



Dairy

EDUCATORS GUIDE

Year 1 – Year 5





Acknowledgments

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This curriculum resource has been adapted to the New Zealand Curriculum by Sow the Seed and supported by Rabobank.

The curriculum-linked resource is designed to introduce young people to the production of food and fibre in New Zealand.

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References

- New Zealand Ministry of Education. New Zealand Curriculum. Retrieved from <https://nzcurriculum.tki.org.nz/The-New-Zealand-Curriculum>
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Introduction

This George the Farmer Educational Resource aims to raise awareness about many of the things the dairy industry does to raise happy cows and calves, produce, process and deliver milk and produce healthy dairy foods for us to enjoy!

WHAT IS INCLUDED IN THE DAIRY FOOD GROUP?

The dairy food group includes milk, cheese, butter, cream, yoghurt and/or alternatives such as soy beverages, made from rice or other cereals which contain at least 100mg calcium per 100ml.

The dairy food group is one of the five food groups that are important for our good health.



A message from George!

Not only do I love dairy foods — but I also love to know the who, what, when, where and why of the New Zealand Dairy Industry!



Did you know that there are different types of dairy farms located across New Zealand? Some are large commercial farms with automated and robotic systems while others aren't.

Some dairy farmers milk cows once, twice or sometimes three times a day in environments like milking sheds that are specially designed and electronically controlled. 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 move through the dairy easily and efficiently with minimal handling.

In most dairy sheds, cows are fed grain or special mixed feed rations while being milked, which improves their health and ensures they receive the nutrients needed to produce high-quality milk. These sheds often use ventilation systems, allowing appropriate heating and cooling options.

Milking sheds have a concrete base, often with concrete under-floor effluent collection pits or channels. These are regularly flushed or drained to remove poo and wee from the sheds.

There are many technologies used to manage cows on farms. There are 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. It's basically like a FitBit for cows to increase output of milk and overall herd wellness.

Did you know that dairy farmers usually graze their animals in environments with high-quality pastures

(grass) that are found in high rainfall areas or regions and that sometimes have access to water supplies so they can irrigate their pastures?

Some cows are fed on 100% pasture, whereas others are fed silage (fermented dried grass), grains, or a mixed rotation of all three types of feed.

Dairy farmers also house their animals in different environments for some stages of their life. For example, calves are raised in small yards with shelter (sometimes sheds) where they are fed milk twice a day, and where they can access clean water and quality pastures.

New Zealand 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 exceptionally clean, hygienic environments when being milked.

Some farmers wash the cow's teats before and after each milking session, while every farmer thoroughly cleans the shed.

There are many managed systems and environments that the dairy industry has designed to raise cows and calves, produce, process milk, and manage their environments sustainably.

Dairy farmers also manage their natural environment in and around the farm. They use some of the best environmental management practices undertaken on farm, and the goal of everyone in the dairy industry is to be viable, profitable and sustainable. The New Zealand dairy industry has made commitments to sustainability.



Resource Description

This resource is intended as starting points for a cross-curricular approach to learning, based on the George the Farmer YouTube video "Dairy" https://youtu.be/zaWW2wA_jQY and accompanying Virtual Reality (VR) video on YouTube <https://youtu.be/BizHV6N9E04> or through the FarmVR app: <https://farmvr.com>.

It is also suggested that students read 'George the Farmer, Ruby and the Dairy Dilemma' <https://www.georgethefarmer.com.au/collections/books/products/george-the-farmer-ruby-and-the-dairy-dilemma>.

The guide is divided into a series of Science, Technology, and Mathematics activities aimed at students between the ages of 4 and 8 years. The activities seek to complement and extend the enjoyment students will experience from seeing the video, whilst at the same time meet some of the requirements of curriculum outcomes.

The activities in this resource can be printed out for students, or alternatively, display the activity page from the PDF on your interactive white board or import an activity page into your online teaching and learning environment such as Google Slides and have the students use their existing workbooks to complete the task.

Curriculum Focus

In the New Zealand Curriculum this learning resource has a variety of student activities for Year 1 – Year 5 in Science, English, Technology, and Mathematics.

They are also suitable for teachers and students in early childhood and care settings such as long day care services, preschools, kindergartens, and outside school hour care services.



New Zealand Curriculum Connections

Level 1

Technology

Technological Practice

Students will:

Planning for practice

- Outline a general plan to support the development of an outcome, identifying appropriate steps and resources.

Brief development

- Describe the outcome they are developing and identify the attributes it should have, taking account of the need or opportunity and the resources available.

