Australian Good Meat Education resources are developed by

MEAT & LIVESTOCK AUSTRALIA

7–8 | LESSON PLAN

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Lesson 2

Feeding strategies and product quality

AUSTRALIAN CURRICULUM CONTENT



Analyse how food and fibre are produced in managed environments and how these can become sustainable. (ACTDEK032, AC9TDE8K04)

Generate, test, iterate and communicate design ideas, processes and solutions using technical terms and graphical representation techniques, including using digital tools. (ACTDEP036, AC9TDE8P02)

LESSON OBJECTIVE

Students will learn about the different feeding strategies of cattle and sheep and the effect on quality when producing food products. Students will also investigate the relationship between ruminants and feeding strategies and the effect on red meat quality.

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Lesson 2

LESSON OVERVIEW

Activity 2.1	Feed me!	10 mins
Activity 2.2	Pasture and fodder scavenger hunt	30 mins
Activity 2.3	The relationship between feed and product quality	15 mins
Activity 2.4	Online learning task: Ruminant digestion	20–30 mins

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Resources and equipment

ACTIVITY 2.1 – Feed me!

1. Stimulus 2.1a – *Types of feed for cattle and sheep in Australia*.
2. Worksheet 2.1a – *Cattle and sheep – What do they eat?*
3. Australian Grain Fed Beef - What are cattle fed at a feedlot? (1.41).

ACTIVITY 2.2 – Pasture and fodder scavenger hunt

1. Worksheet 2.2a – *Feeding strategies for cattle and sheep mix up*.
2. Worksheet 2.2b – *Feeding strategies for cattle and sheep. NB. Print on A3, or students copy page 2 onto cardboard or butcher's paper prior to the start of the activity.*
3. Scissors, sticky tape, glue.
4. Small plastic bags (2x per student).
5. Selection of grains, e.g. barley, wheat, oats, dried corn, rice - in individual labelled bags or containers.
6. Selection of supplements, e.g. hay, straw packaging, honey/golden syrup/rice malt syrup - in individual bags or containers.
7. Spoons.
8. Pestle and mortars.

   NB. Please be advised that grasses and grains used here may cause allergies in susceptible students. Complete a risk assessment prior to performing this activity.

ACTIVITY 2.3 – The relationship between feed and product quality

1. Worksheet 2.3a – *The relationship between feed and product quality*.
2. Australian Grain Fed Beef - Compliments from the chef (1.28).
3. The Marbling in Beef (0.55).
4. MSA Grading Beef (5.29).
5. Computer/digital device access.

***Resources and equipment** continued next page*

Resources and equipment *continued*

ACTIVITY 2.4 – Online learning task: Ruminant digestion

1. Computer/digital device access of Lesson 2 Online learning task.
2. Ruminants – Natural Science.
3. Ruminant Facts for Kids.

ADDITIONAL READING/RESOURCES

- Pasture species | Agriculture and Food.
- An introduction to the Australian feedlot industry.
- Australian Grain Fed Beef - Nourishing cattle, land and communities.
- Ruminant Digestion.

Lesson guide

ACTIVITY 2.1 – Feed me!

a. Facilitate a discussion about what cattle and sheep eat, recording ideas in a central area.

b. Show students pictures of native, exotic/introduced pastures and improved pastures Stimulus 2.1a - *Types of feed for cattle and sheep in Australia* and discuss the features of each. Ask students to consider the appearance of the plant material - leaf size and shape, similarities and differences between the types, and why farmers may feed animals different types of nutrition. (Answers page 18)

c. Describe the use of supplementary feeding on farms, including: feeding grain, hay, molasses, urea, and protein, such as cotton seed, etc. Discuss when this type of feeding might be necessary (drought, meeting market requirements/specifications) (Stimulus 2.1a - *Types of feed for cattle and sheep in Australia*).

d. View the video clip Australian Grain Fed Beef - What are cattle fed at a feedlot? (1.41).

