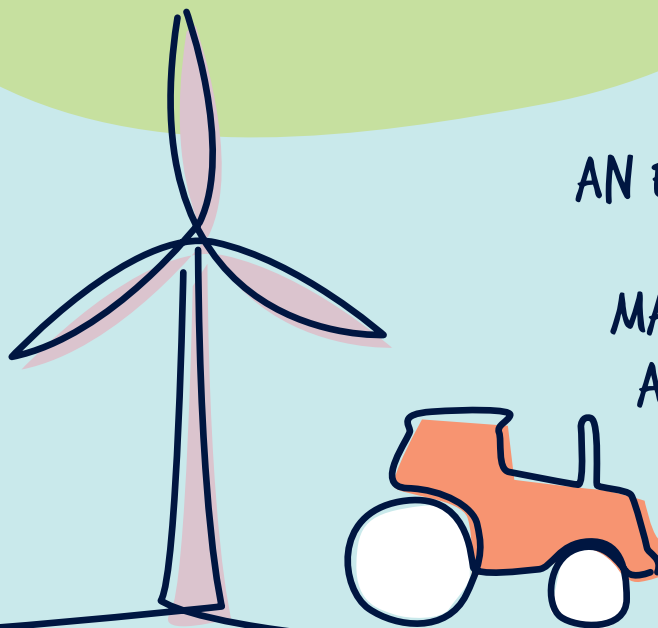


YEARS
7-8

**DISCOVER
DAIRY
AND MAKE
THE INVISIBLE,
VISIBLE**



AN EDUCATIONAL RESOURCE
FOR TECHNOLOGY
MANDATORY YEARS 7-8
AGRICULTURE & FOOD
TECHNOLOGIES

ACKNOWLEDGEMENTS

This online syllabus-linked resource was produced by the Angela Colliver from Angela Colliver Consulting Services for Dairy Australia.

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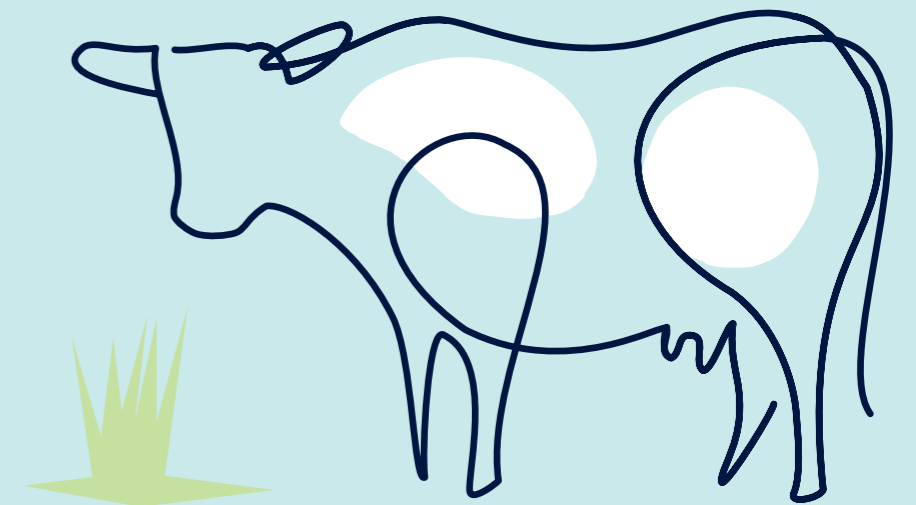
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INTRODUCTION

This resource book is mapped to the outcomes of the Agriculture and Food Technologies content of the NSW Education Standards Authority (NESA) Technology Mandatory (2018) syllabus.

It focuses on the investigation of how managed environments and systems are used to look after cows and calves, produce, process and deliver milk, and manage the environment sustainably. It includes practical food preparation lessons using dairy products so that students can explain how the characteristics and properties of milk determine some preparation techniques.

Students develop knowledge and understanding about all the things the dairy industry does to raise cows and calves, produce, process and deliver milk, and manage the environment sustainably. This is achieved by using design and production skills to design and produce recipe cards that include information about the provenance of the milk that farmers produce, and to educate consumers by telling the story about how milk is produced and processed in Australia.

They also develop knowledge and understanding about dairy products through designing and cooking delicious dairy recipes. These practical food preparation activities support students to explore how food preparation techniques impact on the properties and characteristics of dairy foods.

Safety: Schools need to ensure all student allergies, intolerances and other dietary requirements are known and considered when participating in practical tasks. Schools should consult the [NSW Government guide](#) for minimizing the risk of exposure to allergens.

Aim

This resource book provides schools with opportunities to:

- Develop understandings about the Australian dairy industry and the nutritious products it produces;
- Develop understandings about the Australian dairy industry, milk production and the range of sustainable practices the industry and supply chain have embraced;
- Define the managed environments and systems that are used to look after cows and calves, produce, process and deliver milk, and manage the environment sustainably;
- Discover ideas and solutions that can tackle the industry's sustainability challenges;
- Discover and envision creative solutions to real-world problems;
- Dream and consider the many possible solutions to deal with challenges;
- Design the steps required to create solutions for the tasks they are set;
- Deliver and debrief solutions;
- Use project based learning (PBL) approaches to investigate and respond to a challenge, task or project; and
- Apply thinking skills and develop an appreciation of the processes they can apply as they encounter problems, unfamiliar information and new ideas.

EDUCATIONAL APPROACH

The Project Based Learning (PBL) learning sequence used in this book is underpinned by the work of Lee Watanabe-Crockett.