Outcome development and evaluation

- Investigate a context to communicate potential outcomes. Evaluate these against attributes; select and develop an outcome in keeping with the identified attributes.

Technological Knowledge

Students will:

Technological modelling

- Understand that functional models are used to represent reality and test design concepts and that prototypes are used to test technological outcomes.

Technological products

- Understand that technological products are made from materials that have performance properties.

Technological systems

- Understand that technological systems have inputs, controlled transformations, and outputs.

Nature of Technology

Students will:

Characteristics of technology

- Understand that technology is purposeful intervention through design.

Characteristics of technological outcomes

- Understand that technological outcomes are products or systems developed by people and have a functional nature and a physical nature.

Science

Nature of Science

Students will:

Understanding about science

- Appreciate that scientists ask questions about our world that lead to investigations and that open-mindedness is important because there may be more than one explanation.

Investigating in science

- Extend their experiences and personal explanations of the natural world through exploration, play, asking questions, and discussing simple models.

Communicating in science

- Build their language and develop their understandings of the many ways the natural world can be represented.

Participating and contributing

- Explore and act on issues and questions that link their science learning to their daily living.

Living World

Students will:

Life processes

- Recognise that all living things have certain requirements so they can stay alive.

Ecology

- Recognise that living things are suited to their particular habitat.

Evolution

- Recognise that there are lots of different living things in the world and that they can be grouped in different ways.

Material World

Students will:

Properties and changes of matter

- Observe, describe, and compare physical and chemical properties of common materials and changes that occur when materials are mixed, heated, or cooled.

Chemistry and Society

- Find out about the uses of common materials and relate these to their observed properties.

English

Listening, Reading, and Viewing

Processes and strategies

Students will:

- Acquire and begin to use sources of information, processes, and strategies to identify, form, and express ideas.

Purposes and audiences

- Recognise that texts are shaped for different purposes and audiences by:
 - Identifying the purposes of simple texts.
 - Evaluation the usefulness of simple texts.

Ideas

- Recognise and identify ideas within and across texts by:



- Understanding that personal experience can influence the meaning gained from texts.
- Making meaning of texts by identifying ideas in some texts.

Language Features

- Recognise and begin to understand how language features are used for effect within and across texts by:
 - Beginning to recognise that oral, written, and visual language features can be used for effect.
 - Recognising some topic specific words.

Structure

- Recognise and begin to understand text structures, by:
 - Understanding that the words, sentences, and images contribute to text meaning.
 - Recognising some text forms and some differences between them.

Speaking, Writing and Presenting

Processes and strategies

Students will:

- Acquire and begin to use sources of information, processes, and strategies to identify, form and express ideas.

Purposes and audiences

- Recognise how to shape texts for a purpose and an audience, by:
 - Constructing texts that demonstrate some awareness of purpose and audience through the choice of content, language, and text form.
 - Expecting the texts they create to be understood, responded to and appreciated by others.
 - Developing and conveying personal voice where appropriate.

Ideas

- Form and express ideas on a range of topics, by:
 - Forming and expressing simple ideas and information.
 - Beginning to support ideas with some detail.

Language features

- Use language features, showing some recognition of their effects, by:
 - Using some oral, written, and visual language features to create meaning and effect.
 - Using a range of high-frequency, topic-specific and personal-content words to create meaning.

Structure

- Organise texts, using simple structures, by:
 - Using knowledge of word and sentence order to communicate meaning in simple texts.
 - Beginning to sequence ideas and information.

Mathematics

In a range of meaningful contexts, students will be engaged in thinking mathematically and statistically. They will solve problems and model situations that require them to:

Number and Algebra

Number strategies

- Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions.

Number Knowledge

- Know the forward and backward counting sequences of whole numbers to 100.

Statistics

Statistical Investigation

- Conduct investigations using the statistical enquiry cycle:
 - posing and answering questions.
 - gathering, sorting, and counting, and displaying category data.
 - discussing the results.

Statistical Literacy

- Interpret statements made by others from statistical investigations and probability activities.

Geometry and Measurement

- Order and compare objects by length, area, volume and capacity, weight, turn, temperature, and time by direct comparison and/or counting whole numbers of units.

Level 2

Technology

Technological Practice

Students will:

Planning for practice

- Develop a plan that identifies the key stages and the resources required to complete an outcome.

Brief development

- Explain the outcome they are developing and describe the attributes it should have, taking account of the need or opportunity and the resources available.

Outcome development and evaluation

- Investigate a context to develop ideas for potential outcomes. Evaluate these against the identified attributes, select, and develop an outcome. Evaluate the outcome in terms of the need or opportunity.