e. Students read and highlight important components in the text Worksheet 2.1a – *Cattle and sheep – What do they eat?*

ACTIVITY 2.2 – Pasture and fodder scavenger hunt

a. Distribute Worksheet 2.2a – *Feeding strategies for cattle and sheep mix up*, and Worksheet 2.2b – *Feeding strategies for cattle and sheep*. Students complete the cut and paste task using both worksheets to match the type of food with its correct picture and definition. (Answers page 19–20)

b. Students participate in a 'scavenger hunt' by going outside to either take photos or collect samples of grasses as examples of native pastures, exotic/introduced pastures and improved pastures. Remind students of the features of each pasture type and encourage them to locate plants that are similar in features.

c. Place the suggested grains and supplementary feed in individual labelled containers or bags around the classroom.

d. Students mix their own grain rations by taking small amounts from the containers and using a mortar and pestle to grind them. They should also choose a supplementary feed upon their return and place these in small plastic bags.

e. Using Worksheet 2.2b – *Feeding strategies for cattle and sheep*, students use glue or tape to attach their samples of three different pasture types collected (grain ration and supplementary feed) to the worksheet. Alternatively, photos may be taken, printed and stuck to the worksheet. (Answers page 20)

f. Students present their samples to the class and then display them in the classroom.

***Lesson guide** continued next page*

Lesson guide *continued*

ACTIVITY 2.3 – The relationship between feed and product quality

a. Facilitate a discussion about how the feed that cattle and sheep consume is transformed into food (meat and fat) that humans eat. Draw a simple food chain in a central area showing how energy is transferred.
   - pasture/grain ----> sheep ----> human
   - pasture/grain ----> cattle ----> human

b. View the video clip Australian Grain Fed Beef - Compliments from the chef (1.28) and facilitate a discussion about how the food animals eat (pasture and grain) influences the quality of their muscle/meat.

c. Distribute Worksheet 2.3a – *The relationship between feed and product quality.* Students answer questions on the mind map using a think, pair, share strategy.
   - Students think about their responses to the questions and record their ideas on the worksheet;
   - After 5 minutes, form pairs and share ideas;
   - Both students record more detailed responses on their own worksheet. (Answers page 21)

d. d. View the video clips The Marbling in Beef (0.55) and MSA Grading Beef (5.29) and discuss these in terms of the feed the animal might be given during its lifetime.

ACTIVITY 2.4 – Ruminant digestion

a. Students access Online learning task 2 and complete the provided activities focused on the ruminant digestive system. (Answers page 22)

Student resources

ACTIVITY 2.1 – Feed me!

Stimulus 2.1a	Types of feed for cattle and sheep in Australia
Worksheet 2.1a	Cattle and sheep – What do they eat?

ACTIVITY 2.2 – Pasture and fodder scavenger hunt

Worksheet 2.2a	Feeding strategies for cattle and sheep mix up
Worksheet 2.2b	Feeding strategies for cattle and sheep

ACTIVITY 2.3 – The relationship between feed and product quality

Worksheet 2.3a	The relationship between feed and product quality

ACTIVITY 2.4 – Online learning task: Ruminant digestion

Lesson 2 Online learning task	Ruminant digestion

Stimulus 2.1a

Types of feed for cattle and sheep in Australia

Native pasture



Cattle in native pasture. Grass appears brown and fibrous.



Soft spinifex grass (*Triodia pungens*)[1]
(image from agric.wa.gov.au/rangelands/soft-spinifex-plain-pastures-pilbara-western-australia)

***Stimulus 2.1a** continued next page*

Stimulus 2.1a continued

Stimulus 2.1a

Exotic/introduced pasture



Panic grass. Grass appears luscious and has a large leaf size
(image from agric.wa.gov.au/pasture-species/panic-grass-southern-western-australia?nopaging=1)



This pasture shows a mixture of introduced and native species
(image from lls.nsw.gov.au/our-regions/central-west/articles-and-publications/crop-production/establishing-tropical-grasses)