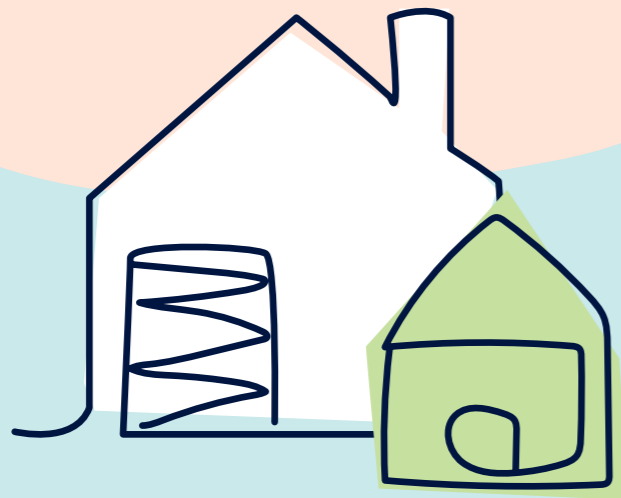
PBL uses the *solution fluency* through six phases: Define, Discover, Dream, Design, Deliver and Debrief. The phases of the model are based on the 21st Century Fluencies created by Crockett et al. (2011).

The Essential Fluencies are outlined extensively in the book '*Mindful Assessment*' (Crockett, L. & Churches, A. (2016) *Mindful Assessment* published by Solution Tree. See also '*Solution Fluency*', Global Digital Citizen Foundation website.



FACT

**AUSTRALIAN DAIRY IS
A \$13 BILLION FARM,
MANUFACTURING AND
EXPORT INDUSTRY,
DIRECTLY EMPLOYING
43,000 AUSTRALIANS
ON FARMS AND IN
DAIRY PROCESSING.**



NSW SYLLABUS OUTCOMES

The following outcomes, cross-curriculum priority, general capabilities and thinking skills are integrated into the learning sequence in this resource.

Design and Production Skills

TE4-1DP designs, communicates and evaluates innovative ideas and creative solutions to authentic problems or opportunities

TE4-2DP plans and manages the production of designed solutions

TE4-3DP selects and safely applies a broad range of tools, materials and processes in the production of quality projects

Knowledge and Understanding

TE4-5AG investigates how food and fibre are produced in managed environments

TE4-6FO explains how the characteristics and properties of food determine preparation techniques for healthy eating

TE4-9MA investigates how the characteristics and properties of tools, materials and processes affect their use in designed solutions

Life Skills

TELS-1DP communicates ideas and solutions to authentic problems or opportunities

TELS-2DP participates in planning for the production of designed solutions

TELS-3DP participates in the production of designed solutions

TELS-4DP follows safe practices in the use of tools, materials and processes for design projects

TELS-6AG describes how food and fibre are produced

Cross-curriculum priority:



Sustainability

General capabilities:



Critical and creative thinking



Literacy



Numeracy



Personal and social capability



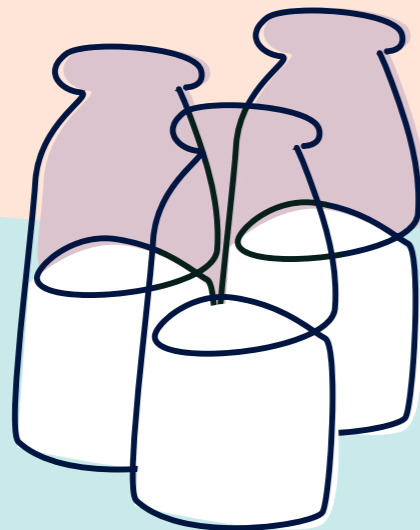
Information and communication technology capability

Thinking skills:

Design thinking and Systems thinking.

FACT

**ALL DAIRY PRODUCTS
STEM FROM MILK.
MILK IS A NATURAL DRINK
FILLED WITH ESSENTIAL
NUTRIENTS INCLUDING
PROTEIN AND CALCIUM.**



DISCOVER DAIRY AND MAKE THE INVISIBLE, VISIBLE

The essential question:

What happens when we understand all the managed environments and systems involved in bringing us nutritious and delicious milk, and we understand how to prepare, cook and transform milk into recipes ideas?

Scenario and design brief:

Know the who, what, when, where and why of the Australian dairy industry.

Dairy Australia is searching for “change making” students to bring their love of dairy and cooking together and explore the range of healthy recipes that can be created using dairy products.

Dairy products make up an important part of our diet, yet most people rarely think about where they come from or how they are produced.

Dairy Australia wants you to promote the provenance of the milk its farmers produce, and educate consumers about what’s involved, by telling the story about how milk gets from the cow to the consumer.

The challenge is to learn about and analyse how milk is produced in managed environments, and experiment with a variety of food preparation techniques that impact on its characteristics and properties.

Your brief requires you to design and create four informative, detailed and eye-catching recipe cards with a detailed design that tells the story of where milk comes from and how it is produced in managed environments. Include the name of the recipe, the ingredients and cooking equipment used, and also explain how to cook the recipes.

Add a ‘Did you know?’ fact below your recipes explaining how the preparation techniques used in the recipe affected the structure, appearance and composition of the milk.

Finally, develop and deliver a presentation of the products to an audience. Explain how your recipe cards educate consumers about how milk is produced and processed in managed environments, and how food preparation techniques impact on the properties and characteristics of milk in the recipes you have chosen. Are you up for the challenge?

STEP 1: DEFINE



Objective:

Have students illustrate their understanding of the challenges set out in the scenario by providing an oral definition of the task.

Share the scenario and design brief

Share the scenario and design brief with the class and talk about the tasks that need to be addressed. Ask students to define the task they have been set. See [Resource 1.1](#) in the Student Design Folio.

