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Technology and food from the farm



AUSTRALIAN CURRICULUM CONTENT

Describe the ways food can be selected and prepared for healthy eating.
(ACTDEK012, AC9TDE4K04)

Examine design and technologies occupations and factors including sustainability that impact on the design of products, services and environments to meet community needs.
(ACTDEK010, AC9TDE4K01)

LESSON OBJECTIVE

Students will learn about the benefits of food technologies to provide safe and healthy food for consumption and the labels associated with buying red meat through hands-on activities.



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Lesson 6

LESSON OVERVIEW

Activity 6.1	Keywords	10–20 mins
Activity 6.2	Technologies for food safety	30–40 mins
Activity 6.3	Labelling on red meat products	30–50 mins
Activity 6.4	Just for fun	20 mins

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Resources and equipment

ACTIVITY 6.1 – Keywords

1. Worksheet 6.1a – *Keywords and definitions.*
2. Worksheet 6.1b – *Keywords scramble.*
3. Worksheet 6.1c – *Keywords spelling list.*
4. Timer.

ACTIVITY 6.2 – Technologies for food safety

1. Stimulus 6.2a – *Technology and red meat food safety – storage.*
2. Stimulus 6.2b – *Teacher background information on technology and red meat food safety.*
3. Stimulus 6.2c – *Technology and red meat food safety – packaging.*
4. Play dough or modelling clay (approximately 500g), tongs, plastic produce bag, plastic or polystyrene tray, clean plastic meat tray, cling film, electric vacuum sealer or zip lock bag and scissors.
5. Worksheet 6.2a – *Technologies for food safety.*
6. Worksheet 6.2b – *Packaging for safe storage of red meat.*

ACTIVITY 6.3 – Labelling on red meat products

1. Stimulus 6.3a – *Red meat labelling.*
2. Worksheet 6.3a – *Design a meat label.*
3. Coloured pencils, scissors.
4. Optional: glue sticks, paper, recycling materials, such as empty food boxes and containers.

ACTIVITY 6.4 – Just for fun

1. Worksheet 6.4a – *Label scavenger hunt.*

ADDITIONAL READING/RESOURCES

- [How long can you store cooked meals, meat, dairy and fruit and vegetables? – ABC Everyday.](#)
- [How to freeze, defrost and reheat beef | Australian Beef – Recipes, Cooking Tips and More.](#)
- [Red meat joins the war on waste.](#)
- [Shelf life of Australian red meat.](#)



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Lesson 6

Lesson guide

ACTIVITY 6.1 – Keywords

1. Distribute Worksheet 6.1a – *Keywords and definitions* and read through the text with students. Allow time for students to individually re-read the words and then allocate students into pairs. Set a five-minute timer and ask pairs to practise recalling the meaning of the keywords with each other. After five minutes, provide pairs with Worksheet 6.1b – *Keywords scramble*. Students work together to unscramble the keywords. (Answers page 23–24)

Optional: Provide students with Worksheet 6.1c – *Keywords spelling list*.

ACTIVITY 6.2 – Technologies for food safety

1. To introduce the topic of food safety as a class, brainstorm the following questions and record ideas in a central area:
 - If your family eats meat, where do they purchase it from?
 - Can you think of any other places where people buy meat?
 - What is red meat? Are there other colours of meat?
 - Where does the retailer or shop owner store red meat?
 - Where do you store raw red meat at home?
 - Do you store it somewhere else when it is cooked?

- Can you think of any technologies that solve the problem of food spoiling and becoming unsafe for people to eat? (Answers page 25)

Summarise the above questions by explaining that; *meat needs to be kept cold, (below 5 degrees celsius) to slow the growth of microorganisms, such as bacteria and fungi (pathogens), which cause meat to spoil and render it unable to be eaten safely. Meat also needs to be packaged in such a way to exclude the presence of food spoilage microorganisms.*

2. Display images from Stimulus 6.2a – *Technology and red meat food safety* information from page 1 of Stimulus 6.2b – *Teacher background information on technology and red meat food safety*. This information shows students the development of technologies in meat storage to increase the ‘shelf life’ (the amount of time that can pass before meat spoils) of red meat over time.
3. Shape a large piece of playdough or modelling clay to resemble roughly four equal-sized pieces of red meat, such as steak or a small amount of mince.

