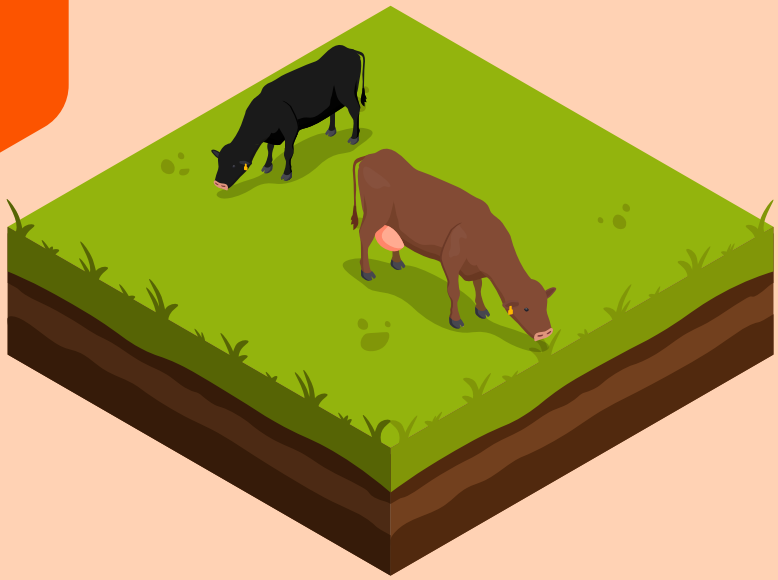
FARMING FOODSTEPS TO FIELD

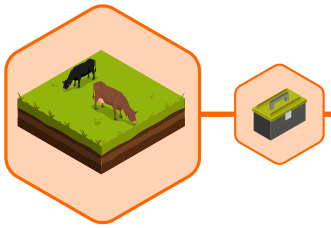
LESSON PLAN

Sustainability & The Environment



SCOTCH BEEF · GEOGRAPHIC ORIGIN PROTECTED · SCOTCH LAMB · SPECIALLY SELECTED PORK

QMS Quality Meat Scotland



FARMING FOODSTEPS TO FIELD

Sustainability & The Environment

Lesson overview

Climate change, sustainability and protecting the natural environment remain critically important issues to Scotland's livestock farmers.

Red meat and its impact on the climate across the globe are regularly in the media spotlight and the increasing demand for cheaper food is adding pressure on our natural environment.

Farmers are using science and technology to try to improve efficiency and reduce their farm's carbon footprint. This lesson looks at the sustainability of the Scottish red meat industry and the work that farmers are doing to protect the natural environment.

Did you know?

Scottish beef's carbon footprint is below the global average.

1

Investigate

Use the 'To Field' PowerPoint presentation to develop understanding of the sustainability of red meat.

The topic can be further explored by watching videos and visiting associated websites using the 'Videos and links' tab.

2

Research

There are two activities in this lesson – the Glorious Grass activity and an individual creative task exploring STEM for Sustainability.

Depending on time constraints it may only be possible to complete one

3

Consolidate

Complete the interactive quiz – this can be done as a class, small groups or individually depending on device availability.

Curriculum for Excellence Experiences & Outcomes covered in this lesson

Level: **Second**

Subject Area: **Technology**

Curriculum Organiser: **Developments in Society & Business**

Experiences & Outcomes: **TCH 2-06a and TCH 2-07a**

Description

I can analyse how lifestyles can impact on the environment and Earth's resources and can make suggestions about how to live in a more sustainable way.

I can make suggestions as to how individuals and organisations may use technologies to support sustainability and reduce the impact on our environment.

Level: **Third**

Subject Area: **Social Subject**

Curriculum Organiser: **People, Place & Environment**

Experiences & Outcomes: **SOC 3-08a**

Descriptiion

I can identify the possible consequences of an environmental issue and make informed suggestions about ways to manage the impact.

FARMING FOODSTEPS
FROM FARM

Level: **Third**

Subject Area: **Science**

Curriculum Organiser: **Planet Earth**

Experiences & Outcomes: **SCN 3-05b**

Description

I can explain some of the processes which contribute to climate change and discuss the possible impact of atmospheric change on the survival of living things.

Level: **Third**

Subject Area: **Maths**

Curriculum Organiser: **Number, Money & Measure**

Experiences & Outcomes: **MNU 3-03a**

Description

I can use a variety of methods to solve number problems in familiar contexts, clearly communicating my processes and solutions.

Level: **Third**

Subject Area: **Technology**

Curriculum Organiser: **Developments with Society & Business**

Experiences & Outcomes: **TCH 3-07a**

Description

I can identify the costs and benefits of using technologies to reduce the impact of our activities on the environment and business.