Highlight key terms in the design brief and record these terms on a whiteboard.

Establish evaluation criteria and what is already known

As a class, establish evaluation criteria through brainstorming and then create an assessment rubric with the class. Ask students to highlight the evaluation criteria on the class-made assessment rubric.

Talk with students about what they know about how dairy cows are cared for and how milk is produced and processed.

Categorise ideas into groups about what is known about the Australian dairy industry, the way cows are sustainably and ethically raised, the ways dairy farms are sustainably managed, the many stages involved in producing and processing milk and the many products produced from milk.

Brainstorm and record the different types of dairy products known to the class.

Develop concept maps describing what is known about the breeds of dairy cows in Australia, dairy farming and milk production.

Recall the task

Invite students to recall the focus of the task that they have been asked to undertake. See [Resource 1.2](#) in the Student Design Folio.

Ask students what they might need to know more about, in order to undertake the challenge. Might they need to know more about the Australian dairy industry and its contributions to Australia? Might they need to know something about how cows are cared for, and how milk is produced and processed in managed environments? Might they need to know something about the properties of milk? Might they need to know something about how food preparation techniques impact on the characteristics and properties of milk, yoghurt, cheese, cream, butter or other dairy products? Might they need to check out some recipe card designs?

Ask students how they might evaluate their informative, detailed and eye-catching recipe card designs that:

- Promote the provenance of the dairy products that farmers produce.
- Tell the story of where milk comes from and how it is produced in managed environments.
- Include the name of the recipes, the ingredients and cooking equipment used and also explain how to cook the recipes.
- Include a 'Did you know?' fact below the recipes, discussing how the preparation techniques used in the recipe affected the structure, appearance and composition of the milk.

Remind students that they are also required to make a presentation of the product to an audience. They need to communicate how the four designed recipe cards can educate consumers about how milk is produced and processed in Australia and how food preparation techniques impact on the properties and characteristics of milk in the recipes they have chosen. Revisit the assessment rubric for the unit with the students ensuring all aspects of the task are understood.

Prerequisite for progression:

Ask students to articulate their understanding of the task/challenge through oral conversation and if appropriate a written (scribed) statement.

Note: *The Prerequisite for Progression are the checkpoints that occur at the end of each stage of the learning sequence. This is the time at which formative feedback is given to the students about what they have accomplished in that stage. It describes what the students must complete before they move onto the next phase of the unit. (Crockett, et, al, 2011)*

STEP 2: DISCOVER



Objective:

Have students research and analyse ideas about what Australian dairy farmers do and how milk is produced, processed and transformed into dairy products. Have students experiment with a variety of food preparation techniques that impact on the characteristics and properties of dairy products.

The industry and how cows make milk

Ask students to consider the questions 'Why is the Australian dairy industry important to Australia?'; 'What is involved in milk production?'; 'What might dairy farmers do?'; 'Where are Australian dairy farms located?'; 'Why are they located where they are?'; 'How might we explore how milk is produced, processed and transformed into delicious dairy products?' and 'How might we discover more about how food preparation techniques impact on the characteristics and properties of some dairy foods?'. See [Resource 1.3](#) in the Student Design Folio.

Introduce the term "farm to plate", "paddock to plate", "grass to glass" or "from farmer to consumer" and as a class share ideas about how milk gets from the cow to us.

Explain to the class that cattle breeds have been specifically bred for milk production.

Talk about how cows first produce milk after giving birth to a calf. View a [video](#) for additional information.

View another [video](#) and ask students to analyse it for information about what cows eat so that they produce milk.

Ask students to learn more about the 'internal features' of dairy cows. Talk about the fact that they have four stomachs, each of which performs a special function. Demonstrate this and play the [animation](#) 'How do dairy cows make milk?'

Share [information about dairy farming in Australia](#) and view a video about [the industry](#).

Managed environments

Introduce the concept of "managed environments on dairy farms" and explain to the class that there are different types of dairy farms located across Australia. Talk about how some are large commercial farms with automated and robotic systems while others aren't.

Talk about how dairy farmers usually graze their animals in environments with high-quality pastures that are found in high rainfall areas or regions where they have access to water supplies so they can irrigate their pastures.

Explain that dairy farmers also house their animals in environments with specialised sheds for some stages of their life. For example, calves are raised in small yards with shelter where they are generally fed milk twice a day and where they can access clean water and food.

Go further and talk about how Australian dairy farmers care for their cows, ensuring they are kept happy and relaxed to help them produce milk. They also ensure the dairy cows have clean water, quality food, adequate shelter and very clean, hygienic environments when being milked. Explain how milkers wear gloves and cow's teats are sprayed after milking with disinfectant to prevent udder infections or mastitis. Farmers work hard to keep their cows healthy, however, when cows do get sick, it is important that they receive the appropriate veterinary treatment, which may require antibiotics. The milk from the treated cows is then discarded until the antibiotics have cleared from their system, and the cow is healthy again.

View a [video](#) to explore what is involved in running a dairy farm. Talk about some of the managed systems and environments that the dairy industry has designed to raise cows and calves, produce and process milk, and manage their environments sustainably.

View a [video](#) that explains how and why dairy farmers milk cows once, twice or sometimes three times a day in environments like milking sheds that are specially designed and electronically controlled. Highlight how milking stalls in these sheds can be set out in a 'herringbone' pattern or on a continuously rotating platform called a rotary that allows the cows to easily and efficiently move through the dairy with minimal handling. Explain how in most dairy sheds, cows are fed grain and mineral supplements while being milked, which supports their health and ensures they receive the nutrients needed to produce high-quality milk. Talk about how some farmers use fans and/or sprinklers in hot weather to cool the cows in the milking shed.

