Australian Good Meat Education resources are developed by

MEAT & LIVESTOCK AUSTRALIA

9–10 | LESSON PLAN

Lesson 6

Emerging production technologies

AUSTRALIAN CURRICULUM CONTENT

Analyse and make judgements on the ethical, secure and sustainable production and marketing of food and fibre enterprises. (ACTDEK044, AC9TDE10K04)

Analyse needs or opportunities for designing; develop design briefs; and investigate, analyse and select materials, systems, components, tools and equipment to create designed solutions. (ACTDEP048, AC9TDE10P01)

LESSON OBJECTIVE

Students will learn about emerging technologies in red meat production that are significant to productivity, profitability and sustainability.

Australian Good Meat Education resources are developed by

mla MEAT & LIVESTOCK AUSTRALIA

Lesson 6

LESSON OVERVIEW

Activity 6.1	Productivity, profitability and sustainability: What's the focus?	35 mins
Activity 6.2	Red meat joins the war on waste	20 mins
Activity 6.3	Focus on: Technology	30 mins
Activity 6.4	Online learning task: BunkBot digital technology	10 mins

CONTENTS

Resources and equipment

Activity 6.1 – Productivity, profitability and sustainability: What's the focus?

1. 20 sticky notes/slips of paper.
2. Meat & Livestock Australia look to Transform their Industry with IoT (4.06).
3. Butcher's paper.
4. Worksheet 6.1a – *Productivity, profitability and sustainability: What's the focus?*

Activity 6.2 – Red meat joins the war on waste

1. Computer/digital device access.
2. Red meat joins the war on waste.
3. Worksheet 6.2a – *Red meat joins the war on waste.*

Activity 6.3 – Focus on: Technology

1. Worksheet 6.3a – Focus on: Technology.
2. Computer/digital device access.

Activity 6.4 – Online learning task: BunkBot digital technology

1. Computer/digital device access of Lesson 6 Online learning task.
2. MLA GrainFed R & D insights BunkBot testing at Mort & Co Pinegrove Feedlot (2.53).

ADDITIONAL READING/RESOURCES

- Caring for the environment (page 3 - telemetry technology and water).

Lesson guide

Activity 6.1 – Productivity, profitability and sustainability: What's the focus?

a. Provide students with Worksheet 6.1a – *Productivity, profitability and sustainability: What's the focus?* Read and highlight the first page.

b. Divide students into groups of four and provide them with approximately 20 sticky notes or slips of paper. Allocate each student a number from one–four. Student one records the first point from the video clip, Student two the second, etc.

c. View the video clip Meat & Livestock Australia look to Transform their Industry with IoT (4.06). During the clip, students record the name of any technology that is identifiable and also any type of data that is recorded by producers/industry on a single sticky note. (Answers page 12)

d. At the conclusion of the clip, provide students with a large piece of butcher's paper. Divide the paper into three circles using pens or markers (as shown on Worksheet 6.1a).

e. Provide students with a definition of the terms: **Productivity** (a measure of effectiveness and outputs); **Profitability** (yield or financial gain); and **Sustainability** (maintaining production over time with respect to the environment, economic and social factors).

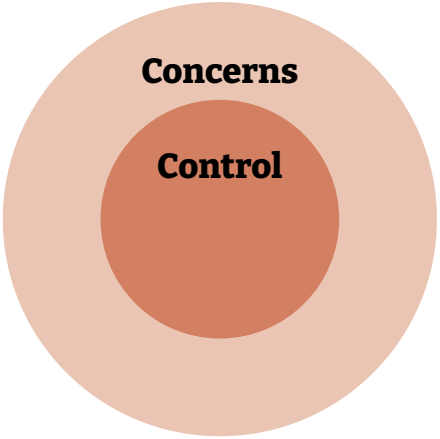
f. Students will collaborate as a group to classify the technology/data they have recorded and place their notes in the correct area of the diagram. They should consider if the technology/data is aiming to improve productivity, profitability or sustainability. If the technology/data can be classified as encompassing two or more categories it can be duplicated and placed in the relevant areas. Sticky notes can be placed on top of each other.

g. Allow time to discuss each of the data points and where they have been placed by groups.

h. Record definitions and examples for future reference on Worksheet 6.1a – *Productivity, profitability and sustainability: What's the focus?* (Answers page 12)

Activity 6.2 – Red meat joins the war on waste

a. Use the 'circle of concern' strategy to generate a discussion about areas of waste within the red meat supply chain (draw the circles in a central area, such as a whiteboard). Encourage students to think about the waste produced: on farms, off farms, during processing or as a consumer.