Level: **Fourth**

Subject Area: **Social**

Curriculum Organiser: **People, Place & Environment**

Experiences & Outcomes: **SOC 4-08a and SOC 4-09a**

Description

I can discuss the sustainability of key natural resources and analyse the possible implications for human activity.

Having evaluated the role of agriculture in the production of food and raw material, I can draw reasoned conclusions about the environmental impacts and sustainability.

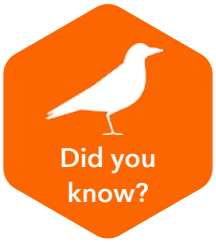
Presentation 1 - aimed at second/third level (including Home Economics)

This PowerPoint presentation will cover the following key topics:

- Definition of sustainable food
- Greenhouse gases (GHG) – carbon dioxide, methane and nitrous oxide
- STEM for sustainability
- Steps Scottish farmers are taking to be more sustainable
- Biodiversity
- Scotland vs. global red meat production
- Economic and social sustainability
- How individuals (you) can help
- Key points, summary and next steps

Click here to download the presentation as a PowerPoint.

Click here to download the presentation as a PDF.



Did you know?

Wildlife like lapwings need natural habitats created by grazing livestock to survive.

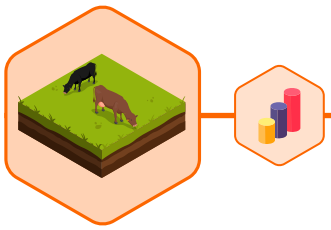
Presentation 2 - aimed at third/fourth level (including Geography and Rural Skills)

This PowerPoint presentation will cover the following key topics:

- Definition of sustainable food
- Carbon footprint and food waste
- Greenhouse gases (GHG) – carbon dioxide, methane and nitrous oxide
- Carbon sequestration
- STEM for sustainability
- Steps Scottish farmers are taking to be more sustainable
- Economic and social sustainability
- How individuals (you) can help
- Key points and next steps

Click here to download the presentation as a PowerPoint.

Click here to download the presentation as a PDF.



Group task

There are two group activities to choose from in this section – either of which could also be carried out as an individual task or set as homework.

Click on the links below to download the activities.

Feeding a Growing Population Activity

Students will be asked to consider the challenges faced in feeding the growing global population in a sustainable way.

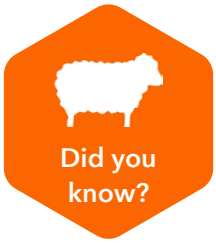
Click here to download the Feeding a Growing Population Activity Sheet

Click here to download the Feeding a Growing Population Activity Answers sheet.

Glorious Grass Activity

Students will discover the basic science of grass and why it is so important in Scotland. They will also learn how grass is measured and use their newly found knowledge to make farming decisions.

Click here to download the Glorious Grass Activity Sheet



Did you know?

Grass grazed by livestock captures carbon dioxide from the air and stores it in the soil.

Individual task

STEM for sustainability

This task can be carried out as an individual task, in small groups or set as homework.

Farming is changing and advances in Science, Technology, Engineering and Maths (STEM subjects) are helping farmers to become more efficient and lower their farm's carbon footprint.

Below are some examples of engineering and technological solutions farmers are using to reduce their farm's carbon footprint:

- Drones
- Agribots
- Smart Tractors
- Precision Livestock
- Farming Data

Information on all of the above can be found here.

Did you know?

Did you know?

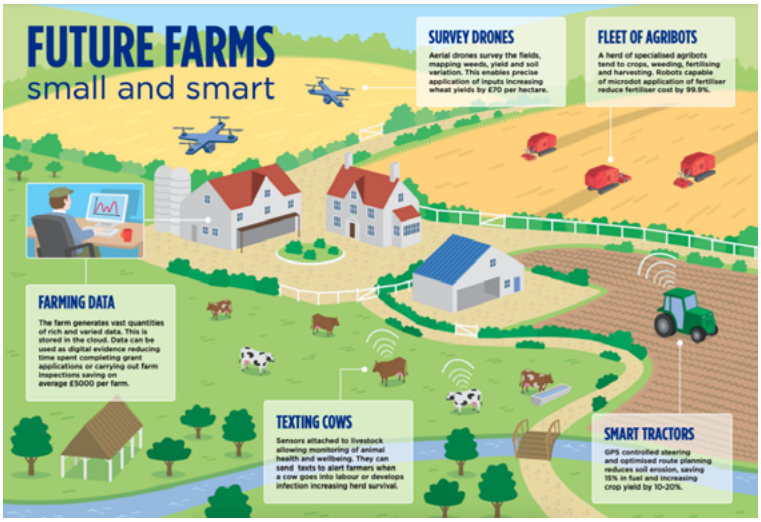
Transport, industry and power account for approx. 68% of UK greenhouse gas emissions. Livestock farming accounts for around 5%.