Lesson guide continued next page



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Lesson 6

Lesson guide *continued*

4. Introduce the concept of packaging and how it influences the shelf life of food products. There are various ways that advancements in technology have improved packaging, and therefore a product's shelf life, over time. Display the packaging images from Stimulus 6.2c – *Technology and red meat food safety – packaging*, and the information from page 2 of Stimulus 6.2b – *Teacher background information on technology and red meat food safety*. Demonstrate to students the various ways that red meat can be packaged for sale at the butcher, supermarket or other retail outlets. As the demonstration is taking place, ask students to pay attention to how much (potentially microorganism containing) air is surrounding the meat in each method of packaging and how this may influence its shelf life.
- Demonstrate different ways of packaging red meat:
- **Plastic bag** – using tongs, place the playdough 'meat' in an open plastic bag such as a produce bag from the supermarket, or butcher.
 - **Overwrapped** – using tongs, place the playdough 'meat' on a piece of cardboard or a plastic/polystyrene tray and wrap cling film plastic over the 'meat' and the tray itself.
 - **Vacuum packaging** – using tongs, place the playdough 'meat' in a vacuum seal bag and withdraw the air using an electronic vacuum sealer. Alternatively, use a plastic zip-seal bag and withdraw the air using your hands. Explain to students that this process is performed by machines in a factory to vacuum or suck out the air in the packaging.
 - **Modified atmosphere packaging** – using tongs, place the playdough 'meat' on a clean, plastic meat tray. Place a layer of plastic cling film over the top of the tray and trim to size. Explain that an optimal amount of carbon dioxide gas and oxygen gas would be pumped into the tray before the plastic is sealed onto the tray. This method traps the gases inside the tray with the meat. Glue the trimmed plastic to the top of the tray to demonstrate sealing the packaging.
5. Discuss the more sustainable new packaging technologies currently being developed, with the aim of reducing the amount of plastic used in packaging, as well as moving towards compostable packaging.
6. Distribute Worksheet 6.2a – *Technologies for food safety*. Instruct students to draw a line to match the name of the technology with its description and another line to its picture. (Answers page 26)
- Optional: Worksheet 6.2b – *Packaging for safe storage of red meat*. (Answers page 27–28)

Lesson guide continued next page



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Lesson 6

Lesson guide *continued*

ACTIVITY 6.3 – Labelling on red meat products

1. As a class, brainstorm the following questions and record ideas in a central area:
 - Why do you think we have labels on the food that we buy in the supermarket?
 - What sort of information is shown on food labels? (Answers page 29)
2. Project (or distribute) Stimulus 6.3a – *Red meat labelling* and explain that there are a number of pieces of information that are required by law to be printed on all food/packaging sold in Australia. The Australia New Zealand Food Standards Code (the Code) requires that food businesses provide critical information for consumers so they have knowledge of the products they purchase. The following information highlights some of the labelling information required by the Code:
 - Name of the product – to describe the nature of the food.
 - Legibility – in clear English.
 - Date marking – best before (product after this date will lose some quality, but can still be sold and consumed) and use by date (product must be consumed by this date).
 - Name and address of the supplier – includes the packer, manufacturer, vendor, or importer of the food.
 - Country of origin – shows where the food was made or grown.
 - Ingredient listing and percentage declaration – listed in descending order, percentage of ingredients characterising the name of the product is declared.
3. Students take turns coming to the front of the classroom, locating and pointing out the various pieces of information found on the example red meat product label. (Answers page 29)
4. Distribute Worksheet 6.3a – *Design a meat label* and coloured pencils to students. Individually or in pairs, students design a label for a meat or meat alternative product and cut out the label using scissors when it is complete.

Optional – students use recyclable materials to create packaging for their meat or meat alternative product and stick their label to the outside.