Technological products

- Understand that there is a relationship between a material used and its performance properties in a technological product.

Technological systems

- Understand that there are relationships between the inputs, controlled transformations, and outputs occurring within simple technological systems.

Nature of Technology

Students will:

Characteristics of technology

- Understand that technology both reflects and changes society and the environment and increases people's capability.

Characteristics of technological outcomes

- Understand that technological outcomes are developed through technological practice and have related physical and functional natures.

Science

Nature of Science

Students will:

Understanding about science

- Appreciate that scientists ask questions about our world that lead to investigations and that open-mindedness is important because there may be more than one explanation.

Investigating in science

- Extend their experiences and personal explanations of the natural world through exploration, play, asking questions, and discussing simple models.

Communicating in science

- Build their language and develop their understandings of the many ways the natural world can be represented.

Participating and contributing

- Explore and act on issues and questions that link their science learning to their daily living.

Living World

Students will:

Life processes

- Recognise that all living things have certain requirements so they can stay alive.

Ecology

- Recognise that living things are suited to their particular habitat.

Evolution

- Recognise that there are lots of different living things in the world and that they can be grouped in different ways.

Material World

Students will:

Properties and changes of matter

- Observe, describe, and compare physical and chemical properties of common materials and changes that occur when materials are mixed, heated, or cooled.

Chemistry and society

- Find out about the uses of common materials and relate these to their observed properties.

Physical World

Students will:

Physical inquiry and physics concepts

- Explore everyday examples of physical phenomena, such as movement, forces, electricity and magnetism, light, sound, waves, and heat.

English

Listening, reading, and viewing

Processes and strategies

Students will:

- Select and use sources of information, processes, and strategies with some confidence to identify, form and express ideas.

Purposes and audiences

- Show some understanding of how texts are shaped for different purposes and audiences, by:
 - Recognising how texts are constructed for different purposes, audiences, and situations.
 - Understanding that texts are created from a particular point of view.
 - Evaluating the reliability and usefulness of texts with some confidence.

Ideas

- Show some understanding of ideas within, across and beyond texts, by:
 - Using their personal experience and world and literacy knowledge to make meaning from texts.
 - Making meaning of increasingly complex texts by identifying main ideas.
 - Making and supporting inferences from texts with some independence.

Language features

- Show some understanding of how language features are used for effect within and across texts, by:
 - Recognising that oral, written, and visual language features can be used for effect.
 - Using a large and increasing bank of high-frequency, topic-specific, and personal-content words to make meaning.
 - Showing an increasing knowledge of the conventions of text.



Structure

- Show some understanding of text structures, by:
 - Understanding that the order and organisation of words, sentences, paragraphs, and images contribute to text meaning.
 - Recognising an increasing range of text forms and differences between them.

Speaking, Writing and Presenting

Processes and strategies

Students will:

- Select and use sources of information, processes, and strategies with some confidence to identify, form and express ideas.

Purposes and audiences

- Show some understanding of how to shape texts for different purposes and audiences, by:
 - Constructing texts that demonstrate a growing awareness of audience and purpose through appropriate choice of content, language, and text form.
 - Expecting the texts they create to be understood, responded to, and appreciated by others.
 - Developing and conveying personal voice where appropriate.

Ideas

- Select, form, and express ideas on a range of topics, by:
 - Forming and expressing ideas and information with reasonable clarity, often drawing on personal experience and knowledge.
 - Beginning to add or delete details and comments, showing some selectivity in the process.

Language features

- Use language features appropriately, showing some understanding of their effects, by:
 - Using oral, written, and visual language features to create meaning and effect.
 - Using a large and increasing bank of high-frequency, topic-specific, and personal-content words to create meaning.
 - Writes legibly and with increasing fluency when creating texts.
 - Gaining increasing control of text conventions, including some grammatical conventions.

Structure

- Organise texts, using a range of structures, by:
 - Using knowledge of word and sentence order to communicate meaning when creating text.
 - Organising and sequencing ideas and information with some confidence.

Mathematics

In a range of meaningful contexts, students will be engaged in thinking mathematically and statistically. They will solve problems and model situations that require them to:

Number and Algebra

Number strategies

- Use simple additive strategies with whole numbers and fractions.

Number Knowledge

- Know the forward and backward counting sequences with whole numbers to at least 1000.
- Know the basic addition and subtraction facts.

Patterns and relationships

- Generalise that whole numbers can be partitioned in many ways.

