Dairy know-how

A Stage 2 unit of work for history and geography.

Rationale

Access to information has made agriculture more efficient and prosperous. Whereas in the past people had limited access to information, students now have so much information available that they need to be able to decide which information to use and which to ignore—as do farmers. This unit asks students to consider what information is required to make informed decisions as well as where reliable information can be found.

NSW syllabus outcomes addressed in the unit

Science and Technology:

A student:

- describes how agricultural processes are used to grow plants and raise animals for food, clothing and shelter ST2-5LW-T
- describes how digital systems represent and transmit data ST2-11DI-T

History:

A student:

- describes and explains how significant individuals, groups and events contributed to changes in the local community over time HT2-2
- applies skills of historical inquiry and communication HT2-5

Geography:

A student:
- describes the ways people, places and environments interact GE2-2
- examines differing perceptions about the management of places and environments GE2-3
- acquires and communicates geographical information using geographical tools for inquiry GE2-4

English

A student:
- communicates in a range of informal and formal contexts by adopting a range of roles in group, classroom, school and community contexts EN2-1A

Unit at a glance

Learning experience	Location	Activities	Resources
1	Classroom	Plan a vegetable garden. How do we access information to inform decisions? What types of information are available to us?	Internet access Learning journals
2	Classroom	The People of Belgenny. What sort of information was available to the Macarthurs when they came to the Cowpastures?	Tiki-toki timeline* or pdf version
3	Classroom	Geography of Belgenny. Geographical information that can be used to make decisions about land use.	Soundcloud audio file—internet access or transcript in appendix.
4	Onsite or online	Learning journal activities about the influence of information on farming.	Learning journals
5	Classroom	Review of learning journals / drawing together the lessons from site visit. How has the information available to dairy farmers changed since colonisation?	Learning journals
6	Classroom	Researching the needs of an animal, choosing appropriate websites.	Internet access Learning journals
7	Classroom	Produce a story for younger readers and viewers.	Depends on chosen format for presentation

*Instructions on how to access and use the tiki-toki timeline are on our website (https://www.belgennyfarm.com.au/education/creamery).

Learning sequence

Learning experience 1

Aim: Students will develop a plan for a vegetable garden, taking into consideration the needs of people involved and the information that is available to them in order for the garden to be successful.

Learning intention

Students will be able to list two or three factors that need to be considered when deciding where and when to plant a vegetable of their choice and at least one place that they could find this information.

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⚙ Activate prior knowledge

Ask students to think of a time they have planned something. What did they plan? Why did they plan? And where did they get the information from? Did planning help them to achieve the desired results? Ask them to think of a time that they didn't plan something as well and contrast the results.

🔍 Discuss / Investigate / View

Discuss with students the process of planning a school vegetable garden—or extension to an existing one. This garden does not need to be built; the aim of the lesson is to guide students in the design process.

What do we want from our vegetable garden? What fresh foods do members of the class like to eat? Take a survey of the class and find out one thing from each student that they would like to grow in the garden.

Where could we put it? This should be specific to your location, in the city there may be spaces for raised garden beds or a community garden, you may have an area in the school yard that is not used much. If you are lucky enough to already have a garden at your school you could plan to expand it.

Where can we find out how and when to grow each of the things that we would like to harvest? Eg a seed packet provides a lot of information about preferred amount of sunlight, soil types, water requirements, time to plant and spacing (see image); or perhaps a website that allows you to look up planting times for your area.

✏ Suggested activities

In learning journals, or in student books record the results of the survey, design process and draw a diagram of the planned vegetable garden.

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Take it further

Research the process community groups and others have followed in the planning of their vegetable gardens.

Next

How did the Macarthurs research the farming enterprises that they were interested in starting at Belgenny?

Note if you are planning on using the interactive timeline in learning experience 2 you will need to download a viewer before starting the lesson; alternatively you will need the pdf version from our website.

Learning experience 2

Aim: The Macarthurs were influential in the early colony because they trialled a range of agricultural enterprises. This lesson considers the sorts of information that was available to them and compares this to how we would research a new enterprise today.

Learning intention

Students will be able to discuss one significant enterprise trialled at Camden Park and where information was sourced in planning the venture.