Lesson guide continued next page

Lesson guide *continued*

b. Record areas of waste production in the outer circle. (Answers page 13)

c. Allow students time to work as a group to consider how these individual 'wastes' can be controlled/addressed with better management or development of new technology and products. Nominate students to contribute their ideas and record them in the inner 'control' circle. (Answers page 13)

d. View the source Red meat joins the war on waste.

e. Students read the source material and complete Worksheet 6.2a – *Red meat joins the war on waste.* (Answers page 14)

f. Provide students with time to discuss the three focuses of MLA and during the discussion ask students to justify how they ranked each focus in order of importance.

Activity 6.3 – Focus on: Technology

a. Provide students with computer/digital device access and Worksheet 6.3a – *Focus on: Technology.*

b. Familiarise students with the Meat & Livestock Australia Donor Company Limited. (MLA Donor Company Limited (MDC) is a fully-owned subsidiary of Meat & Livestock Australia. MDC attracts commercial investment from individual enterprises and others that share a mutual interest with MLA to co-invest in innovation that will benefit the Australian red meat and livestock industry).

c. Either in groups or individually, students research MDC technologies that are of interest to them in the red meat industry. The technologies provided focus on different aspects of the supply chain from paddock to plate, and address advancing areas of productivity, profitability and sustainability. Arrow icons denote media source materials and book icons represent reading materials.

d. Students research one of the recommended case studies, or be given the option of a 'personal pitch' of their own technological idea, based on an aspect of the industry they have learnt about during previous lessons.

e. The *Technology spotlight* template on Worksheet 6.3a can be used to record a summary of the chosen option.

Activity 6.4 – Online learning task: BunkBot digital technology

a. Students access Online learning task 6 and complete the provided activities focused on the potential of BunkBot technology in feedlots. (Answers page 15)

Student resources

Activity 6.1 – Productivity, profitability and sustainability: What's the focus?

Worksheet 6.1a	Productivity, profitability and sustainability: What's the focus?

Activity 6.2 – Red meat joins the war on waste

Worksheet 6.2a	Red meat joins the war on waste

Activity 6.3 – Focus on: Technology

Worksheet 6.3a	Focus on: Technology

Activity 6.4 – Online learning task: BunkBot digital technology

Lesson 6 Online learning task	BunkBot digital technology

Worksheet 6.1a

Productivity, profitability and sustainability: What's the focus?

Meeting the demands of future food production is dependent on new innovations and evolving technologies within agriculture.

Technological advances are focusing on the entire supply chain of red meat production: animals; producers; industry stakeholders; processors; consumers; and improvements to the environment. Research and funding of new innovations in the red meat industry aim to target known problem areas; improve the quality and quantity of red meat produced in Australia; increase efficiencies in the paddock to plate process and improve sustainability.

Some examples of targets within the red meat industry are to:

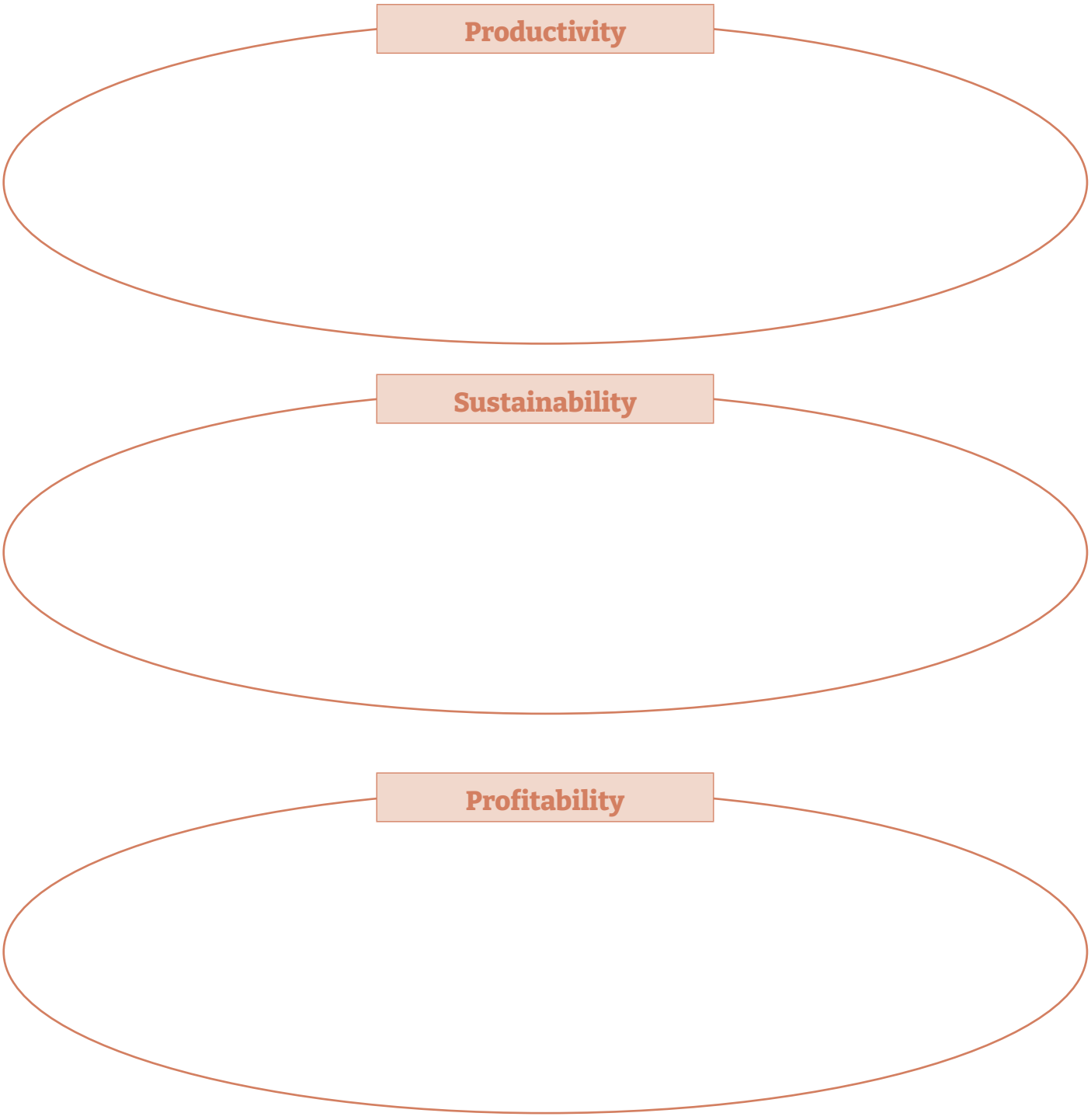
- Improve animal welfare aspects of production, ensuring best practice and minimal stress is placed on productive animals (e.g. faster detection of disease and, therefore, quicker treatment of animals).
- Improve the environmental impacts associated with red meat production (e.g. becoming carbon neutral by 2030).
- Improve aspects of the environment that allow greater productivity and profitability (e.g. analysing and increasing native pasture species within areas to support production in times of drought).
- Make processing more time efficient, to increase productivity and to minimise waste within the production process (e.g. x-ray technology to process cuts at abattoirs).
- Add value to low quality cuts of meats (e.g. investigating vending machine opportunities for meat sales in the European Union).
- Decrease plastic waste within the industry (e.g. using plastic free packaging options).

***Worksheet 6.1a** continued next page*

Worksheet 6.1a continued

Worksheet 6.1a

a. Write a definition of each of the terms in the circles below and provide an example of a technology or data that can be recorded to improve this area in the red meat industry.



Worksheet 6.2a

Red meat joins the war on waste

a. Access Red meat joins the war on waste and identify three questions that MLA projects are targeting from August 2020.

MLA's projects are stemming food wastage by addressing three questions

1.
2.
3.

b. Read the source material and summarise how each of the MLA technologies are focusing on reducing waste. Rank the three technologies in order of importance. Place a 1 in the circle that is most important to you and a 2 and 3 in the other circles.

Plastic-free meat tray

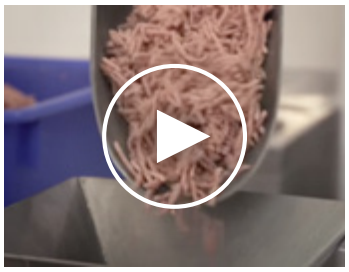
Beyond the supermarket shelf

Zero scrap plastic technology

Worksheet 6.3a

Focus on: Technology

Research a technology associated with the red meat industry.