Talk more about milking sheds having a concrete base and how they are hosed down after each milking to remove effluent which goes into an effluent pond.

Talk with students about some of the technologies used to manage cows on 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 like reproduction activity.

Explain how dairy farmers also manage their natural environment in and around the farm. View a [video](#) that shares some of the best environmental management practices undertaken on farm. Ask students to record ten or more ways dairy farmers manage their environment and systems like water, waste and energy sustainably.

If possible, visit a dairy farm and investigate how managed environments and systems are used to sustainably manage environments, produce cows, calves and milk.

If possible book an incursion from '[A Smart Farmer](#)' and their mobile dairy. The mobile dairy brings two cows, a calf and a milking machine to the school. Students milk a cow by hand, interact with a calf and then make multiple dairy products.

Explain how dairy farmers also manage their natural environment in and around the farm. View a [video](#) that shares some of the best environmental management practices undertaken on farm. Ask students to record ten or more ways dairy farmers manage their environment and systems like water, waste and energy, sustainably.

Explain to the class that the goal of everyone in the dairy industry is to be viable, profitable and sustainable. Introduce students to the commitments made by the industry to sustainability. Introduce the industry's [sustainability framework and 2030 goals](#).

Talk about the word 'sustainability'. As a class, consider the differences between 'environmental sustainability', 'economic sustainability', 'social sustainability' and 'political sustainability'.

Discuss how sustainability includes the way farmers care for their animals. Animal welfare is linked with ethical, political, economic, environmental and social issues. Investigate how the Australian dairy industry is working towards ensuring the highest quality animal care and has enforced practices such as disbudding with pain relief (cow horn removal) and is phasing out routine calving induction and tail removal.

Ask students to develop a concept map describing what they know about the sustainable practices in the dairy industry.

Go further and investigate how milk is processed and delivered to customers. Watch a [video](#) and ask students to record the managed environments and systems that are used to process and manufacture milk.

Design activities

Remind students that their task is to conduct their own research and record information about the Australian dairy industry. Investigate how dairy cows are farmed, raised and produced on Australian dairy farms, and how milk is processed in a plant, and then used to produce other dairy products. Introduce students to the [Dairy Matters](#) and [AgriFutures Dairy](#) web pages.

Ask students to use their Design Folios to document their design project's research and development and to:

- Play the 'Farm to Plate' [digital interactive](#) and find out how milk gets from the cow to us, is processed in a plant and then used to produce other dairy products.
- Use Dairy Australia's resources on the "[Dairy Matters](#)" platform to find additional information about how dairy cows are farmed, raised and produced in managed environments on Australian dairy farms, and how milk is processed in a plant and then used to produce other dairy products.
- Investigate the Australian dairy industry using the [AgriFutures Dairy](#) page.
- Discover [how cows make milk](#).
- Explore [milking time](#) and research the different types of milking systems used on Australian dairy farms. Analyse the design features of the different types of milking systems. Record information about what's positive, negative or interesting about them.
- Locate and search for information about rotational grazing systems, pasture management and animal management.
- Research and record information about the industry's [sustainability framework and 2030 goals](#) and [sustainability initiatives](#).
- Delve deeper into the Australian dairy industry and explore how it has developed its own Sustainability Framework that aligns itself with the United Nation's Sustainable Development Goals (SDGs). View a [website](#) and explore the SDGs it is delivering on.

- View a range of [producer](#) stories about dairy production. Record information about their production processes and note any designs used within their systems.
- Read and take notes about [manufacturers](#) who make dairy products in Australia and the systems they use to process dairy products responsibly and sustainably.
- View a [video](#), read about the [milking process](#) and record information about how milk is processed (pasteurised and homogenised).
- Go further and watch a [video](#) to investigate how other dairy products are made.
- Explore how [cheese](#) is made.
- Discover how [yoghurt](#) is made.

Remind design teams to record information from each source in their Design Folio. See [Resource 1.3](#) in the Student Design Folio.

Ask students to complete a flow chart diagram in their Design Folio about the managed environments and systems used in the production and processing of milk to demonstrate their understandings.

Ask students to draw conclusions about what has been learned and develop concept maps in the Design Folio using key words. Ask students to draw connecting lines between words and indicate how they believe their words relate to each other. From the concept maps, encourage students to come up with statements about the managed environments and systems used to produce milk.

Thinking skill activity

Use the Edward de Bono's Six Thinking Hat technique to explore the managed environments and systems used in milk production in more depth. Students, in groups, each with a different hat, discuss and document their ideas according to their given perspectives and come together at the end to share their ideas. Ask students to record ideas in the Student Design Folio. See [Resource 1.3](#).

Experiment in the school kitchen

Safety: Schools need to ensure all student allergies, intolerances and other dietary requirements are known and considered when participating in practical tasks. Schools should consult the [NSW Government guide](#) for minimizing the risk of exposure to allergens.

Food safety, hygiene and reminders

Discuss food safety and hygiene procedures with the class. Talk about how safety and hygiene are very important when preparing or eating food. Talk about washing hands, using clean and dry utensils for different food products, keeping work surfaces clean and dry, and importantly, storing food safely. Remind the class that in this unit they will be experimenting with a variety of food preparation techniques that impact on the characteristics and properties of dairy products.

Characteristics and properties of cow's milk

Discuss the chemical composition of cow's milk. Talk about milk containing water, protein, fat, carbohydrates, and vitamins such as vitamin A, B12, magnesium, zinc, potassium, iodine and riboflavin, plus minerals such as calcium. Explain that these chemical properties are what make it possible for milk to be transformed into other foods. Ask students to document the chemical composition of milk in their design folios. See [Resource 1.3](#) in the Student Design Folio.