Statistics

Statistical investigation

- Conduct investigations using the statistical enquiry cycle:
 - posing and answering questions.
 - gathering, sorting, and displaying category and whole number data.
 - communicating findings based on the data.

Statistical literacy

- Compare statements with the features of simple data displays from statistical investigations or probability activities undertaken by others.

Level 3

Technology

Technological Practice

Students will:

Planning for practice

- Undertake planning to identify the key stages and resources required to develop an outcome. Revisit planning to include reviews of progress and identify implications for subsequent decision making.

Brief development

- Describe the nature of an intended outcome, explaining how it addresses the need or opportunity. Describe the key attributes that enable development and evaluation of an outcome.

Outcome development and evaluation

- Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity.

Technological Knowledge

Students will:

Technological modelling

- Understand that different forms of functional modelling are used to inform decision making in the development of technological possibilities and that prototypes can be used to evaluate the fitness of technological outcomes for further development.



Technological products

- Understand the relationship between the materials used and their performance properties in technological products.

Technological systems

- Understand that technological systems are represented by symbolic language tools.

Nature of Technology

Students will:

Characteristics of technology

- Understand how society and environments impact on and are influenced by technology in historical and contemporary contexts and that technological knowledge is validated by successful function.

Characteristics of technological outcomes

- Understand that technological outcomes are recognisable as fit for purpose by the relationship between their physical and functional natures.

Science

Nature of Science

Students will:

Understanding about science

- Appreciate that science is a way of explaining the world and that science knowledge changes over time.
- Identify ways in which scientists work together and provide evidence to support their ideas.

Investigating in science

- Build on prior experiences, working together to share and examine their own and others' knowledge.
- Ask questions, find evidence, explore simple models, and carry out appropriate investigations to develop simple explanations.

Communication in science

- Begin to use a range of scientific symbols, conventions, and vocabulary.
- Engage with a range of science texts and begin to question the purposes for which these texts are constructed.

Participating and contributing

- Use their growing science knowledge when considering issues of concern to them.
- Explore various aspects of an issue and make decisions about possible actions.

Living World

Students will:

Life processes

- Recognise that there are life processes common to all living things and that these occur in different ways.

Ecology

- Explain how living things are suited to their particular habitat and how they respond to environmental changes, both natural and human induced.

Evolution

- Begin to group plants, animals, and other living things into science-based classifications.

What do you know?

First, have a good look around this page.

Can you find some of the interesting characters featured in the George the Farmer video "Dairy"?



Write what you know about these characters, and what you would like to find out about them, in the boxes below.

NAME OF CHARACTER	WHAT I KNOW	WHAT I WANT TO FIND OUT

ACTIVITY 1

Ask a person in the class what they know about where their milk comes from and the people who produce it. Record their name and answer in the space below.

NAME

THEIR ANSWER

NAME	THEIR ANSWER

Ask another person what they think dairy cows look like; what covers their body; what shape they are; what other features they have; whether they have curly or straight tails; what sounds do they make; what colours can they be?

Record their name and answers in the space below.

NAME

THEIR ANSWER

NAME	THEIR ANSWER

ACTIVITY 1

Think about which animal has the same colours and pattern illustrated?

List the animals you can think of below.



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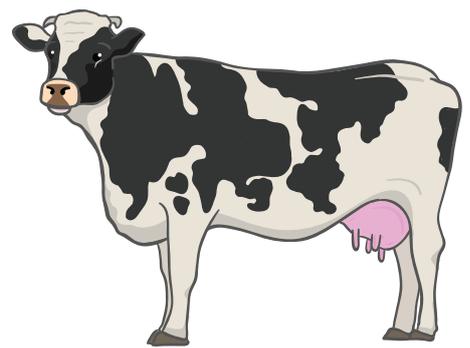
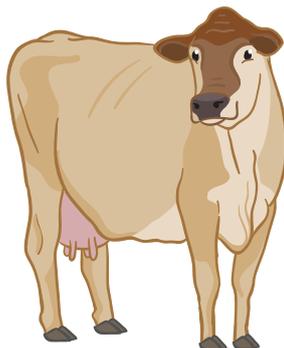
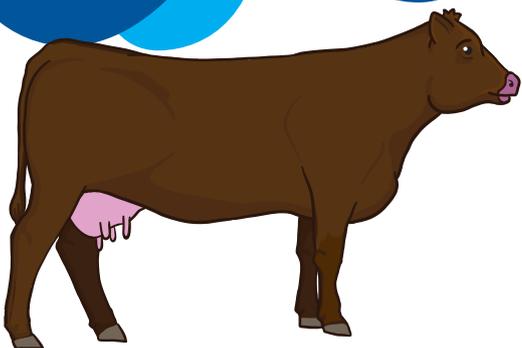
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Did you know?