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Review

The process of planning a vegetable garden in Learning experience 1.

Discuss / Investigate / View

View the interactive timeline (or the pdf version). As this unit is aimed at addressing the information strand—the amount and quality of information available to the Macarthurs is a focus for the discussion as you view the resources. Of particular note are the study tours undertaken by Elizabeth Macarthur Onslow in 1887 to research dairy production (she returned and transformed dairying at Belgenny) and by William Macarthur in 1815 to research winemaking before planting the first vineyard at Belgenny.

Suggested activities

As you view the resources students will be able to record some information in their learning journals or notebooks.

Ask students to consider how they would research a new farming enterprise. In groups have students compare and contrast where or how they can access information compared to how the Macarthurs researched new products or technology.

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Take it further

Ask students to imagine a newly discovered crop that is going to feed all the people of the world. The growing conditions are quite specific though, so how are they going to communicate this to the people that will be growing this new crop?

Interesting Note: a lot of the information that we have about Macarthur operations comes from newspaper articles written at the time to share information. That information may have taken days or even weeks to reach other farmers after it was written and published.

Next

Changes have occurred in the area since European settlement using aerial imagery as a source of information.

Learning experience 3

Aim: Students will look at Belgenny Farm from a geographical perspective and consider the features that were present before the Macarthurs arrived, and those that have developed in more recent times. They will also talk about the sorts of information that farmers have access to now to assist them in running their businesses.

Learning intention

Students will be able to name one natural feature present before arrival of the Macarthurs, one Macarthur structure and one modern development. They will also be able to discuss one source of information that modern farmers have access to that the Macarthurs didn't.

Review

Review the need for planning and gathering information to inform a design process.

Discuss / Investigate / View

View the Belgenny Farm site online (Google Maps, Six Maps or iPad app—or a map is available on our website). Viewing and discussing the benefits of online maps will add value to student's learning.

Discuss which features of the Belgenny environment are natural and which are built. Can students identify those that would have been there before the British came to Australia? Which are more recent?

Listen to the audio file on Sound Cloud (link) or read the transcript in the Appendix. These describe the changes to the area around Belgenny Farm since European settlement.

Ask students to consider what they think the Macarthurs would have brought with them when they arrived to start farming in the Camden area. Discuss with the class the idea that the Macarthurs probably travelled by boat along the river to Parramatta and then by horse and cart to Camden, bring with them a few supplies needed to build a cottage, plant vegetable gardens for food, raise animals for slaughter and milking. Think about how they changed the environment to suit their needs.

Consider information that is available to farmers now, to decide the best places for certain crops and enterprises, including climate records, flood records, access to weather predictions, testing for pests and disease, soil analysis, results of others attempts with enterprises.

The NSW Department of Primary Industries website contains a lot of information useful to farmers—if you have time to look at it students will gain an understanding of how much information is available to farmers (link). The Office of Environment and Heritage also offer advice about environmental management and climate change (link).

This is a good opportunity to discuss with students the reliability of where their information comes from. Australian Government websites are subject to strict controls and are considered safer sources of information than unknown and unattributed sites. For more information see The Office of Children's eSafety website (link).

