

To view a copy of this license, visit: <http://creativecommons.org/licenses/by-nc/4.0/>

Resources and equipment



Teacher
guide

Activity 1 – Dairy sector supply chain

- 1 Digital devices
- 2 [Discover Aussie Dairy 360 virtual farm tour \(6:53\)](#)
- 3 [Interactive – Farm to plate – Discover Aussie Dairy](#)
- 4 **Worksheet 1a – Dairy sector supply chain**
- 5 Butchers paper or A3 paper
- 6 Scissors, markers, and glue

Activity 2 – Dairylicious design

- 1 Digital devices
- 2 [Discover how milk is made \(2:39\)](#)
- 3 [Discover how cheese is made \(3:10\)](#)
- 4 [Discover how other dairy products are made \(3:07\)](#)
- 5 **Worksheet 2a – dairylicious design**
- 6 [Recipes – Dairy Australia](#)
- 7 A4 paper or design software, e.g. [Canva](#)

Activity 3 – Case study: Chittick Dairy Farm

- 1 Digital devices
- 2 [Technology | Dairy Australia](#)
- 3 [Chittick dairy farm: A beacon of modern dairy farming – Humans of agriculture \(4:18\)](#)
- 4 **Worksheet 3a – Case study: Chittick dairy farm**

Additional resources

[Dairy manufacturers | Who makes dairy products in Australia? – Dairy Australia](#)

[How milk is made & the milking process | Milk pasteurisation & homogenisation – Dairy Australia](#)

[A smart farmer](#)

[Technology | Dairy Australia](#)

[Dairy matters | Dairy Australia](#)

Lesson guide



Teacher
guide

Activity 1 – Dairy sector supply chain

Students will develop an understanding of the Australian dairy industry through the use of a 360-degree virtual farm tour video. They will collaborate to design a dairy supply chain flowchart highlighting the steps required to produce dairy products from paddock to plate.

- a Facilitate a class discussion about supply chains. Ask the students the following questions:
 - What is a supply chain?
 - How do dairy products such as milk or cheese get to our fridge from the farm where they are produced? This is often called ‘paddock to plate’ and, in the case of dairy products, is sometimes referred to as ‘farm to fridge’. (Answers page 7)
- b View the **Discover Aussie Dairy 360 Virtual Farm Tour** (6:53) video to provide students with an understanding of the dairy sector supply chain. This may be viewed as a class or individually, allowing students to explore areas of interest in the dairy supply chain.
- c Students use digital devices to access the interactive, **Interactive – Farm to Plate – Discover Aussie Dairy**, to explore the dairy supply chain further.
- d Allocate students into pairs and provide them with **Worksheet 1a – Dairy sector supply chain**, scissors, markers, and a piece of A3 or butchers paper. Instruct students to cut out each box containing the steps of the dairy supply chain and arrange the steps in the correct order on the paper, drawing arrows between each step to create a dairy supply chain. After a period of time, provide students with a projected image of the completed sequence. Students use glue to secure their flowcharts to the paper and use the space around the arrangement to draw illustrations (e.g. cows, milk cartons, delivery trucks, etc.) and write facts about each stage of the dairy supply chain. (Answers page 7)

Activity 2 – Dairylicious design

Students will use their creativity to design a recipe card for a dairy product, highlighting their knowledge of where milk comes from and how it is produced and processed in managed environments.

- a Facilitate a class discussion about the nutritional composition of cow’s milk. Discuss that milk contains water, protein, fat, carbohydrates, vitamins such as vitamin A, B12, magnesium, potassium, iodine, riboflavin, and minerals such as calcium, and zinc. The nutritional properties of milk make it possible to be transformed into other dairy foods such as cheese, yoghurt, ice cream, etc.
- b Discuss with students that milk has a complex structure that allows it to be changed into the dairy products that we know. The proteins in milk help with coagulation (sticking together) as seen in clotted cream, while the sugars can be fermented by microorganisms to make cheese and yoghurt.
- c Explain to students that they will create a dairy recipe card but will need to have an understanding of how dairy products are made to create their recipe card. As a class, view the videos **Discover how milk is made** (2:39), **Discover how cheese is made** (3:10), and **Discover how other dairy products are made** (3:07).
- d Distribute **Worksheet 2a – Dairylicious design** and read through the task with the class. Students will plan, design, and produce an informative, detailed, and eye-catching recipe card that also tells the story of where milk comes from and how it is produced in managed environments. They should include the name of the recipe, ingredients, and cooking equipment used, an explanation of how to cook the recipe. Students should also include a ‘Did you know?’ fact that explains how the preparation techniques used in the recipe affect the structure, appearance, and composition of the dairy product used in the recipe.
- e Instruct students to use their devices to access **Recipes – Dairy Australia** for inspirational ideas for their recipe cards.