Have a milk tasting and investigate milk's physical properties. Taste full cream, low fat, skim, lactose free, long-life, A1/A2, organic, reduced fat and free range milk for odour, colour, heaviness and structure. Learn more about the different types of milk [here](#).

Discuss the colour of cow's milk being due to the carotene in the grass they eat, and make mention of the fact that certain breeds will produce milk that is a paler or a deeper yellow colour.

Go further and talk about the modern processing technique of homogenisation - which passes the milk under pressure through very fine nozzles - evenly disperses the fat and protein micelles to create a smooth, creamy texture and taste, plus brighter white colour. See [here](#) for more information.

Talk about how milk has a complex structure that allows it to change into the dairy products that we know. Explain how the proteins help with coagulation as in clotted cream, how the sugars turn to acids under the right conditions when making yoghurt, and that fat is responsible for the smooth, mouth-coating quality.

Practical classroom activities

Note: Before beginning any of the techniques and recipes ask students to wash their hands thoroughly and ensure all utensils and equipment are sterilised.

Cooking milk

Do some milk science and explore milk's complex structure that allows it to change into dairy products.

Talk with students about the principles of cooking milk. Explain that in cookery, milk is treated as a protein food and how both the flavour and odour of milk are adversely affected by prolonged heating and by high temperatures.

Test cooking techniques using normal pans and double boilers. Investigate which technique scorches the milk and which doesn't. Test whether stirring the milk affects its properties and characteristics.

Test what happens when milk is heated in an uncovered pan. Discuss the milk protein called "casein" and experiment with the clotting features of casein.

Demonstrate how milk when heated forms a surface film or 'skin'. Discuss what might account for the formation of the surface film or 'skin'. Explain that the skin consists of coagulated milk proteins (casein), fat and minerals and results from the drying out of the top of the milk. Explain how skin formation can be prevented by using a covered pan, by stirring the milk during the slow heating process, or by whisking the mixture to form a foamy layer on the surface of the milk. Brainstorm ways the skin can be disguised or made unnoticeable in a hot chocolate. Ask students to research recipes that feature heated milk.

Experiment with cooking milk. Experiment with making a white sauce, custard, hot chocolate or milk pudding recipe. As a class share explanations about how the application of heat effects the structure, texture, colour, taste and appearance of the milk. Talk about the effects of low and high heat on milk.

Coagulating milk by adding acid or heat

Explain to the class that milk proteins are coagulated not only by heat but also by the enzyme 'rennet' (which is an enzyme derived from cow's intestines, which solidifies proteins in milk) or by acids such as lemon juice. Highlight that when added to heated milk, rennet and lemon juice brings about the clotting properties.

Test a [milk curdling recipe](#) that uses fresh milk, pineapples and lemons and produce some cheesy results.

As a class, experiment with adding fresh acidic types of fruit to milk, and predict and then test how the fruit might affect the structure, composition and appearance of the milk. Go further and discuss why milk sometimes clots and curdles in tomato soup or lemon-based sauces.

Invite students to design a milkshake that won't clot or curdle. See [Resource 1.3](#) in the Student Design Folio.

Talk about how milk sometimes curdles in tomato soup and lemon sauces and ask students to research soup recipes in which the vegetable acids may cause the separation of milk proteins.

Talk about how many baking recipes call for sour milk, sometimes as a substitute for buttermilk. Experiment with how to purposefully sour milk and cream using vinegar and lemon mixtures. To make 1 cup (250 ml) sour milk for baking, use 1 tbsp (15 ml) vinegar or lemon juice and enough milk to equal 1 cup (250 ml). Stir using a whisk and let stand for 5 minutes before using. Explain to students how this is the cornerstone of making buttermilk, cheese and yoghurt.

Investigate other dairy mixtures that separate using an easy ricotta cheese [recipe](#). Talk with the students about how this recipe demonstrates how milk can change its properties this time when it is heated and has an acidic mixture added to it.

Ask students to watch the mixture change, talk about what is happening and why and record ideas as a word chain describing the changes that occurred when ricotta style cheese was made. Invite students to compare observations.

Discuss questions like:

- What can we do to milk to change it into ricotta style cheese?
- Can we possibly change the ricotta style cheese back into milk? Why or why not?

Yoghurt

Introduce yoghurt. Discuss how yoghurt is milk that has been transformed into a soft curd by the action of lactic acid bacteria. Talk about how making yoghurt is simply a case of adding the right bacteria to some milk and keeping the milk at the correct temperature for the bacteria to thrive. Discuss how the micro-organisms convert the milk sugars into lactic acid, which curdles the milk proteins and gives yoghurt its distinctive texture and tangy flavour. Buy some live natural yoghurt and experience cooking with bacteria, and [make yoghurt](#). As a class, write explanations that explain how the preparation techniques in making yoghurt impact on the properties and characteristics of the milk.

Butter

Test recipes that make butter. Demonstrate or challenge students to [turn milk into butter](#). The whole process can take a few minutes. Allocate groups and test recipes that simply use a jar, electric beater and food processor. Discuss how the fat in the milk helps with holding the butter together.

Cream

Explore cream science. Using a bowl, a whisk or electric beater and some cream, invite students to experiment with cream and transform it from a puddle of liquid into a cloud of semi-soft foam. Ask students to explain how the whipping action might change the physical structure and chemical properties in the cream.

Find out what students now know about the characteristics and properties of dairy foods like milk, cream, butter, and yoghurt. Encourage students to write and sketch their ideas. See [Resource 1.3](#) in the Student Design Folio.