✐ Suggested activities

In learning journals ask students to colour code the features of the map provided. Green for the natural features (river, hills, vegetation), orange for the Macarthur features (Belgenny, Camden Park, older roads, railway) and blue for the modern features (residential areas, highway, roads).
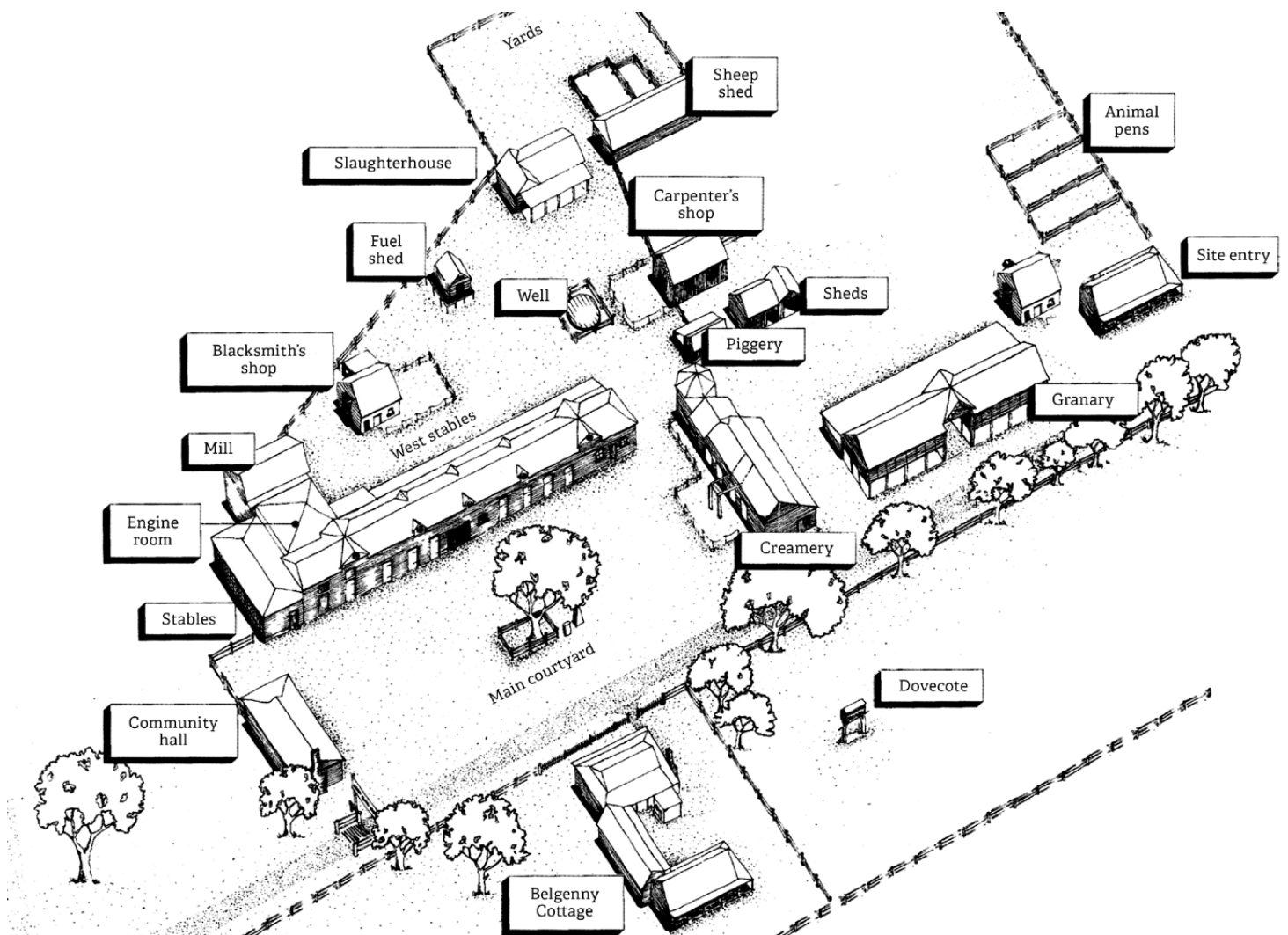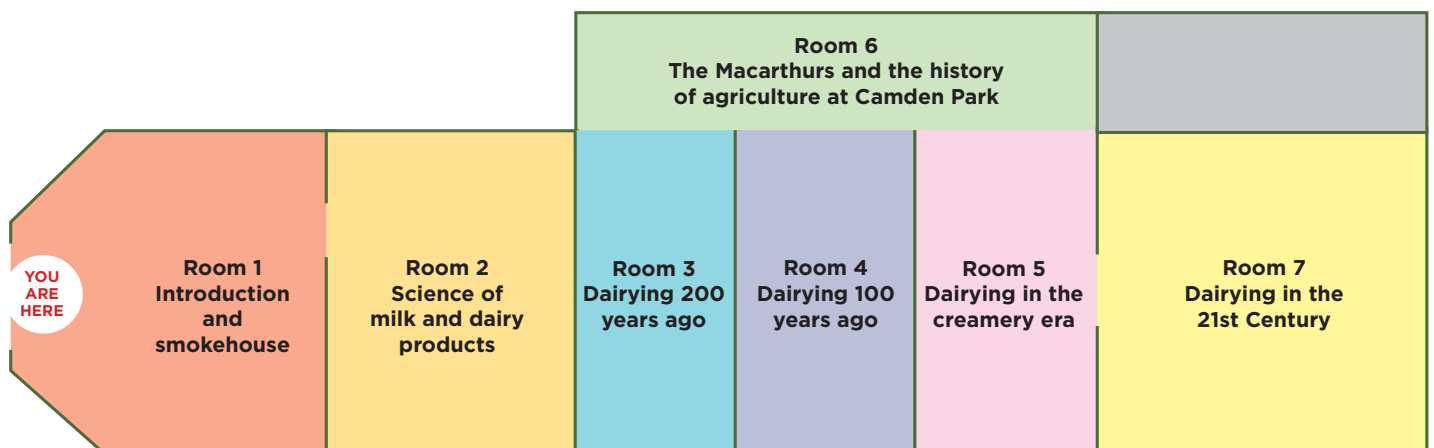
Next