ACTIVITY 6.4 – Just for fun

1. To conclude the lesson on technology and food from the farm, students use Worksheet 6.4a – *Label scavenger hunt* and labels from around the home (or provided at school) to find information from a variety of food products. Students may complete the worksheet by writing an answer, drawing or taking a photo to place in each box on the worksheet. (Answers page 29)



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Lesson 6

Student resources

ACTIVITY 6.1 – Keywords

Worksheet 6.1a	Keywords and definitions
Worksheet 6.1b	Keywords scramble
Worksheet 6.1c	Keywords spelling list

ACTIVITY 6.2 – Technologies for food safety

Stimulus 6.2a	Technology and red meat food safety – storage
Stimulus 6.2b	Teacher background information on technology and red meat food safety
Stimulus 6.2c	Technology and red meat food safety – packaging
Worksheet 6.2a	Technologies for food safety
Worksheet 6.2b	Packaging for safe storage of red meat

ACTIVITY 6.3 – Labelling on red meat products

Worksheet 6.3a	Design a meat label
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ACTIVITY 6.4 – Just for fun

Worksheet 6.4a	Label scavenger hunt
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Worksheet 6.1a

Keywords and definitions

Read the keywords and definitions below. Practise saying them once to yourself and then with a partner. Test each other on the meaning of the words.

technology

The use of knowledge to invent new devices and tools.

refrigeration

The cooling of substances or enclosed spaces to low temperatures.

shelf life

The length of time that food can be safely stored.

storage

Keeping things in a special place for use in the future.

packaging

Material used to enclose something.

label

An informative piece of paper or plastic that is attached to an object.

food safety

Handling, preparing and storing food in a way to reduce the risk of becoming sick.





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Worksheet 6.1b

Keywords scramble

Unscramble the keywords below and recall their meanings.

ingpckaag

doof yetafs

aternoigerrif

ogreast



Worksheet 6.1b continued next page



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Worksheet 6.1b continued

Worksheet 6.1b

Unscramble the keywords below and recall their meanings.

ectloogyhn

beall

lfesh ifel





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Worksheet 6.1c

Keywords spelling list

Spell the keywords below.

1.

2.

3.

4.

5.

6.

7.



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Stimulus 6.2a

Technology and red meat food safety – storage

Coolgardie safe



Image: [Museums Victoria](#)

Refrigeration





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Stimulus 6.2b

Teacher background information on technology and red meat food safety

Today we use technology, such as refrigeration, to extend the 'shelf life' of meat.

In the past, it was necessary for meat to be slaughtered and consumed with little delay, especially in the summer months. Until the middle of the 20th century, most homes in Australia had basic refrigerators called Coolgardie Safes in which perishable products, such as meat, fish and milk, were stored. The safes were basically boxes with fly screen walls to prevent flies from contacting the food. These were stored on the verandah to catch any breeze. A wet hessian bag was draped over the walls of the safe and, as the water evaporated, the heat was withdrawn from within the safe and therefore from the food.

Butchers typically slaughtered their own animals or received them from the local slaughterhouse and usually sold the meat the same day. Likewise, the consumer purchased meat and consumed it the same day or the next day, depending on the ambient temperature. Packaging was usually in greaseproof paper.

In the middle of the 20th century, technological advancements meant that domestic refrigerators became more affordable, and when supermarkets began to replace high street shops, meat retailing began changing as well.

Refrigeration slows down the growth of microorganisms, such as bacteria and fungi (pathogens), which cause food to spoil and may cause people to become very sick.

Meat can also be frozen (cooler temperatures than refrigeration) as it further slows down the growth of microorganisms and the shelf life is extended again.



Coolgardie safe



Refrigeration

Stimulus 6.2b continued next page



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Stimulus 5.2a continued

Stimulus 6.2b

Without packaging, meat will spoil very quickly in the fridge or at room temperature.

Meat can simply be placed in plastic bags for consumers to take home. Meat packaged in this way has a very short shelf-life (mince has a shelf life of 1 day).

Meat can also be 'overwrapped'. This is when meat is placed on a polystyrene or plastic tray and wrapped with a flexible plastic wrap.

In the early 1970s, Australia began using 'flexible packaging' based on placing meat in plastic bags and using machines to withdraw the air prior to sealing. This is known as vacuum packaging. The advantage of this type of packaging is that by removing most of the air, which contains microorganisms, the shelf life of meat is increased.

Currently, most pre-packaged meats are packed in a modified atmosphere, which means that the levels of oxygen and carbon dioxide are carefully balanced inside the packaging to ensure that red meat maintains its quality, whilst also increasing its shelf life.