... that there are 4 main breeds of dairy cows in New Zealand?
There are Holstein Friesian, Jersey, Kiwi Cross and Ayrshire cows.



Design and make a dairy cow's udder

Calves drink milk from the mother's udder by sucking on her teats.

Using a plastic disposable glove, milk, or water, string and a needle, your task is to experiment and show how the udder, like the glove needs to be sucked/squeezed to get the milk out.

Record your design ideas in the space below.

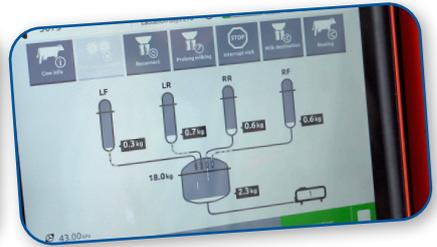
Re-design your ideas and try...

1. Placing water or milk in the plastic disposable glove.
2. Tying off the plastic glove with some string.
3. Puncturing one of the fingers with a needle.
4. Squeezing the punctured finger simulating the sucking action.

Note: This experiment is best conducted over a sink or bucket

Dairy Farmers

New Zealand dairy farmers, like engineers use science and maths to develop solutions to problems.



Make a list of things that have been engineered on the dairy farms seen in the video.

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ACTIVITY 3

Engineers use a design process including drawings, diagrams, text and measurements. It helps them stay on track when developing a product or a solution to a problem.

Imagine you are a Mechanical Engineer and give Farmer Josh from the video's robotic dairy an update. Add an improvement or invention to make it work better or differently.

Draw your design ideas and use labels to explain how the new parts work.

Dairy Farms

Have you ever imagined what it would be like to plan and design a dairy farm from scratch?

Recall features of the dairy farm in the video and design your 'ultimate dairy farm' for dairy cows. It needs to ensure that the dairy cows are safe and healthy in all types of weather.

Think about:

- what everybody and every animal needs to have to be safe and healthy
- what needs to be opened and closed to let the dairy cows in and out of the paddocks and milking shed
- where the dairy cows graze and eat grass
- how they get to the milking shed
- what the milking shed looks like
- what the milking shed contains
- where the cows wait to be milked
- what keeps the dairy cows in the paddocks
- where the baby calves are housed and fed
- where the dry feed is kept; and
- how the milk tanker comes onto the dairy farm to collect the milk

Draw or write about any distinctive features you know about that are on dairy farms.