Lesson guide



Teacher
guide

- f Ask students to think about card shapes, dairy recipes, procedures, ideas, and colours for their recipe cards. Ask students to think about the following:
 - What width and length will the recipe cards be?
 - Will they be digital or hard copy recipe cards?
 - Will they tell the story of where milk comes from and how it is produced in managed environments using different formats? For example, text, a flowchart, an infographic, a linked QR code, etc.
 - What fonts and colours might be used for the name of the recipe, the ingredients and cooking equipment used, and the explanation of how to cook the recipes, and
 - Will the 'Did you know?' fact that explains how the preparation techniques used in the recipe affect the structure, appearance, and composition of the dairy product be placed below the recipe, alongside it, or somewhere else?
- g Distribute **Worksheet 2a – Dairylicious design** and instruct students to write their recipe card draft plan on the worksheet before creating the final product. The final product may be created on paper or using design software such as **Canva**.
- h Once students have completed their recipe cards, conduct a class reflection discussing the following questions:
 - How does the designed recipe card educate consumers about how milk is produced and processed in managed environments?
 - How does the designed recipe card educate consumers about how preparation techniques can impact the properties and characteristics of milk or other dairy products?

Activity 3 – Case study: Chittick Dairy Farm

Students will explore a case study of a dairy farm showcasing the future of dairy farming through its innovative use of automation technology.

- a Introduce the concept of “managed environments on dairy farms” and explain that different types of dairy farms are located across Australia. Discuss how some are large commercial farms with automated and robotic systems while others are smaller and may be more labour-intensive. Discuss some of the technologies used to manage dairy cows on a farm. Introduce students to the sensors and tracking devices being used by some dairy farmers that give them the ability to track a cow’s activity levels, health, and other key behaviours. (If further information is required, refer to **Technology | Dairy Australia**.)
- b As a class, view the video **Chittick Dairy Farm: A beacon of modern dairy farming – Humans of agriculture** (4:18).
- c Distribute **Worksheet 3a – Case study: Chittick Dairy Farm** and instruct students to answer questions one to six after watching the video. (Answers page 8)
- d As a class, discuss the answers to the questions. (Answers page 8)
- e For reflection, instruct students to discuss the following questions with a partner or small group:
 - What aspect of the Chittick Dairy Farm case study did you find most interesting or surprising? Why?
 - How do you think automation and technology might change the future of dairy production in Australia?
 - What potential challenges might dairy producers face when using advanced technologies like sensors and robotic systems? (Answers page X)