The site visit.

Learning experience 4:
Map of site

Guide to Creamery

		Room 6 The Macarthurs and the history of agriculture at Camden Park			
YOU ARE HERE Room 1 Introduction and smokehouse	Room 2 Science of milk and dairy products	Room 3 Dairying 200 years ago	Room 4 Dairying 100 years ago	Room 5 Dairying in the creamery era	Room 7 Dairying in the 21st Century

Learning experience 4:
The site visit

Note: If you decide not to take learning journals with students on a site visit there are online resources available for you to review with students once you are back in the classroom.

Room 1 - Smokehouse

This room is the smokehouse, it was not originally connected to the buildings next to it. Look at the poster on the wall that shows the development of this structure. The Coach House was built in the 1820s, this smokehouse in the 1830s or 40s and they were connected some time before the 1960s. The upper level a bit further along the building was added in 1898. But how do we know that? This information is gathered from photographic evidence, historic survey maps and sometimes and sometimes old newspaper articles report on developments.

Optional learning journal activity

In your learning journal there is a diagram of the development of this structure. Can you connect the building with the source of the information?

Room 2 - Science of milk

Milk is a natural product produced by mammals to feed their young. Humans use milk from animals including cows to meet their nutritional needs, and from that milk we also get cream, cheese, butter, yogurt and a lot of other products. Even though it is a natural product people can get sick from drinking milk that has not been stored correctly. In fact before refrigeration and the milk treatment processes that we have today, people were getting sick from drinking milk but they didn't know that milk was the cause. People working scientifically figured out that it was the milk that was not being milked or stored in clean conditions or not kept cool enough that was making people sick. They discovered that if they treated the milk by pasteurising it (heating it and cooling it quickly) and storing it at low temperatures that it is safer to drink. The research and development of milk and treatment processes is a really good example of people using information and working scientifically to keep us well.

Optional learning journal activity

Look at the notice from the NSW Food Authority about Raw Milk as an example of how the government communicates important information to us. In your learning journal circle the parts of the notice that tell you that the information comes from the government and the places where you would be able to find out more details about the notice.

Room 3 - Dairying 200 years ago

200 years ago farmers didn't have computers to find information and record their farm operations but they still had to do those things. On one of the posters on the wall is an example of how the Macarthurs recorded their milk/cream sales/totals. And that was just one aspect of the farm operations, all the staff hours and pay were recorded, all aspects of farming enterprises are monitored and recorded. Additionally, negotiations with livestock and produce agents or people selling equipment was mostly done through handwritten letters. Why do you think this was? (no phones, computers or electronic devices to transfer information as we have today). How do you think farmers today communicate with others to buy and sell products?

 Optional learning journal activity

In your learning journal have a go at completing part of the record from a farm worker … imagine how much time it took to do all that recording! Later in your visit you will see how much easier that is for farmers now!