Refocus on the task

Inspire students with a range of [recipes](#) that can be found on "The Dairy Kitchen" website.

Re-focus students' attention on the Design Task.

Ask the students to share their understandings with others.

Ask each student to share what their research has told them and what they still have to accomplish within the task with their peers, the teacher and family.

Prerequisite for progression:

Students have worked as a class, individually and in teams and collected information about what Australian dairy farmers do, and how milk is produced, processed and transformed into dairy products. They have experimented with a variety of food preparation techniques that impact on the characteristics and properties of dairy products.

Websites, videos, practical activities and texts are used to contextualise understanding. Students share their ideas within their design teams.

STEP 3: DREAM



Objective:

Have students imagine how they are going to design and produce four informative, detailed and eye-catching recipe cards with a detailed design that tells the story of where milk comes from and how it is produced in managed environments. It should cite

the name of the recipe, the ingredients and cooking equipment used, explain how to cook the recipes, and also include a 'Did you know?' fact that explains how the preparation techniques used in the recipes affected the structure, appearance and composition of the milk.

Visualise

Ask students to visualise their four different recipe ideas and sketch them in their Design Folio. Ask them to label each ingredient with the agricultural industry that produces it and the cooking method they intend using. See [Resource 1.4](#) in the Student Design Folio.

Ask teams to use all the knowledge they have gathered to visualise a creative and appropriate solution about how they see their four recipe cards being produced.

Imagine solutions and draft ideas

Ask students to play with card shapes, dairy recipes, procedures, ideas, colours and the intended statements that their detailed designed cards will make.

Ask students to pose questions about the possible ways of designing and creating their recipe cards. Questions include:

- 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 four different or similar formats? For example, text, a flow chart, info-graphic, or 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
- Might the 'Did you know?' facts that explain how the preparation techniques used in the recipe affected the structure, appearance and composition of the milk, be placed strategically below the recipe, alongside it, or somewhere else?

Focus students' attention on the following prompts:

- What might you have to do to make your design idea possible?
- What might it include?
- How might it be created?
- What are the different ways it could be created?

Ask students to record and make decisions about what's practical, possible and preferable about their draft ideas. See [Resource 1.4](#) in the Student Design Folio.

Introduce students to [information](#) about some designing principles.

Talk about colour schemes and how colour is used by graphic designers and artists to invoke connections, senses and emotion.

Invite students to generate their draft design ideas in an annotated concept sketch. See [Resource 1.4](#) in the Student Design Folio.

Materials, tools, equipment and evaluation

Challenge students to think about the materials, tools and equipment they will need to design and create the designs. Will they use digital or non-digital equipment and tools? How might they work safely and co-operatively? How might they appropriately source their images and information that is used to create the recipe cards?

Ask students how they might evaluate whether their recipe cards and accompanying five minute presentation, meet the original criteria of their task? Might they create a matrix of success criteria?

Prerequisite for progression:

The class has brainstormed ideas and begun designing their four informative, detailed and eye-catching recipe cards with a detailed design that tell the story of where milk comes from and how it is produced in managed environments. They have cited the name of the recipes, the ingredients and cooking equipment used, explained how to cook the recipes and included a 'Did you know?' fact that explains how the preparation techniques used in the recipes affected the structure, appearance and composition of the milk.

STEP 4: DESIGN



Objective:

Have students explain, prepare and action how they are going to design and produce their four informative, detailed and eye-catching recipe cards with a detailed design that tells the story of where milk comes from and how it is produced in managed environments. They should cite the name of the recipes, the

ingredients and cooking equipment used, explain how to cook the recipes, and include a 'Did you know?' fact that explains how the preparation techniques used in the recipes affected the structure, appearance and composition of the milk.

Project planning

Ask students to explain, prepare and action how they are going to document their design ideas. See [Resource 1.5](#) in the Student Design Folio.

Ask students to draft a storyboard with the messaging being used in the accompanying presentation they are going to design.

Invite students to develop a project plan outlining the planning and production steps required to their four recipe cards and accompanying presentation.

What?	How?	When?	Who?	Completed (Y/N)

Talk about the importance of a clear layout and design that makes it easy for an audience to understand and interpret the information given.

Talk about the importance of sourcing graphics, clip art and information correctly and keeping records of sources in a bibliography.

Review rules on personal safety, group safety, and classroom and furniture safety with the students.

Ask students to establish a work station and to gather the materials and tools they require.

Talk about safely storing their work samples and keeping a record of the processes they use to create it in the Design Folio.

Ask students to start actioning the steps involved in making their chosen digital or non-digital work samples.

Designing the solutions

Ask students to gather the materials, tools, and equipment needed and then plan each step involved in creating the digital or non-digital work samples.

Invite students to start creating their four detailed, informative and eye-catching recipe cards and presentation. See [Resource 1.5](#) in the Student Design Folio.

Talk with students about how they might share and present their recipe cards to an audience?

Invite students to finalise their presentation narrative. See [Resource 1.5](#) in the Student Design Folio.

Ask students to finalise and create their work samples to share them with another peer in the class and seek feedback on their ideas.

Prerequisite for progression:

Students are able to document in oral or written/digital forms how this project is to occur. The understanding is demonstrated by the students explaining their design and production thinking to a peer in the class.

STEP 5: DELIVER



Objective:

Have students deliver their four informative, detailed and eye-catching recipe cards with a detailed design that tell the story of where milk comes from and how it is produced in managed environments. They should cite the name of the recipes, the ingredients and cooking

equipment used, explain how to cook the recipes, and include a 'Did you know?' fact that explains how the preparation techniques used in the recipes affected the structure, appearance and composition of the milk.