***Stimulus 2.1a** continued next page*

Stimulus 2.1a continued

Stimulus 2.1a

Improved pasture



Sheep in a pasture containing grass and vast amounts of clover (a legume)



Pasture mix containing grass and clover

Stimulus 2.1a continued next page

Stimulus 2.1a continued

Stimulus 2.1a

Supplementary feed



Cattle in a pasture, feeding on straw



Hay bales

Stimulus 2.1a continued next page

Stimulus 2.1a continued

Stimulus 2.1a

Grain feed (e.g. supplied in feedlots)



Cattle feeding on a mixed grain ration in a feedlot



Milled, mixed feedlot ration

Worksheet 2.1a

Cattle and sheep – What do they eat?

Sheep and cattle in Australia are mostly pasture-fed.



Pastures are balanced communities of plants that provide grazing animals with food. They are usually a mixture of plants, which include both grasses and legumes. The grasses provide carbohydrate and energy for the grazing animal and legumes provide protein, essential for growth and repair.

There are many different types of pastures in Australia. They can be **native pastures, exotic/ introduced pastures or improved pastures.**

Native pastures are predominantly made up of grasses and other plants that originated in Australia, such as wallaby and kangaroo grasses, spinifex and saltbush. These plants are adapted to the dry conditions and nutrient poor soils of Australia and don't offer as much nutritional value to grazing animals as other pasture types. Their leaves are thin and they are very fibrous.

Another type of pasture in Australia is an **exotic** or **introduced** pasture, which is made up of grasses and other plants that were introduced from overseas. They have a higher nutritional value than native pastures. The leaves are larger, greener, less fibrous and contain more moisture than native grasses. They provide grazing animals with a higher quality feed, and therefore, better nutrition. These pastures are generally more productive and have a higher carrying capacity than native pastures. They can only survive in certain areas depending on the climate, soil type and rainfall.



Worksheet 2.1a continued next page

Worksheet 2.1a continued

Worksheet 2.1a

Both native and exotic/introduced pastures can be **improved** by adding plant species such as legumes to the pasture to provide grazing animals with increased protein, which is essential for their growth, whilst also enriching the soil with nutrients (which helps the pasture to grow). Bacteria called rhizobia live in the roots of legumes, such as clovers and medics and are able to convert the nitrogen gas from the air into nitrogen in a form that the plants can use.



Sometimes pasture alone is not able to support the grazing animal's nutritional needs for it to continue growing at the desired rate, so **supplementary feed**, such as protein meals and high-protein seeds (cottonseed and lupins and molasses/urea mixes) are given. This is often the case during drought when there is poor quality dry feed available.

Grains, such as barley, wheat and sorghum, are often given, to beef cattle, to increase weight and fat deposition prior to processing. This grain feeding typically occurs in feedlots - areas where animals are housed and fed grain rations to improve their quantity and quality of muscle to meet market specifications prior to processing.



PLEASE NOTE: This activity requires single-sided printing

Worksheet 2.2a

Feeding strategies for cattle and sheep mix up

The different feeding strategy types have been mixed up below. Cut out each box and paste them onto page 2 so that the feeding strategy name, definition and picture matches.



Additional feed given to make up for the main nutrient deficiencies in the paddock feed, e.g. hay, molasses and cotton seed.

Grain feeding /feedlots

Made up of plants, which include legumes (clovers and medics) that have been introduced to increase the quality of the pasture.

Additional feed, such as barley, wheat and sorghum 'ration' given to increase weight and fat deposition prior to processing.



Improved pasture



Native pasture

Made up of mostly plants that were originally brought into Australia.

Introduced/ exotic pasture



Supplementary feeding

Made up of mostly grasses, herbs and shrubs that originated in Australia.



Worksheet 2.2b

Print at A3 size

Feeding strategies for cattle and sheep

Sample					
Picture					
Definition					
Name of feeding strategy					

Worksheet 2.3a

The relationship between feed and product quality

Describe how you can measure meat quality.

Identify what you can use to measure meat quality.