New packaging technologies are continuing to be developed for the red meat industry, with particular interest in using less plastic and more sustainable packaging. For example, Meat & Livestock Australia are working with a company named Corumat to develop a new plastic-free meat tray that is made using upcycled food waste which would be compostable.



Vacuum packaging



New packaging technologies



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Stimulus 6.2c

Technology and red meat food safety – packaging

Overwrapping packaging



Vacuum packaging



Stimulus 6.2c continued next page



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Stimulus 6.2c continued

Stimulus 6.2c



Modified atmosphere packaging



New technology



New technology

Sustainable packaging. Recyclable cardboard and soft plastic that can be recycled through REDCycle™.

Plastic-free meat tray.



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Worksheet 6.2a

Technologies for food safety

Instructions: Look at the images below of different technologies designed to keep red meat safe to eat. Draw a line to match the name of the technology, its description and matching picture.

Technology

Description

Picture

Refrigeration

This technology uses machinery to place meat in a tray and wrap it with plastic to keep air (which contains microorganisms) away from the meat, to increase its shelf life.



Freezer storage

This technology ensures that the small amount of air that is surrounding the meat contains a certain level of oxygen and carbon dioxide gases. It is then vacuum packed.



Overwrapping

This technology is used to keep food cold (3-4°C) to prevent it from spoiling by slowing down the growth of microorganisms.



Vacuum packaging

This technology is used to keep food very cold (-20°C) to prevent it from spoiling by slowing down the growth of microorganisms.



Modified atmosphere packaging

This technology uses machinery to vacuum or suck almost all the air out of meat packed in a plastic bag. This keeps the air (which contains microorganisms) away from the meat to increase its shelf life.





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Worksheet 6.2b

Packaging for safe storage of red meat

There are many different technologies that are used to keep meat safe to eat and obtain maximum shelf life.

How long you can store red meat depends on how it is packaged. After you have seen your teacher demonstrate the different packaging methods, answer the following questions:



1. Why do we care about the amount of air that is surrounding the meat?



2. Which method of packaging has the greatest amount of air surrounding the meat?

Worksheet 6.2b continued next page



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Worksheet 6.2b continued

Worksheet 6.2b



3. Which method of packaging has the least amount of air surrounding the meat?



4. Overwrapped beef mince has a safe storage time of 4-5 days. Vacuum packed beef mince has a safe storage time of 5-7 days. What do you think the safe storage time of beef mince with no packaging is?

5. Check with your teacher. Did your estimate match with the correct answer? If not, what is the safe storage time of beef mince with no packaging?



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Worksheet 6.3a

Red meat labelling

Date marking

Cut name

Retailer brand

Country of origin



Weight details

Nutritional information, ingredient listing and percentage declaration

Cooking/storage hints

Name and address of the supplier

Declaration of certain substances e.g. allergens

What other information can you see on the packaging?



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Worksheet 6.3a

Design a meat label

Use the boxes below to remind you of what information you need to include on your label. Cross each box out when you have included the information.

Barcode	Country of origin	Brand	Use by date	Name of the product
Nutritional information	Name and address of supplier	Allergens	Storage information	Ingredients



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Worksheet 6.4a

Label scavenger hunt

Look around your house and find the following items.

You can draw them, take a photo and paste it into the box or write an answer. If you cannot find items, look up the information on the internet.

Use-by date of a meat product

Barcode of a red meat product

Grams of protein per 100g from beef or lamb

Imported product

Grams of iron per 100g from beef or lamb

Australian made product

Country it was imported from



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Activity 6.1

Keywords

Worksheet 6.1b – Keywords scramble.

Unscramble the keywords below and recall their meanings.

ingpckaag

packaging

Material used to enclose something.

doof yetafs

food safety

Handling, preparing and storing food in a way to reduce the risk of becoming sick.

aternoigerrif

refrigeration

The cooling of substances or enclosed spaces to low temperatures.

ogreast

storage

Keeping things in a special place for use in the future.



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6.1b Answers continued

Activity 6.1

technology

technology

The use of knowledge to invent new devices and tools.

label

label

An informative piece of paper or plastic that is attached to an object.

shelf life

shelf life

The length of time that food can be safely stored.



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Activity 6.2

Technologies for food safety

1.

Where does your family buy meat?

- Various answers (Butcher, supermarket, grocery store, farmers market, restaurants, etc.)