Produce, publish and present

Ask students to finalise their four recipe cards and accompanying presentation.

Ask students to photograph their designed recipe cards and insert them in [Resource 1.6](#) in the Student Design Folio.

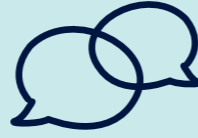
Students present their designed products to the class or other peers.

Video presentations of the students' recipe cards and enjoy a day of showcasing what has been discovered about how milk is produced and processed in Australia, and how its properties and characteristics determine how it can be used.

Prerequisite for progression:

Each student has produced four informative, detailed and eye-catching recipe cards with a detailed design that tell the story of where milk comes from and how it is produced in managed environments. They have cited the name of the recipes, the ingredients and cooking equipment used, explained how to cook the recipes, and included a 'Did you know?' fact that explains how the preparation techniques used in the recipes affected the structure, appearance and composition of the milk. They have presented to an audience.

STEP 6: DEBRIEF



Objective:

Assess the results of the designed recipe cards and accompanying five minute presentation about how milk is produced and processed in Australia and how its properties and characteristics determine how it can be used.

Reflections

Ask students to reflect on their learning. Ask students to:

- Explain what they know about the Australian dairy industry.
- Explain where milk comes from.
- Explain how cows make milk.
- Explain the ways dairy farmers raise and look after their cows.
- Re-tell their findings about how milk is produced and processed in Australia.
- Identify and describe who produces milk and highlight a specialised Australian manufacturer who processes it.
- Explain how the designed recipe cards educate consumers about how milk is produced and processed in managed environments.
- Explain how the designed recipe cards educate consumers about how preparation techniques can impact on the properties and characteristics of milk.

Evaluate the Solutions

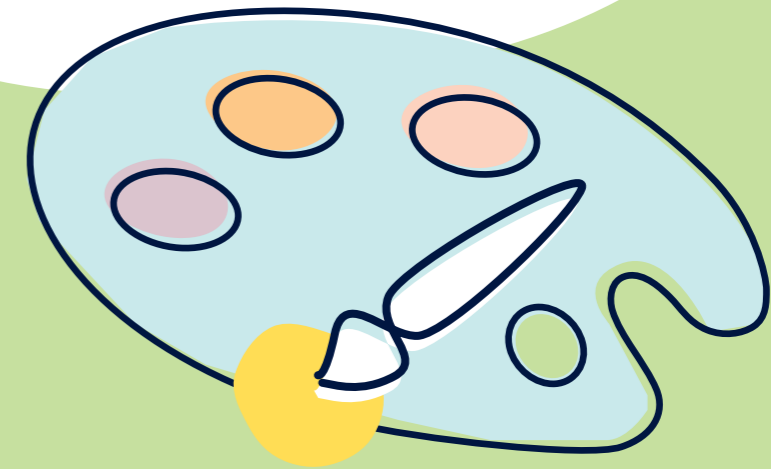
Evaluate their four recipe cards and accompanying presentation and write about whether their work:

- matched the definition of the task
- used a detailed, informative and eye-catching design, and;
- included sources of any graphics, images and information used whilst creating the label and presentation.

Write about the quality of their planning, their research, cooking, finished recipe cards and presentation and whether they enjoyed the tasks. See [Resource 1.7](#) in the Student Design Folio.

Challenge students to re-design their recipe cards and presentation where needed. See [Resource 1.8](#) in the Student Design Folio.

STUDENT DESIGN FOLIO DISCOVER DAIRY AND MAKE THE INVISIBLE, VISIBLE



THE DESIGN FOLIO

Your Design Folio is a vital communication tool for your design project.

It should document your design project's development.

Start by recording your understanding of the design brief through to the final evaluation of your designed solution.

Use concept maps, word clouds, sketches, photographs, flow charts, labelled drawings and information to communicate your ideas.



Resource 1.1 Your Design Brief



The essential question:

What happens when we understand all the managed environments and systems involved in bringing us nutritious and delicious milk, and we understand how to prepare, cook and transform milk into recipes ideas?

Scenario and design brief:

Know the who, what, when, where and why of the Australian dairy industry.

Dairy Australia is searching for "change making" students to bring their love of dairy and cooking together and explore the range of healthy recipes that can be created using dairy products.

Dairy products make up an important part of our diet, yet most people rarely think about where they come from or how they are produced.

Dairy Australia wants you to promote the provenance of the milk its farmers produce, and educate consumers about what's involved, by telling the story about how milk gets from the cow to the consumer.

The challenge is to learn about and analyse how milk is produced in managed environments, and experiment with a variety of food preparation techniques that impact on its characteristics and properties.

Your brief requires you to design and create four informative, detailed and eye-catching recipe cards with a detailed design that tells the story of where milk comes from and how it is produced in managed environments. Include the name of the recipe, the ingredients and cooking equipment used, and also explain how to cook the recipes.

Add a 'Did you know?' fact below your recipes explaining how the preparation techniques used in the recipe affected the structure, appearance and composition of the milk.

Finally, develop and deliver a presentation of the products to an audience. Explain how your recipe cards educate consumers about how milk is produced and processed in managed environments, and how food preparation techniques impact on the properties and characteristics of milk in the recipes you have chosen. Are you up for the challenge?