Answers



Answer

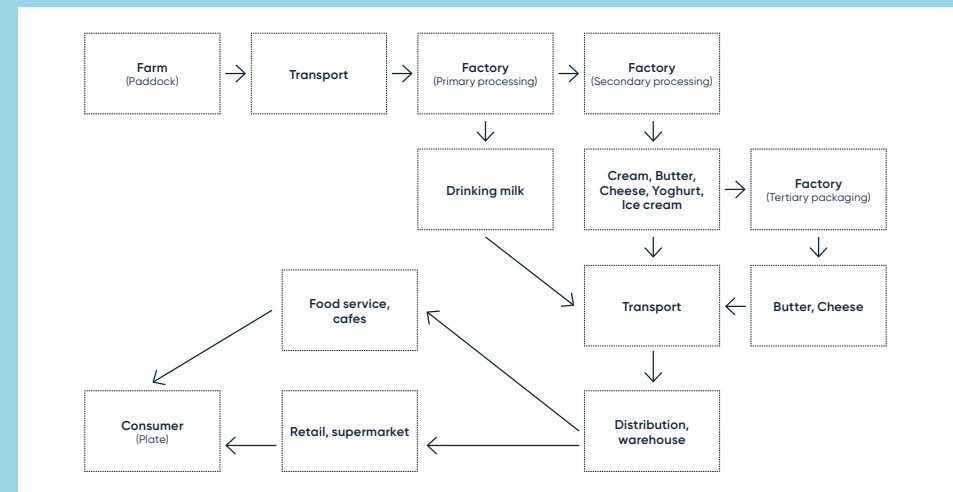
Activity 1 – Dairy sector supply chain

Discussion questions

- A supply chain refers to the sequence of processes involved in the production and distribution of a commodity. In agriculture, it encompasses all stages, from the initial production on the farm (paddock) to the final consumer purchase (plate). This journey includes raising animals, planting, harvesting, processing, packaging, transportation, and retailing. In the case of dairy products, the supply chain is sometimes referred to as 'farm to fridge'.
- Milk is collected from cows on dairy farms, usually twice a day, and stored in refrigerated tanks. It is then transported by refrigerated trucks to factories/ processing plants, where it is pasteurised (which involves heating milk to 72°C for no less than 15 seconds, then cooling it immediately. This technique destroys harmful bacteria and microorganisms while also extending the shelf life of milk) and homogenised (milk is passed through fine nozzles putting it under high pressure, which evenly disperses fat globules. Doing so prevents the cream in the milk separating and rising to the top and results in a more consistent texture and taste). It is then packaged into bottles, cartons, or other containers and transported to retail stores, and sold to consumers. Cheese production involves an additional step of processing the milk to create the desired texture and flavour and aging before packaging and distribution.

Worksheet 1a – Dairy sector supply chain

See page 9 for full page slide of the diagram below.



Student annotations will vary. Suggested responses include:

Farm (Paddock): Cows are usually milked twice a day

- Milking may be automated or collected by hand
- Milk travels through stainless steel pipes to a large refrigerated vat, where it is stored and cooled.

Transport: Refrigerated trucks collect the cooled raw milk from farms, maintaining the cold chain to prevent spoilage.

- The milk is transported to a factory for processing.

Factory (Primary Processing): Delivered milk undergoes quality testing to meet safety standards.

Answers



Answer

- The milk is pasteurised and then homogenised. Pasteurisation involves heating milk to 72°C for 15 seconds, then cooling it immediately. This technique destroys harmful bacteria and microorganisms while extending milk's shelf life. Homogenisation involves putting milk under pressure through fine nozzles, evenly dispersing fat globules. This prevents cream in milk from separating and rising to the top, resulting in a more consistent texture and taste. Milk is separated into cream and skim milk, allowing processors to create products with varying fat contents, such as whole milk, low-fat milk, and skim milk.

Factory (Secondary Processing): Milk is manufactured into a wide range of value-added products such as cheese, yoghurt, butter, cream, and milk powders.

(Tertiary Packaging) – bulk transport packaging used to move large quantities of dairy products safely through the supply chain (from factory to warehouse to retailers).

Distribution/Warehouse: Packaged dairy products are stored in refrigerated warehouses to preserve their freshness before being collected for delivery.

Retail/Supermarket: Refrigerated trucks deliver the products to supermarkets, grocery stores, and other retail outlets, ensuring the cold chain is maintained throughout. Consumers purchase dairy products from these stores.

Food Service/Cafes: Refrigerated trucks deliver the products to cafes and food service locations, where consumers can purchase them.

Consumer (Plate): Dairy products are consumed and enjoyed by people.

Activity 3 – Case study: Chittick Dairy Farm

Worksheet 3a – Case study: Chittick Dairy Farm

- 1 Automation reduces manual labour by allowing cows to milk themselves using robotic systems. It provides a less stressful environment for the cows, as they can choose when to be milked. Automation also collects data about the cows, which helps to better manage their productivity and health.
 - 2 Robotic milking systems clean the cows' udders with brushes before milking to remove dirt and stimulate milk flow. After milking, iodine is sprayed on the teats to prevent infection. The brushes and cups are disinfected between cows to avoid transferring diseases.
 - 3 Data such as body temperature, rumination, walking activity, milk quality (fat and protein levels), and cell count (to detect bacteria) are collected.
 - 4 The data helps to identify sick cows, manage feeding schedules, optimise milk production, and monitor overall animal welfare.
 - 5 Challenges include the initial time and effort needed to train cows to use the system and the need for someone to be on call 24/7 for potential breakdowns. Occasional system failures can disrupt operations and require immediate attention.
 - 6 For cows, it reduces stress by allowing them to self-motivate their milking and feeding schedules, leading to better health and productivity. For Chittick Dairy Farm, it provides a better work-life balance for workers by reducing the need for early morning manual milking and improving the overall efficiency of operations.
- e Student responses will vary.