Room 4 - Dairying 100 years ago

This room represents the 1900s, roughly the last 100 years or so. Over one hundred years ago dairy farmers started to get better access to machines to help them do their work. In the late 1800s, a mechanical cream separator was installed here at Belgenny and in the 1900s farmers started using milking machines. It was during this time that Australians got better access to information as telephones became more common in homes around the country. And later in the 1960s and 1970s, televisions became more common in people's homes. Through these mediums farmers had better access to information to be able to make farm decisions and to communicate with agents and others they needed to do business with.

 Optional learning journal activity

In your learning journals have a look at the images, can you order the images from oldest to newest?

Room 5 - Dairying in the creamery era

This whole end of the building was constructed in the 1820s as a coach house for horse-drawn vehicles. This section was converted into a creamery in 1898 by adding the upper storey and an elevated water tank. Here the milk was separated into cream and skim milk. Cans of milk were hauled to the top floor from carts parked directly underneath. The milk was tipped into a vat and flowed into a machine called a 'separator'. The cream was taken to Menangle Central Creamery to be sold or made into butter. The skim milk was fed to pigs on Camden Park, which were then eaten by the people living here or sold.

In 1939 the Macarthurs opened the Camden Valley Inn Milk Bar, not far from Belgenny Farm. The milk bar sold Camden Vale Special Milk and milk products as well as Devonshire teas. It was a great way of advertising their products. Advertising is one way of communicating information to your market—the people that you would like to buy your products.

 Optional learning journal activity

In your learning journal have a look at the imaginary advertisement for the Camden Valley Inn, how many products can you see that they might have sold through this outlet?

Room 6 - The Macarthurs

Each of the Macarthur family who are shown here made a special contribution to the development of Belgenny Farm.

 Optional learning journal activity

See if you can match their photos in your learning journal to the development that they were part of.

Room 7 - Dairying in the 21st century

In modern dairies farmers have access to the internet for finding information and to computers to record their farm operations and the health and wellbeing of their cows. In fact in some dairies the computers do the milking as well. In this room you can see what a robotic milking machine looks like. At one stage this milking robot operated in a robotic dairy on Camden Park, just nearby. Robotic dairies are a gentle way of milking cows as the computer that operates the milking machines can tell (by reading the cows identification tag) which cow is in the stall, how long she needs to be milked and how much feed she needs. The computer can also tell if she is getting sick by testing the milk—if a cow is getting sick the farmer can arrange for the vet to come and treat her so she gets well again soon.

Listen to this description of a robotic dairy in Northern NSW 'The system is complex and relies on serious data exchange … With the central computer monitoring the behaviour of each cow, health and milking patterns, service can be tailored to each animal. Cows wear collars with responders that monitor rumination and activity data which is downloaded at the robot each time she comes up to the dairy for milking. This information, along with other data collected every milking, is monitored through reports generated by the system. Newly calved cows might milk three or four times in a day, those midway through their lactation are milked at least twice and those cows at the end of their lactation cycle may be milked just once. Grain is fed more or less—to the gram—depending on recent milking results and the computer makes adjustments as per the program. As cows move out of the paddocks and towards the dairy they are directed by "Grazeways" or gates. If a cow craves another feed of pellets and decides to go back to the dairy before her udder is full, the computer will register that fact, and she negotiates a network of pneumatically controlled traffic gates, and before long she is back on grass. Cows ready to milk can go to the dairy any time of the day or night, and most of the herd will travel through the dairy during the night. Once in the bails, with a precise amount of feed in the bowl, the robot arm moves under the cow, rotating brushes stimulate the teats, and help "milk let down" with their gentle action. Her udder and teat placement is already mapped and the arm looks for their location, and then the cups go on while the cow is standing comfortably eating in the "box". After milking, cows have the option to stand under a rotating brush and have their neck massaged. Any cows detected with ailments, such as mastitis, are automatically drafted to the herd health pen, to await attention from their human handlers. "If a cow is healthy and going through the system you don't see them," Tony said. [note: this is from a *Rural Weekly* story that you may choose to show students on your return to school link]

Optional learning journal activity

In your learning journal there are three cows entering the milking shed, one has a full udder, one has just been milked and one is not feeling well. Draw a path through the gates to guide each cow to where she needs to go.

