RESOURCE 7
TECHNOLOGY ON A FARM

Using this resource, pupils will explore how technology is used on the farm and investigate the advantages and possible disadvantages.

Learning Outcomes Unit 2: Soils, Crops and Habitats	**Pupils will be able to:** • describe how the agricultural industry has adopted technology (such as electronic ID collars or tags, computer-based record keeping programs, pedometers for heat detection and Animal and Public Health Information System (APHIS)) and explain the benefits to farm businesses; and • demonstrate knowledge and understanding of how technology, such as GPS on tractors, allows for more accurate application of fertilisers and pesticides.
Cross-Curricular Skills	**Pupils will have opportunities to develop skills in:** • Communication
Thinking Skills and Personal Capabilities	**Pupils will have opportunities to develop skills in:** • Working with Others • Thinking, Problem-Solving and Decision-Making
Resources	• Internet access • Video 7: Technology on a Farm • Resource 1: Sorting Grid • Resource 2: Breeding Technologies Terms and Definitions • Resource 3: Scenario • Resource 4: SWOT Analysis • Technology on a Farm PowerPoint

CONTEXT

Agriculture has always adopted new technology and used it to save labour and become more efficient. In recent years technology has included electronic ID collars, pedometers and GPS on tractors.

This resource provides opportunities for pupils to enhance their understanding of the Food Production and Processing, and Pollution and Farm Waste parts of Unit 2: Animals on the Land. The following activities are designed to encourage pupils to consider these **key questions:**

- What are the benefits to farm businesses of adopting new technologies?
- What are the barriers to adopting new technologies?

SUGGESTED TEACHING AND LEARNING ACTIVITIES

LAUNCH

Display the Technology on a farm PowerPoint slides 2, 3, 4 and 5 explaining the learning intentions, context and definitions for this resource.

Show slide 6. Working in small groups, encourage your pupils to discuss:

- The technology found on dairy farms;
- The benefit to farmers of using this technology;
- What prevents farmers from using technology like this.

Ask your pupils to report back and establish prior knowledge.

You might also find it useful to setup an online collaborative whiteboard such as Google Jamboard or Padlet and invite your pupils to contribute what they know or understand about intensive farming.

Show slide 7 and play **Video 7: Technology on a Farm** to introduce the context. Ask your pupils to consider these questions:

- What technologies do you see in the video?
- What are the barriers to new technologies?

Ask your pupils to make a list of all the technologies mentioned in the video.

Encourage your pupils to use **Resource 1: Sorting Grid** to sort their list of technologies into these categories:

- IT-based
- energy saving
- labour saving.

Technologies your pupils list could include:

- Sexed semen
- Computerised heat detection system
- Automated calf feeder
- Slurry aeration system
- Robotic milkers
- GPS on tractors
- Electronic ID collars or tags
- Electronic pedometers
- APHIS (Animal and Plant Health Inspection Service)

Some of these technologies will span more than one category, allowing for debate. Definitions are provided separately in **Resource 2: Breeding Technologies Terms and Definitions**, to allow for differentiation during the task or for whole class review at the end.

ACTIVITY

Show slide 8. Encourage your pupils to use **Resource 3: Scenario** to learn about an ageing farmer with an outdated dairy. Tom has the dilemma of deciding on how to go about investing in a new dairy parlour.

Show slide 9. Working in small groups, ask your pupils to carry out a **SWOT analysis** for the farmer on the strengths, weaknesses, opportunities or threats of buying a robotic milker or rotary diary. This may require some computer-based research. See **Resource 4: SWOT Analysis**.

SWOT ANALYSIS – HOW DOES IT WORK?

This method helps pupils to examine all sides of a proposal. It can be used during the preparation stages of action planning to develop possible future initiatives. It may also be a useful tool for the evaluation of a group or event, in order to think about what has gone before and to look for future implications.