Automation and technology will likely make dairy production more sustainable and productive by reducing labour demands, optimising resource use, and improving animal welfare. Production practices becoming less physically demanding may attract more people to the dairy industry.

- Dairy producers might face challenges such as high upfront costs for purchasing and maintaining these technologies, they may need technical training for the equipment, and potential system malfunctions could disrupt operations.

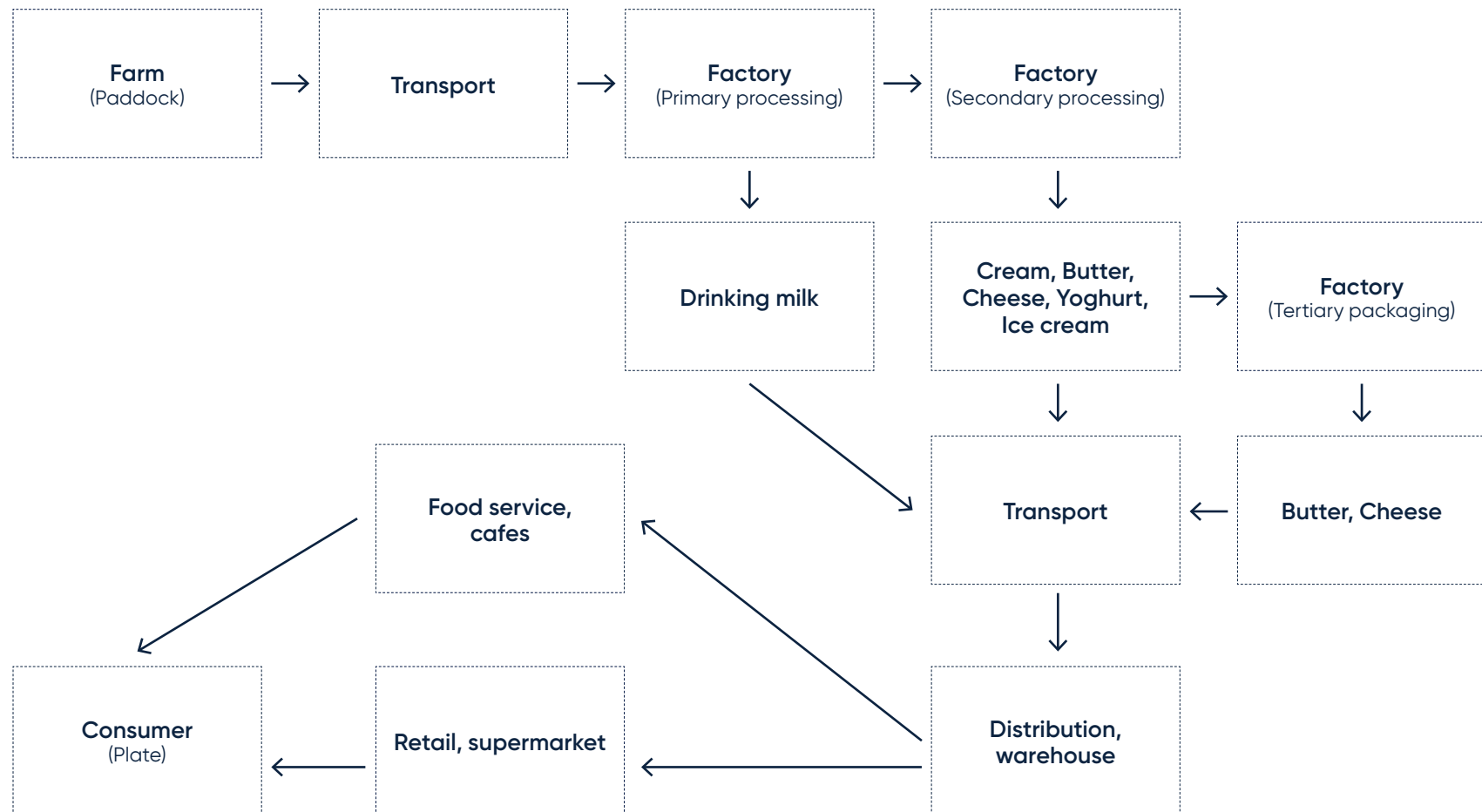
Answers

Worksheet 1a - Dairy sector supply chain

Full page slide of diagram



Answer



References



Teacher
guide

A Smart Farmer. (n.d.). A Smart Farmer Home Page. asmartfarmer.com

Chittick. (2024, September 19). Humans of Agriculture. Humans of Agriculture. humansofagriculture.com/stories/automation-chittick