The Task

Either:

A) These new scientific and technological solutions are often taken up by younger farmers who are keen to embrace innovative solutions to reducing farming's carbon footprint. Sometimes it can be difficult to convince people to take start using new approaches.

Create a poster to persuade a reluctant farmer to embrace one of the solutions above.



or

B) The students of today are the ones who will create the solutions to the challenges of tomorrow. Some of the technologies above are still in the development stage and new ideas are being created and tried out all the time.

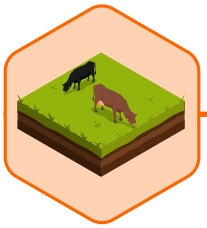
Can you come up with a new STEM (Science, Technology, Engineering, Maths) solution to help farms lower their carbon footprint? Try and make it as functional and realistic as possible.

Create a poster detailing what your solution is and how it will work.

Your poster should be eye catching, persuasive and informative.

Take it Further

- Make this into a coding project
- Make it into a class/year group competition



Videos and links

Below you will find a selection of complementary videos and useful links which will aid further in-depth learning.

Videos

- The use of Science & Technology in monitoring and improving livestock emissions (Rothamsted Research & CIEL)
- Educational video highlighting the sustainability of the Scottish red meat industry
- Hill Farmer Martin shares his pride in the environment and animal welfare
- Farmer Bruce discusses how he produces meat with integrity
- Farmer Joyce discusses animal welfare standards on her farm
- The practical application of thermal imaging (SRUC)
- Rethinking Methane looks at Biogenic Methane in more detail (CLEAR Center at UC Davis)

Useful links

- Centre for Innovation Excellence in Livestock
- Farming for 1.5 Degrees
- Farming for a Better Climate
- NESTA – Innovation Foundation
- SEFARI - Scottish Environment, Food and Agriculture Research Institutes – Online Education Resource Table
- Sustainable Food Trust
- The Royal Highland Education Trust - Precision Farming
- Rothamsted Research
- Easter Bush Science Outreach Centre

Lesson quiz

It's time to put learning to the test with our simple quiz. It will cover the content of this lesson, the main learning takeaways and provide opportunities for class discussion.

Sustainable food should be produced, processed, distributed and disposed of in ways that: (tick all that apply)

- [ ] Encourage poor working conditions for workers
- [x] Avoid damaging or wasting natural resources
- [ ] Create food without consideration of environmental impact
- [x] Provide social benefits such as good quality food

In the UK, how much of the food that is produced is wasted?

- [ ] 1/2
- [ ] 1/4
- [ ] 1/5
- [x] 1/3

What steps can individuals take to eat more sustainably (tick all that apply)?

- [x] Reduce your food miles (how far food has travelled)
- [x] Reduce food waste
- [x] Eat food produced locally
- [x] Read food labels

Which of the below accurately describes carbon sequestration?

- ☐ The process by which nitrogen is stored in the plant to encourage growth
- ☑ The process by which carbon is stored in the soil through plant intake, lifecycle and decomposition
- ☐ The process by which carbon dioxide or other carbon compounds emitted in to the atmosphere are measured
- ☐ The process by which soil naturally produces carbon

Which of these greenhouse gases has the shortest lifespan (lifetime in the atmosphere)?

- ☐ Carbon Dioxide (CO2) – created when burning fossil fuels
- ☑ Methane (CH4) – a natural bi-product of ruminants enteric fermentation (cow burps)
- ☐ Nitrous Oxide (N20) – produced by soils, levels increased by cultivation and Nitrogen fertiliser

Grass is a livestock farmer's main crop. Growing grass has which of the following benefits (tick all that apply):

- [x] Provides stability to the soil
- [x] Sequesters (absorbs) carbon
- [x] Provides an ecosystem both above and below the soil
- [x] Feeds cattle and sheep which produce a nutrient dense protein

Which of these technological or scientific solutions to farming is fictional (select one):

- [ ] Agribots that can carryout microdot application of fertiliser
- [x] Robotic worms to aerate soil
- [ ] Farming drones to analyse crops or check stock
- [ ] Thermal imaging to check animal health

What challenges do farmers face in helping to tackle climate change (tick all that apply)?

- ☑ Some of the treatments that assist with animal welfare can be harmful to biodiversity
- ☑ Many sprays that are used to increase crop yield can have adverse effect on biodiversity
- ☑ The majority of farms in Scotland rely on financial support from the government – the future of this support is uncertain
- ☑ Climate change is causing more unpredictable weather events such as droughts and floods

FARMING FOODSTEPS
TO FIELD

Quality Meat Scotland