1. You may need to discuss with pupils the meaning of SWOT and explain what each term means, particularly the possible distinction between 'strength' and 'opportunity', 'weakness' and 'threat'. 'Opportunity' and 'threat' should both concentrate on possible future implications, whilst 'strength' and 'weakness' may both involve the generation of a list of positives and negatives of the proposal as it stands, based on a consideration of what has gone before.
2. Give pupils the proposal to discuss or evaluate. Ideas are placed under the relevant heading (S-W-O-T).
3. You may wish to concentrate on one heading at a time and get feedback before moving on to the next heading. For example, pupils might need time to consider 'strengths' before moving on to 'opportunities'.
4. During feedback, you may wish to use questions such as: what is good? What is bad? What might happen now? What might prevent future progress?
5. A debrief of group work might be beneficial.

DEBRIEF

Conclude by reviewing the **outcomes of the SWOT Analysis**. Responses might include:

- Strengths – saves labour, more efficient use of time.
- Weakness – requires training, high capital outlay/expensive.
- Opportunities – time saving may allow new activities, new ways of doing things, automated tasks may save money which means more profit.
- Threats – failure of technology for example the robotic milker may breakdown.

Complete the learning sequence by briefly revisiting the **learning outcomes** and **key questions** from the start of the resource with your pupils.

If you used an online collaborative whiteboard in the launch activity, return to the whiteboard and ask your pupils to use a different coloured font to add a sentence to summarise the activity, including any new information they have learned.

RESOURCE 1: SORTING GRID

List the technologies mentioned in the video:

Sort your list into the following categories:

IT-BASED	ENERGY SAVING	LABOUR SAVING

RESOURCE 2: BREEDING TECHNOLOGIES TERMS AND DEFINITIONS

Sexed semen	Used to minimise the number of bull calves during artificial insemination. Although it is more costly to breed this way, it eliminates calves being born on the farm that aren't going to be introduced into the milking herd, resulting in longer term financial and environmental benefits.
Computerised heat detection system	Each cow is fitted with a collar that monitors heat expression and transmits the data wirelessly to a computer or a smart device (mobile phone or tablet). Once the data is recorded the animal can be served.
Automated calf feeder	Calves are fed through an automatic feeder for 65 days from the age of one week.
Slurry aeration system	Slurry aeration system also known as an automatic slurry blubber system reduces ammonia (NH_3) emissions and allows the slurry to be always ready to spread.
Robotic milkers	Robotic milkers automate the milking of cows. This tool measures each cow's milk output and records the quality of the milk. This helps to reduce the incidence of mastitis and is argued to improve the welfare of the cows.
GPS on tractors	GPS on tractors allows more accurate application of fertilisers and pesticides. This reduces waste and saves on cost. It is also beneficial in reducing water pollution.
Electronic ID collars or tags	Many dairy parlours use electronic ID collars are often used to identify cows as they walk into the parlour or into each feed stall. Once the identity of the animal is known, data such as volume of milk or weight can be collected, or animals can be individually fed.
Electronic pedometers	Electronic pedometers transmit information about the number of steps that the cow takes over a set time. This is used to judge the oestrus and health status of the cow.
APHIS (Animal and Plant Health Inspection Service)	APHIS is the online database used to register cattle births, deaths and stillbirths. Farmers also use it to notify DAERA of all cattle movements. Farmers can view detailed information about their animals, including calving history, post and ante mortem information on slaughtered animals, from the APHIS website.

RESOURCE 3: SCENARIO

Tom, an ageing farmer, has an outed dairy. He must decide if he will invest in a new dairy parlour. He currently has a herd of 50 cows and wants to increase this to 70.

Create a mind map of the factors Tom should consider, including:

- Lifetime cost, running and labour cost
- Training
- Time
- Efficiencies such as how to improve time-and labour-saving devices
- General animal welfare
- Farmer safety
- Access, layout, lighting
- Automation and monitoring
- Hygiene

RESOURCE 4: SWOT ANALYSIS

Carry out a **SWOT analysis** for the farmer on the strengths, weaknesses, opportunity and threats of buying a robotic milker or rotary diary.

STRENGTHS	WEAKNESSES
OPPORTUNITIES	**THREATS**