Inspirational ideas

Record the inspirational [recipes](#), ingredients, preparation techniques and cooking ideas found in recipes on "The Dairy Kitchen" website. See: <https://www.dairy.com.au/recipes>

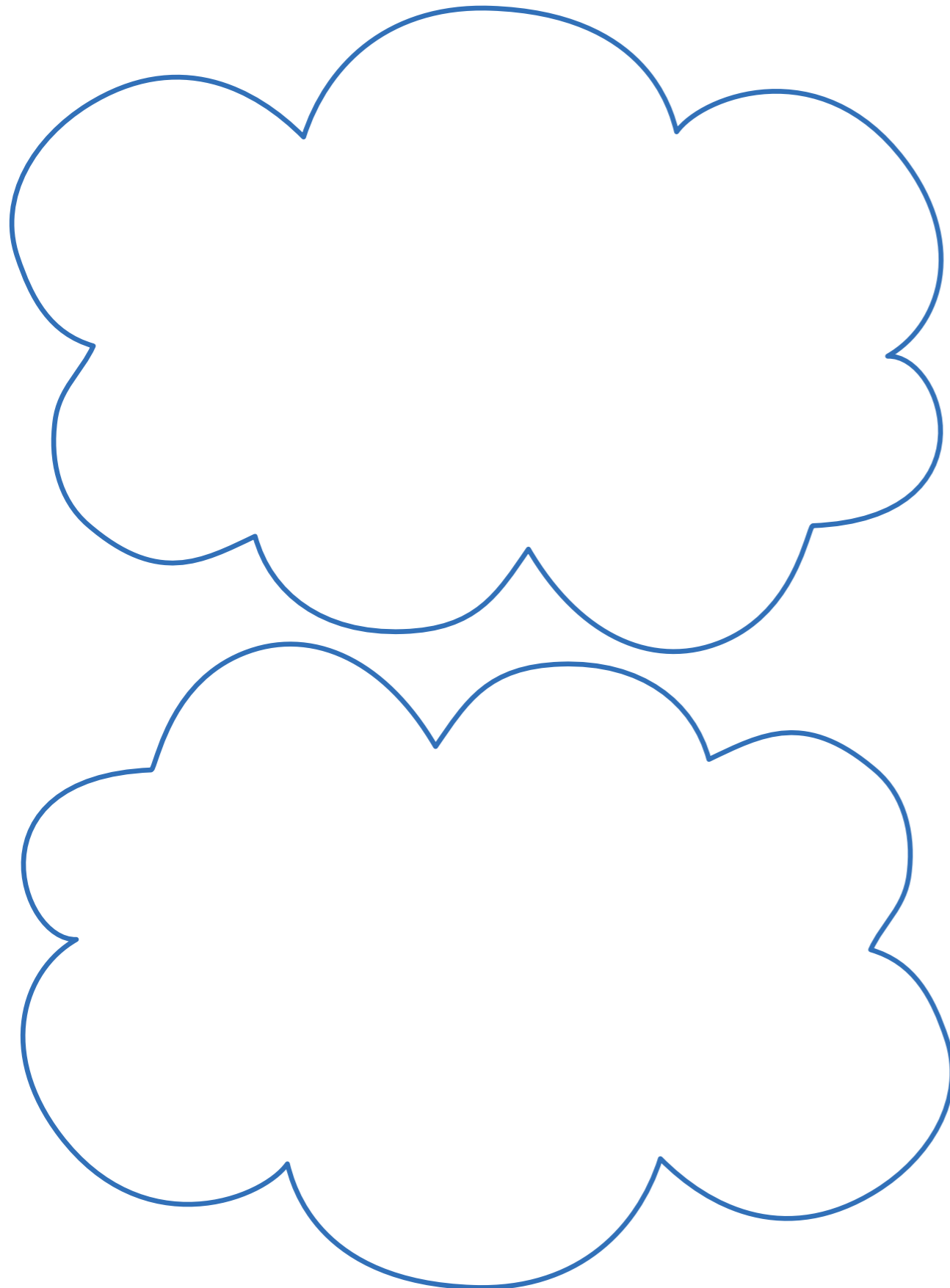
A large, empty rectangular box with a blue border, intended for students to record their inspirational ideas.

What does the solution look like in your mind?

Visualise a creative and appropriate design solution.

Sketch annotated concept sketches below of what the four different recipe card ideas might look like and contain. Label each ingredient with the agricultural industry that produces it and the cooking method you intend using.

Two large, empty thought bubble shapes with blue outlines, intended for students to sketch and label their design solutions.



Using the table below record what is practical, possible and preferable about you draft ideas.

Recipe Card Ideas	Practical (Y/N)	Possible (Y/N)	Preferable (Y/N)	Identify your decision

Using your ideas in the table above, which design ideas are the most practical and have the greatest potential to meet the design brief?

Recipes

Name your four recipes.



Provenance of milk

Explain how you will tell the story of where milk comes from and how it is produced in managed environments on each of the recipe cards.

Recipe Card 1

Recipe Card 2

Recipe Card 3

Recipe Card 4



Ingredients and equipment

List all the ingredients and equipment you need for each recipe.

Recipe 1

Recipe 2

Recipe 3

Recipe 4



Preparation and cooking techniques

List all the preparation and cooking techniques you will use for each recipe.

Recipe 1

Recipe 2

Recipe 3

Recipe 4



Did You Know Fact

How might you explain how the preparation techniques used in the recipes, affected the structure, appearance and composition of the milk? What design features appeal to you?

Recipe 1

Recipe 2

Recipe 3

Recipe 4



Design your presentation

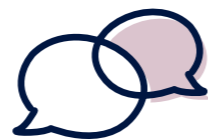
Write the introduction:

Write the body:

Write the conclusion:



Make your solution(s) and place photos of them here.



Were you successful? Why or why not?



How would you improve your designs and the information they incorporated?

BIBLIOGRAPHY



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