ProForm: extruded meat

Cultivate Farms

X-ray guided lamb processing

Waste to energy technology

Johne's disease test

Bio Polymers

Grazing management database

Carwoola Smart Farm Initiative (connectivity)

Feeder Reader

***Worksheet 6.3a** continued next page*

Worksheet 6.3a continued

Worksheet 6.3a

Technology spotlight

Research an existing technology in red meat production or pitch an idea for a new technology that you think has potential. Present details of the technology.

Technology name:

Who benefits from the development of the technology? (Producer, industry, consumer, environment, animal)
Explain the function of the technology (how it works):
Identify the advantages of the technology over the existing method of production (the value):
How does the technology target productivity and/or profitability and/or sustainability?

Activity 6.1

Productivity, profitability and sustainability: What's the focus?

c. 1. Drones 2. Measure the quality and quantity of the pasture 3. Sensor technology 4. Camera technology 5. Identifying and counting animals 6. Live weight of animals 7. How many teeth 8. Feedlot data 9. Processing data 10. How the animal hangs and grades 11. Mapping every transaction the animals goes through 12. Efficiency of the steps in production 13. Weather stations 14. Rain 15. Temperature 16. Wind 17. Soil temperature 18. When the best growth is 19. Process intelligence 20. Digital dashboard 21. Links the whole picture of a paddock 22. Animal numbers 23. Land condition 24. Feed quantity 25. Water availability 26. Paddock sizes.

h.

Productivity

A measure of effectiveness and outputs
e.g. Collecting data targeting productivity of pastures for animal consumption.

Sustainability

Yield or financial gain e.g. less fuel being wasted by using drone technology.

Profitability

Maintaining production over time with respect to the environment, economic and social factors e.g. Monitoring water.

Circle of concern:
Red meat joins the war on waste

b. May include: carbon dioxide production from agricultural processes, methane production from animal production, chemicals released into the environment, effluent from animals, pollution associated with transport and processing, wasted food, waste of parts of an animal during processing, waste of money in inefficient systems, packaging waste, etc.

c. Examples include: carbon credit schemes, planting more trees/plants to sequester carbon, feed control, effluent management systems, sustainable energy solutions, reusing effluent as fertilisers on crops, decreasing chemical use where possible, careful consideration of food quantities when purchasing food and eating food to decrease waste, composting, environmentally friendly packaging options.

Activity 6.2

Worksheet 6.2a – Red meat joins the war on waste

a.

MLA's projects are stemming food wastage by addressing three questions

1. Can plastic in packaging be replaced by other materials?
2. If plastic has to be used, can it be minimised?
3. How can red meat shelf life be extended to prevent spoiling?

d. Read the source material and summarise how each of the MLA technologies are focusing on reducing waste. Rank the three technologies in order of importance. Place a 1 in the circle that is most important to you and a 2 and 3 in the other circles.

Plastic-free meat tray

MLA worked with American start-up company, Corumat, to develop patented technology using food and meat waste to make a plastic-free, compostable meat tray. The Corumat meat tray is also approximately 20% cheaper than plastic meat trays.

Beyond the supermarket shelf

(MDC) is investing in solutions to optimise shelf life and reduce markdowns. A food preserver called 'Meal Me' adapts combination oven cooking to develop 'hot fridge' technology. This presents red meat as a true 'grab and go' product range, increasing the value of secondary cuts and positioning red meat as a convenience protein. Combining the quality of slow-cooked meats with the efficiency of fast service can unlock new opportunities for red meat, reduce food waste, and ultimately, increase the profitability of the red meat industry.

Zero scrap plastic technology

Darfresh®'s 'on board' packaging uses a board made from paper pulp. The meat sits directly on the board and is vacuum-sealed with plastic to seal in freshness and extend shelf life. This technology uses 70% less plastic than standard trays.

Online learning task:
BunkBot digital technology

2.

Sitting atop the vehicle is the bunk scanner. A vertical upright supports a retractable boom which includes a high-performance lidar scanner. When the BunkBot is in position next to a bunk, the retractable arm extends in preparation to commence its run. The system fuses all of the inputs, calculates how much feed remains, and then publishes the result at the end of each bunk.

3.

The vehicle can navigate its way around a site, thanks to site mapping and advanced Global Navigation Satellite System (GNSS) positioning. This sees the unmanned vehicle drawing on information from around 40-50 satellites, enabling the BunkBot to be guided within millimetres of its intended location.

1.

Heavy-duty base featuring all terrain tyres.