Can you think of any other places where people buy meat?

- Butcher, supermarket, grocery store, farmers market, restaurants, etc.

Where does the retailer or shop owner store red meat?

- Refrigerator, cold room, freezer.

What is red meat? Are there other colours of meat?

- Red meat includes beef, lamb, mutton, goat, venison, etc. It is red when raw because the muscle fibres that it is made of contain a high content of myoglobin (red in colour). White meat includes chicken, turkey, and other game birds. It is white, or lighter in colour because it doesn't contain as much myoglobin as red meat.

Where do you store raw red meat at home?

- Meat, both raw and cooked, should be stored in the coldest part of the refrigerator (not the door). Raw meat should be stored on the bottom shelf of the refrigerator so that juices (e.g. blood) don't drip onto other foods and cause cross-contamination.
- Meat can also be frozen and stored in the freezer. Meat should be defrosted in the refrigerator on a plate or in a container to prevent juices from contaminating other foods.

Do you store it somewhere else when it is cooked?






- Cooked red meat, such as meat in leftovers, can be stored in the refrigerator if it is going to be consumed within 3 to 4 days. Otherwise, cooked red meat can be stored in the freezer for one month.

Can you think of any technologies that solve the problem of meat spoiling and becoming unsafe for people to eat?

- Refrigerators, freezers, drying, salting, packaging of meat to exclude pathogens, labelling technology to advise consumers when to eat or how to cook the product, etc.

Activity 6.2

Worksheet 6.2a – Technologies for food safety

Technology	Description	Picture
Refrigeration	<p>This technology uses machinery to place meat in a tray and wrap it with plastic to keep air (which contains microorganisms) away from the meat, to increase its shelf life.</p>	
Freezer storage	<p>This technology ensures that the small amount of air that is surrounding the meat contains a certain level of oxygen and carbon dioxide gases. It is then vacuum packed.</p>	
Overwrapping	<p>This technology is used to keep food cold (3-4°C) to prevent it from spoiling by slowing down the growth of microorganisms.</p>	
Vacuum packaging	<p>This technology is used to keep food very cold (-20°C) to prevent it from spoiling by slowing down the growth of microorganisms.</p>	
Modified atmosphere packaging	<p>This technology uses machinery to vacuum or suck almost all the air out of meat packed in a plastic bag. This keeps the air (which contains microorganisms) away from the meat to increase its shelf life.</p>	



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Activity 6.2

Worksheet 6.2b – Packaging for safe storage of red meat



1. Why do we care about the amount of air that is surrounding the meat?

Air contains microorganisms, such as fungi and bacteria, which cause food to spoil and can make you very sick. If less air is surrounding the meat product, it will be exposed to fewer microorganisms so it should have a longer shelf life.



2. Which method of packaging has the greatest amount of air surrounding the meat?

Meat placed in a plastic bag.



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Answers 6.2b continued

Activity 6.2



3. Which method of packaging has the least amount of air surrounding the meat?

Vacuum-packed meat.

4. Overwrapped beef mince has a safe storage time of 4-5 days. Vacuum packed beef mince has a safe storage time of 5-7 days. What do you think the safe storage time of beef mince with no packaging is?

Various answers.



5. Check with your teacher. Did your estimate match with the correct answer? If not, what is the safe storage time of beef mince with no packaging?

Yes/No. 1 day.



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Activity 6.3

Labelling on red meat products

1. Why do you think we have labels on the food that we buy in the supermarket?

- So that consumers have information and knowledge of the products they purchase.

What sort of information is shown on its label?

- See below.

Stimulus 6.3a – Red meat labelling

Date marking

Cut name

Retailer brand

Country of origin

Weight details

Nutritional information, ingredient listing and percentage declaration

Declaration of certain substances e.g. allergens

Name and address of the supplier

Cooking/storage hints

\$10

NUTRITION INFORMATION:	
Serving per package 5 Serving size Approx. 100g	
Quantity	% Daily Intake*
Energy	1040kJ (248kcal)
Protein	25.0g
Total Fat	12.0g
-saturated	4.0g
Calcium	100mg
Sodium	60mg



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3-4 | ANSWERS

Activity 6.4

Just for fun

Worksheet 6.4a – Various responses