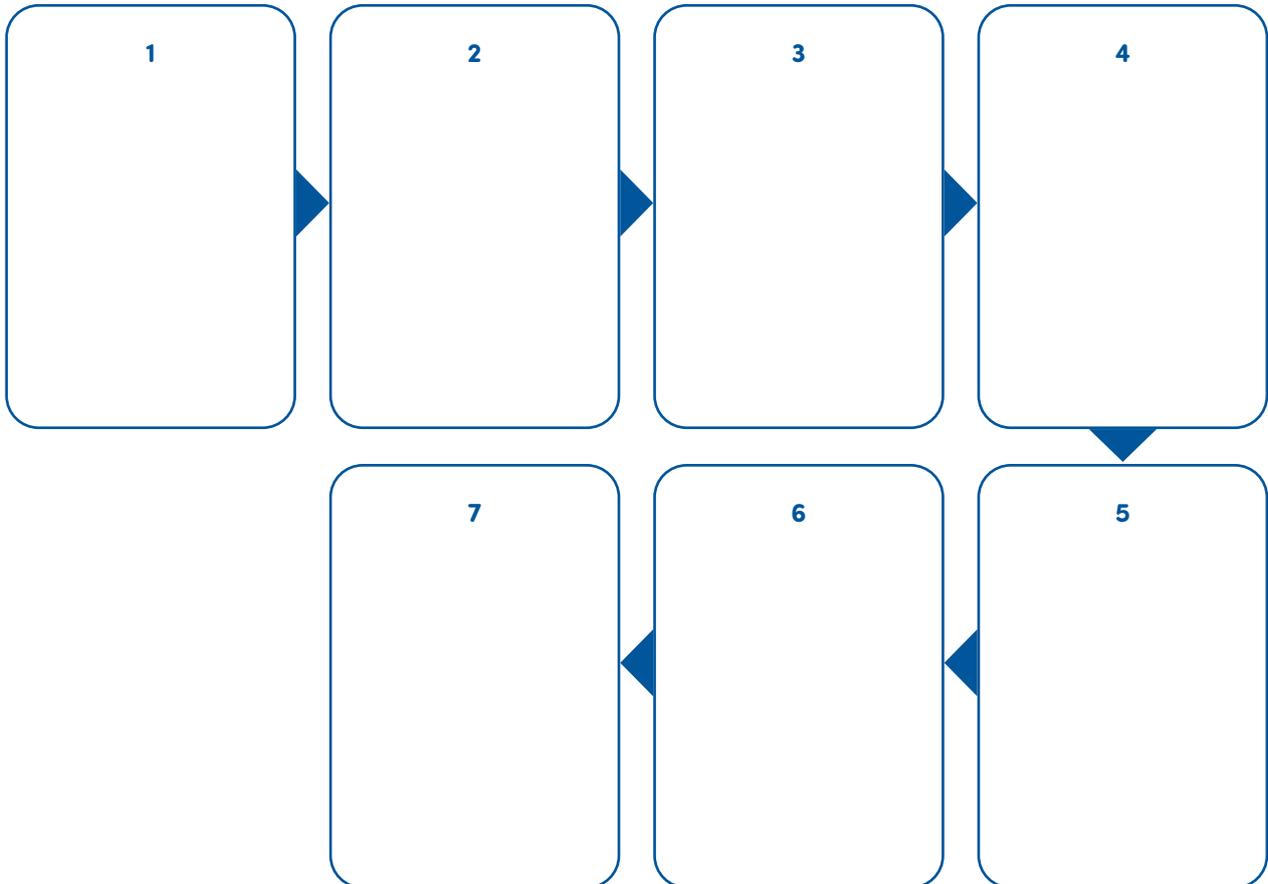
ACTIVITY 4

Now design and make a model of the ultimate dairy farm accompanied by a text about how dairy cows are grown, raised, and cared for.

Where does our milk and butter come from?

Viewing the George the Farmer 'Dairy' video helped us learn more about where our milk comes from and the steps involved in the production of milk.

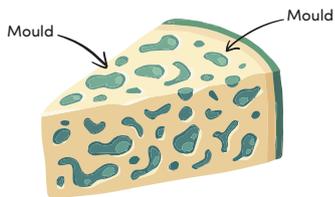
Design and draw a 7-step flow chart or storyboard explaining where our milk comes from and the steps involved in the production of milk.



ACTIVITY 5

Brainstorm and list down what you know about what foods milk can be made into.

List key words and create an annotated drawing that includes pictures and words or descriptions about the dairy foods you know about.



Blue Cheese

ACTIVITY 5

Milk

Did you know that milk contains water, protein, fat, carbohydrates, and vitamins such as vitamin A, D, B12, magnesium, zinc, potassium, iodine, and riboflavin, plus minerals such as calcium?

These chemical properties are what make it possible for milk to be transformed into other foods.

**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. Which milk did you like the best? Why?**

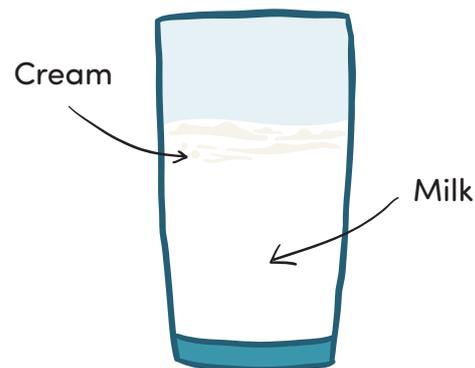
ACTIVITY 5

The cream is less dense than the milk, so the cream rises to the top where it can be skimmed off to leave behind skim or light milk or the cream can be blended in to make full-cream milk – scientists call this process homogenisation and the milk is known to be homogenised.

Have you ever seen homogenised milk in the supermarket?

Did you know that butter is made from cream?

Cream is whisked or churned until it separates into two different mixtures – one being buttermilk (a light, slightly sour milk used mainly for cooking cakes) and the other being delicious butter.



Your task is to use cream to make butter.

Make butter using clean jars with tight fitting lids, a marble and different types of cream including, pouring cream, light cream, whipping cream, double cream, thickened cream, sour cream, or crème fraiche. Fill the jars half-way up with cream, pop the marble in and shake until the cream separates.

Use an iPad and time how long it takes to make butter.