Identify who measures meat quality.

Identify the type of pasture(s) that produce the highest quality meat.

Explain why beef cattle are given grain before they are sent for processing.

List any other thoughts or questions about meat quality.

Define meat quality.



Feed me!

Worksheet 2.1a - Cattle and sheep – What do they eat?

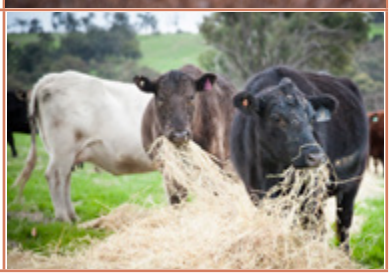
Features of different feed types for discussion with Stimulus 2.1a.

Native pastures	Exotic/introduced pastures	Improved pastures	Supplementary feeding	Grain feeding
Small, thin leaves	Larger leaves, more luscious, often deeper green in colour than native pastures	Contain legumes	May include hay, molasses, high protein grain, such as cotton seeds	Grain rations are generally given in a feedlot
More fibrous than exotic pasture	Less fibrous than native pastures	Medics and clover	Used to satisfy the animals need for protein, energy, roughage and minerals when pasture feed is not adequate	Grains include barley, wheat and sorghum

Activity 2.2

Pasture and fodder scavenger hunt

Worksheet 2.2a – Feeding strategies for cattle and sheep mix up

Native pasture	Made up of mostly grasses, herbs and shrubs that originated in Australia.	
Introduced/ exotic pasture	Made up of mostly plants that were originally brought into Australia.	
Improved pasture	Made up of plants, which include legumes (clovers and medics) that have been introduced to increase the quality of the pasture.	
Grain feeding/ feedlots	Additional feed, such as barley, wheat and sorghum 'ration' given to increase weight and fat deposition prior to processing.	
Supplementary feeding	Additional feed given to make up for the main nutrient deficiencies in the paddock feed, e.g. hay, molasses and cotton seed.	

***Answers 2.2** continued next page*

Answers 2.2 continued

Activity 2.2

Worksheet 2.2b - Feeding strategies for cattle and sheep

Name of feeding strategy	Suggested sample(s)
Native pasture	Dry, brownish grass with small, thin leaf size
Introduced/exotic pasture	Lush green, large leafed grass
Improved pasture	Lush green, large leafed grass and clover or other medic
Grain feeding/feedlots	Barley, wheat, oats, dried corn, rice
Supplementary feeding	Hay, cotton seeds, honey/golden syrup/rice malt syrup to represent molasses

Activity 2.3

The relationship between feed and product quality

Worksheet 2.3a – The relationship between feed and product quality

Define meat quality.

Various answers:
how tasty it is;
how marbled it is;
the colour of the meat;
the colour of the fat;
the amount of fat;
how tender or chewy.

Describe how you can measure meat quality.

The agriculture industry calls the methods of measuring quality 'market specifications'

Identify what you can use to measure meat quality.

By looking at the specifications:
marbling;
breed of cattle (how much tropical breed they have in their genetic make-up);
ossification;
rib fat.



List any other thoughts or questions about meat quality.

Various answers.

Identify who measures meat quality.

Meat Standards Australia (MSA) accredited graders.

Explain why beef cattle are given grain before they are sent for processing.

Producers do this to achieve a consistent supply of quality meat that meets market specifications for weight/marbling and fat scores/fat colour.

Grain fed beef also is more desirable in some markets and returns a higher price.

Identify the type of pasture(s) that produce the highest quality meat.

Better quality pasture = better quality product.

Improved pastures provide more protein for animals to convert into muscle.

Activity 2.4

Online learning task: Ruminant digestion

1. The four digestive cavities or chambers in ruminant animals are
   - Rumen
   - Reticulum
   - Omasum
   - Abomasum
3. Materials used may include
   - Straws
   - Balloons
   - Tubing
   - Cardboard toilet paper roll
   - Plastic bags, etc.
4. Various different models.