Learning experience 5

Aim: Review of the site visit and learning journals. This lesson will draw together the information gathered onsite and consider the changes in information available to farmers and how that can assist their operations.

Learning intention

Students will be able to discuss three ways that access to information has improved the operation of the dairy at Belgenny Farm, for example, less trial and error, better weather forecasting, growing areas for supplementary feeding, knowledge about nutritional needs of cows.

Review

Review the site visit and ensure that students have a chance to ask questions about things they didn't understand or didn't find out at the time of their visit. Talk about the comparison between different 'eras' of production represented in the different rooms and on the different pages of their journals. How was information collected and used?

Discuss / Investigate / View

Discuss with students the information they needed to plan the vegetable garden. Ask students to think about the ways that this information has been or is being collected and distributed in dairy farming. Do they think this also applies to farming decisions? If yes, where can farmers access this information today? Things to consider, climate, water, animal's preferences/where they thrive, soils.

As a group decide on something that students would like to have on their farm… it might be something that they planned for in the vegetable garden in learning experience 1 or perhaps an animal.

Ask students to suggest where they could find information about the product and together undertake a quick survey of what will be required to grow the product. You may choose for small groups to collect information on the product from different sources (websites, library, personal communication). Small groups should report back on the information they collected about the product and whether the research method they used was practical and reliable. Record the research process in learning journals.

Regroup and discuss the reliability of the information found—is it current? Is the source reliable? How do you know?

Suggested activities

Record findings in learning journals or student notebooks.

Take it further

Questions to discuss:
- What happens or has happened in the past when properties are sold? Where does all the knowledge about the farm go?
- Do you think that the Macarthurs could have taken advice from the local Aboriginal people about farming at Camden? Ask students to consider the types of food the two groups ate, how well they communicated, their different lifestyles.

Next

Students will research an animal that they will use as the basis of a story book.

Learning experience 6

Aim: This learning experience encourages students to use a respected website to gather information—in this case they will be researching factual information about an animal to use as a character in a story.

Learning intention

Students will be able to describe several sources of information available to farmers when considering agricultural enterprises.

Review

Review the products students chose for their farm and places they might access information about them.

Discuss / Investigate / View

One way that information is distributed to young children is through stories and picture books. In this learning experience students will research an animal and write a picture book about it to share with younger students. As a class discuss the information that would be useful in planning a story for younger students.

If you have a preferred website to research feel free to use that, otherwise the Animals in Schools website (link) or the NSW Department of Primary Industries (link) will provide a number of options for students to make their choice.

Depending on your students, you may like to do this as a class or give students a choice in the animals that they research individually or pairs or groups. Keep in mind that they will use this information to inform the writing activity in the next learning experience.

The following process is an example for you to show the students how they could research and collect information for their story books:

- Choose an animal.
- Browse through the information that is available and assist students to record the information in their learning journals. The information on the DPI website is aimed at people who are considering raising animals—often commercially—you might need to assist students in extracting information to record in their learning journals. On the Animals in Schools website there are tabs under the species heading to provide more information including their preferred environment, food etc.
- Brainstorm with students other information that may be useful eg does the weather in your area suit the animal type (4A?), does your region suit their preferred diet? Do you have enough space for them? What would the animal do at different times throughout the day?
- Discuss how this information might be conveyed in a picture book.

✏️ Suggested activities

Record students research in the learning journals.

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Take it further

Have a look at related links to see what other information is available on raising animals. Take a moment to reflect on how brave the Macarthurs were when trialling new enterprises, often with limited access to information.

Next

Writing the picture book.

Learning experience 7

Aim: Students will write a story about a day in the life of a farm animal—aimed at entertaining younger students in the school while teaching them about the needs of that animal.

Learning intention

Students will produce a story based on an imaginary character that conveys the information that they have learned about an animal and its normal routine, behaviours and features.

If time is short this activity can be completed as a joint construction.

Review

Talk to students about the idea of communicating information via fictional stories such as picture books with animals as the main character. They often tell us a lot about animals as do movies like *Charlotte's Web* or *Babe*.