You will need:

- An electric whisk
- Two mixing bowls
- Clean perforated kitchen wipe or cheese cloth
- 500ml cream (35% milk fat at room temperature)
- A sieve
- A plastic plate



You need to:

- Pour cream into the first mixing bowl and beat for approximately 5 – 6 minutes or until the cream starts to thicken and separate.
- Line the sieve with the clean kitchen wipe or cheese cloth and sit over the second bowl.
- Pour butter mixture onto the cloth, gather the sides of the cloth around the mixture to form a tight ball to squeeze out as much butter milk as possible into the bowl below.
- When this is done, remove the butter that will be left inside the cloth and refrigerate.
- The butter is now ready to be spread on to bread or crackers.

ACTIVITY 5

Watch the milk and cream change, and think about what is happening and why.
Record ideas as a word chain describing the changes as they occurred.

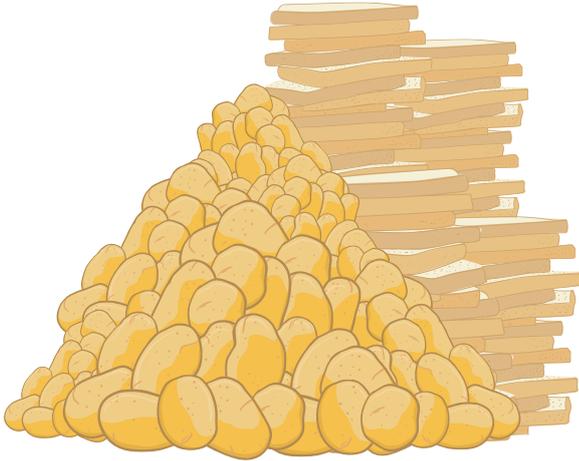
For example: Whisk cream – butter comes together into clusters - butter separates from the buttermilk.

Remember that butter needs to be refrigerated or frozen to prevent it from spoiling

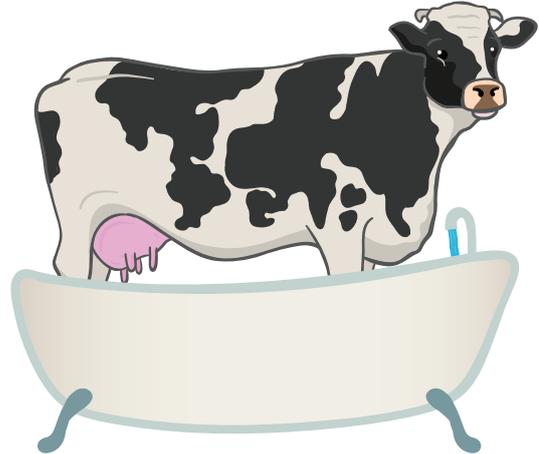
Might these cooling processes change the properties of the butter too?

You can also transform butter by blending herbs and spices or salt and pepper with it.

Think like a mathematician



Who knew that dairy cows eat about 20 kilograms of nutritious food a day. Although bread or potatoes aren't generally included in a dairy cows diet, this amount of nutritious food is equivalent to 103 baked potatoes or 720 slices of bread*!



And dairy cows can drink about 100 litres of water (a bathtub full) in a day.

Use your mathematical skills to work out the quantities of bread, potatoes and water needed to feed a cow for a day, a week, and a month if they were to eat a diet of potatoes and bread.