Dairy Australia. (2019a). Dairy Matters | Dairy Australia. dairy.com.au/dairy-matters

Dairy Australia. (2019b). How milk is made & the milking process | milk pasteurisation & homogenisation. Dairy Australia. dairy.com.au/products/milk/how-milk-is-made

Dairy Australia. (2022, November 6). Discover Aussie Dairy 360 virtual farm tour. YouTube. youtube.com/watch?v=LGsXIONnTKw

Dairy Australia. (2023a). Discover how cheese is made. Dairy.edu.au. youtube.com/watch?v=0JVbgzhTTeg

Dairy Australia. (2023b). Interactive - Farm to Plate - Discover Aussie Dairy. [dairy.edu.au. dairy.com.au/education/students/dairy-games/discover-dairy-farm-to-plate](https://dairy.edu.au/dairy.com.au/education/students/dairy-games/discover-dairy-farm-to-plate)

Dairy Australia. (2024a). Technology. [dairyaustralia.com.au. dairyaustralia.com.au/milking/milking-systems/dairy-shed-technologies](https://dairyaustralia.com.au/milking/milking-systems/dairy-shed-technologies)

Dairy Australia. (2024b, January 30). Discover how milk is made. [dairy.edu.au. youtube.com/watch?v=02MubUjvEPM](https://dairy.edu.au/youtube.com/watch?v=02MubUjvEPM)

Dairy Australia. (2024c, January 30). Discover how other dairy products are made. [dairy.edu.au. youtube.com/watch?v=9FJyYNDgjj4](https://dairy.edu.au/youtube.com/watch?v=9FJyYNDgjj4)

Humans Of Agriculture. (2024, September 14). Humans of Agriculture.

Humans of Agriculture. humansofagriculture.com/stories/little-big-dairy-nsw



Worksheet 1a

Dairy Sector Supply Chain



Activity

- 1 Access and view the **Interactive - Farm to Plate - Discover Aussie Dairy** dairy.com.au/education/students/dairy-games/discover-dairy-farm-to-plate
- 2 Cut out the boxes below. Each box represents a key stage in the dairy supply chain.
- 3 On butchers or A3 paper, arrange the boxes in the correct order to show how milk travels from the farm (paddock) to the consumer (plate).
- 4 Draw arrows between the stages, showing the direction of the supply chain.
- 5 Glue the boxes onto butchers or A3 paper.

Optional

Use the space around your arrangement to draw illustrations (e.g. cows, milk cartons, delivery trucks, etc.) and write facts about each stage of the dairy supply chain.

 Factory (Primary processing)	Transport	Drinking milk	Butter, Cheese	Cream, Butter, Cheese, Yoghurt, Ice cream
Food service, cafes	Distribution, warehouse	Factory (Secondary processing)	Consumer (Plate)	Transport
Retail, supermarket (Primary processing)	Farm (Paddock)	Factory (Tertiary packaging)		

Worksheet 2a

Dairylicious design



Design a detailed, informative, and eye-catching recipe card that tells the story of where milk comes from and how it is produced in managed environments. Access **Recipes - Dairy Australia** (dairy.com.au/products/recipes) for inspiration.

Include the following in your plan below before creating your final copy on A4 paper or electronically:

Recipe name

Ingredients

Cooking equipment used

Explain how to cook the recipe

'Did you know?' fact that explains how the preparation techniques used in the recipe affect the structure, appearance, and composition of the dairy product:



Worksheet 3a

Case study: Chittick dairy farm



As a class, watch the video **Chittick Dairy Farm** and answer the questions below.

A beacon of modern dairy farming – Humans of agriculture (4:18)
humansofagriculture.com/stories/automation-chittick



- 1 What is the role of automation at Chittick Dairy Farm?
- 2 How do robotic milking systems ensure the cleanliness and health of the cows during the milking process?
- 3 What data is collected about the cows by the automated milking system?
- 4 How is the data used to manage the health and productivity of the cows?
- 5 Name some of the challenges in the implementation and maintenance of the robotic milking system.
- 6 How does the robotic milking system benefit the cows and Chittick Dairy Farm?



1800 004 377
dairyaustralia.com.au