Discuss / Investigate / View

Discuss the idea that the aim of this exercise is to share information with younger students. So the information that they sourced in the last learning experience should be conveyed in their stories.

View the [Tocal Farms picture books on YouTube](#). These stories are written to share agricultural information with young students. Share some model texts eg *Diary of a Wombat* by Jackie French, *Olga the Brolga* by Rod Clemment, *The Best Beak in Boonaroo Bay* by Narelle Oliver—some of these are available online.

Ask students to think of a character and a name for the animal they researched in learning experience 6—list some of the information they can share with younger students. Discuss the importance of the story being written appropriately for the age and in an entertaining way—discuss differences between informative text type eg NSW DPI website and a story book.

Give students a choice in how they present the information—hand drawn or hand written story, a graphic novel style digital text, an audio file recording or a scripted play. The activity can be completed in groups, pairs or individually.

Take it further

Students share their stories with their younger peers.

Appendix 1

Australian Curriculum outcomes

Science:

Compare characteristics of living and non-living things and examine the differences between the life cycles of plants and animals AC9S3U01

Write and create texts to communicate findings and ideas for identified purposes and audiences, using scientific vocabulary and digital tools as appropriate AC9S3I06

History:

Causes and effects of changes to the local community, and how people who may be from diverse backgrounds have contributed to these changes AC9HS3K01

The experiences of individuals and groups, including military and civilian officials, and convicts involved in the establishment of the first British colony AC9HS4K03

Geography:

The importance of environments, including natural vegetation and water sources, to people and animals in Australia and on another continent AC9HS4K05

English

Plan, create, edit and publish imaginative, informative and persuasive written and multimodal texts, using visual features, appropriate form and layout, with ideas grouped in simple paragraphs, mostly correct tense, topic-specific vocabulary and correct spelling of most high-frequency and phonetically regular words AC9E3LY06

Appendix 2

Transcript of the reading adapted from Vernon Wood, Richard (2010) Birthplace of Australian Agriculture Belgenny Farm. Belgenny Farm Trust.

Belgenny Farm

A wonderful convergence of good soil, plentiful fauna, a freshwater river, ponds, forest and natural beauty made Belgenny a desirable place to live, work and to exploit during three distinct eras of occupation. Over thousands of years the Dharawal shaped the landscape from the coast inland to near Camden. Their presence is recorded in rock engravings, cave paintings, and in stories about the land and its people. The name Belgenny is a variation of benkennie or binhinny, a word used by the Dharawal traditional owners. It means the dry land. The Dharawal influence was eventually overwhelmed by the British who came here in 1795 in search of a herd of cattle that had strayed from Sydney in 1788. To British eyes, the landscape of forested hills and fenceless pasture, teeming with wildlife and dotted with Cabbage Gums that had been tended by Dharawal, Gundungarra and Dharuk people, appeared utopian and untouched. They named it the Cowpastures, and the area became a popular destination for dignitaries and officers from Sydney keen to see the escaped cattle herd, which by 1801 numbered more than 500 head. They studied the landscape and no doubt admired the scenery. It also became the haunt of escaped convicts who had gone bush. In 1805, John Macarthur was granted just over 2000 hectares of land specifically for the development of a wool industry. He chose a section of the Cowpastures, the best land available in the Colony of New South Wales, and named it Camden after Lord Camden in England who had recommended the grant. The property later became known as Camden Park. The Macarthur family became preeminent in the development of Australias colonial agriculture. At Belgenny Farm they pioneered fine wool sheep breeding, wool processing for export, grape growing, and wine making, silk production, fruit growing and horticulture, grain growing and refrigerated and mechanised dairying. The familys intensive and experimental farming over 168 years transformed the landscape and included the construction of many state of the art agricultural buildings that remain intact today. Most of Camden Park, the section we now call Belgenny Farm was sold in 1973. But, recognising its significance to history, architecture and agriculture, the NSW government bought back 1583 hectares in 1984 and built the Elizabeth Macarthur Agricultural Institute in 1990. This third era of occupation saw the reintroduction of the name Belgenny and the re-establishment of the farm as a place of agricultural innovation. It also ensured the preservation of its buildings and of a site significant to the Dharawal traditional owners and the Macarthur family.