FOOD	QUANTITY PER DAY	QUANTITY PER WEEK	QUANTITY PER MONTH
POTATOES			
LOAVES OF BREAD			
WATER			
TOTAL			

ACTIVITY 6

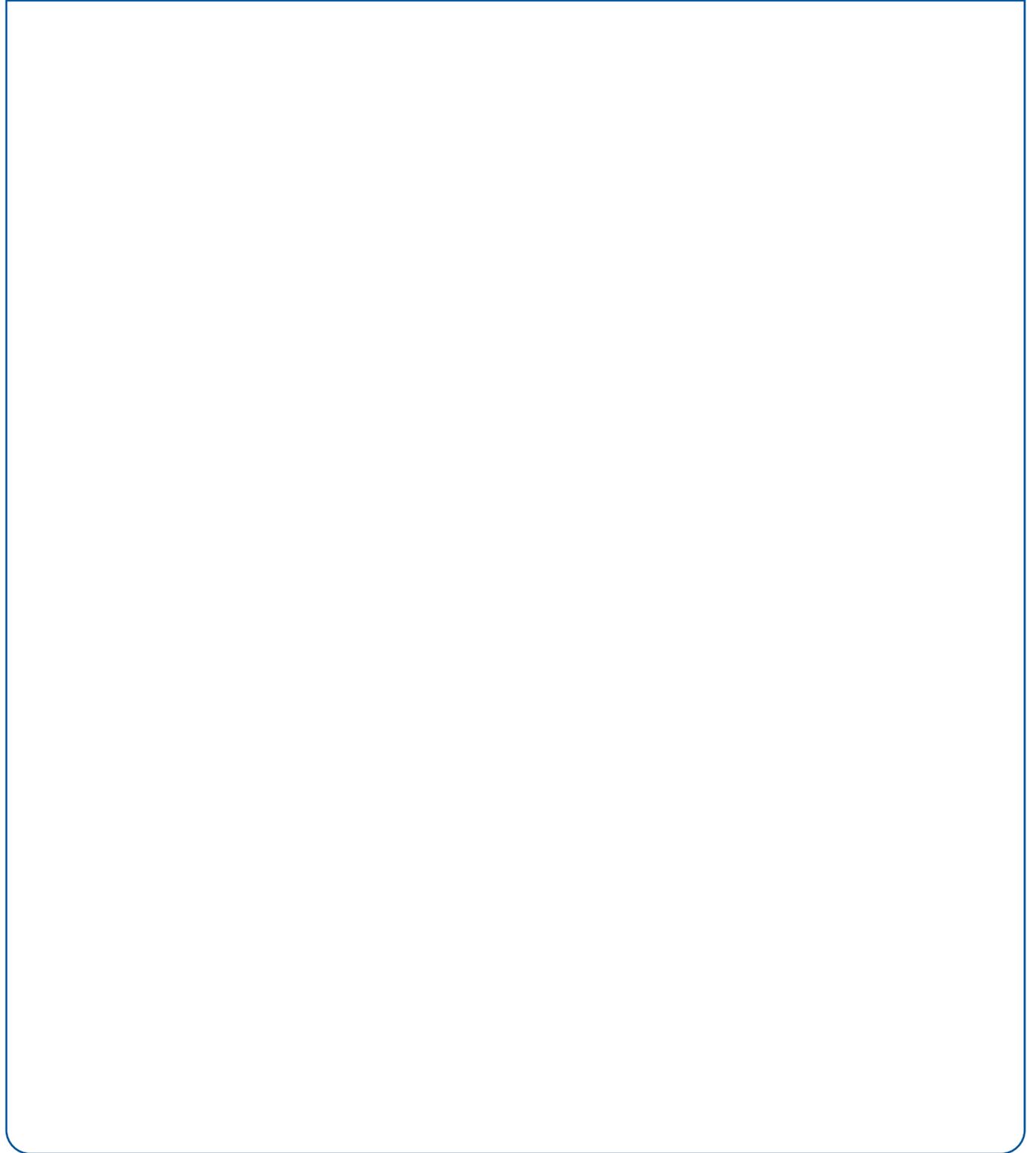
Use your mathematical skills to work out how much it would cost to feed a dairy cow for a day, a week, and a month. Remember there are 4 weeks in a month. To help you find out the cost of water, potatoes and bread visit an online supermarket's website.

FOOD	QUANTITY PER DAY	QUANTITY PER WEEK	QUANTITY PER MONTH
POTATOES			
LOAVES OF BREAD			
WATER			
TOTAL			

Using your mathematical skills work out which food (potatoes or bread) would take up more space in the milking shed and explain your reasoning in everyday language.

ACTIVITY 6

Draw a picture graph to represent the amounts of food and water that dairy cows drink and eat every day.



What can we learn from dairy farmers?

Replay the video and think about what we have learnt from gamechangers like Josh and Nick.

Then, tell the story of where milk comes from and how it is produced. Write a draft script and create a Minecraft video or use Windows Movie Maker or Padlet to retell their stories about dairy farming.

Draft your script below and then create your video and share with family and friends.

MY TITLE

MY INTRODUCTION

MY STORY

MY ENDING

Happy lunch making!

This week you may have eaten a cheese sandwich or a tub of yoghurt.

You may have poured milk onto your cereal, enjoyed a hot chocolate at a local cafe, drank a milkshake or smoothie, eaten a piece of cheese as a snack, enjoyed a piece of quiche made with butter, cream and cheese, eaten an ice cream for dessert, eaten a serve of cheese and macaroni, some frittata with ricotta and feta cheese or a piece of cheesecake. All of these dairy products were produced by dairy farmers and their cows.

Jump for joy as you organise and prepare a packed lunch made with dairy foods.

Plan, prepare and pack a lunch that you will enjoy and one that ensures plenty of energy for physical and mental activity, giving particular emphasis to dairy foods.

Design your packed lunch below.