SUSTAINABLE FOOD 1: FARMING AND THE ENVIRONMENT

INTRODUCTION

The food we eat has many environmental impacts. Making the way we produce and consume our food sustainable is vital in order to feed an ever-growing world population, whilst protecting our environment. As a set, this group of resources covers the following important themes concerning food sustainability:

1. **Farming and the environment**
2. Food miles
3. Food packaging and recycling
4. Food waste
5. Fairtrade

FARMING & THE ENVIRONMENT: KEY LEARNING OBJECTIVES

- What are the impacts of intensive arable farming on the environment?
- How does organic farming help to reduce these impacts?
- What are the advantages and disadvantages of genetically modified crops?
- What are the impacts of intensive livestock farming and what is being done to reduce them?
- What are the impacts of commercial fishing?

NOTE TO TEACHERS

These notes are intended to provide key information and facts to support teachers delivering the topic. They are accompanied by a PowerPoint presentation with plenty of visuals to aid students' learning (all slides are referred to in the notes). Please feel free to modify the presentation by adding your own slides or deleting those you don't need.

You can find a host of other environmental teaching resources on our website: ypte.org.uk/audiences/teachers

FARMING AND THE ENVIRONMENT: KEY WORDS

Arable farming - the growing of crops.

Livestock farming - when farm animals are raised to generate a profit (also known as pastoral farming).

Intensive farming - farming that aims to produce as much as possible, usually with the use of chemicals.

Pesticide - a chemical used to kill animals or insects that damage plants or crops.

Herbicide - a chemical used to destroy plants or stop plant growth.

Fertiliser - a substance that is added to the soil to help the growth of plants.

Pollution - when the environment is contaminated, or dirtied, by waste, chemicals, and other harmful substances.

Irrigation - the watering of land by artificial means to foster plant growth.

Organic food - food that is grown or made without the use of artificial chemicals.

Sustainable - able to be maintained at a certain rate.

Biodiversity - the existence of many different kinds of plants and animals in an environment.

Genes - little "codes" that make every plant and animal different to any other. We inherit genes from our parents.

Genetically modified food - foods derived from organisms whose genetic material (DNA) has been modified in a way that does not occur naturally,

Carbon footprint - a measure of how much carbon is used in the production and transportation of a product. It is better for the environment to consume goods with a low carbon footprint.

Personal Carbon footprint - the total amount of carbon we produce from all our activities and the choices we make in our daily lives.

Global warming - a gradual increase in the overall temperature of the earth's atmosphere generally attributed to the greenhouse effect.

Greenhouse effect - a warming of the Earth's surface and the air above it. It is caused by gases in the air that trap energy from the sun. These heat-trapping gases are called greenhouse gases.

INTENSIVE ARABLE FARMING: ENVIRONMENTAL IMPACTS

Slide 4: Many arable farms around the world are now intensive. This has resulted in increased food production, but there have been a number of unwelcome side effects.

Chemical Use

Slide 5: In order to maximise productivity, they use different chemicals to grow their crops:

- Pesticides - kill animals that feed on the crop e.g. slugs and caterpillars
- Herbicides - remove competing plants e.g. weeds from the crop growing area
- Artificial fertilisers to make plants grow bigger and better.

Slide 6: These chemicals can get washed by rain into nearby rivers and lakes, causing water pollution which harms wildlife. They can then get into the food chain, affecting animals such as otters and birds of prey, that have eaten poisoned fish. The situation in the UK's rivers and waterways has improved in recent years, due to increased legislation restricting the use of harmful chemicals by farmers. As a result predators like otters, which had been in decline, have seen their numbers increase.

Slide 7: If pesticides kill slugs and other minibeasts, there is less food available for insect-eating birds and mammals in the area, resulting in a loss of biodiversity.

Slide 8: Bees are vital pollinators for many crops. But evidence now indicates that pesticides such as neonicotinoids are responsible for a mass die-off of bees. Aldi were the first supermarket to ban eight bee killing pesticides on their produce.

Slide 9: These chemicals don't just disappear; they stay in the food we eat and no one really knows the long term effects this has on our health. Tests have found that strawberries are more likely to contain pesticides than any other fruit.

Slide 10: Animals which eat grass that has been sprayed with chemicals will absorb them into their bodies and we then absorb them when we eat meat.

Water Use

Slide 11: In the UK and in many countries around the world, the pressure on water supply is increasing due to the growing population and climate change. Irrigation can have a large impact on water resources and efficiencies in water use are now being explored. For example, using alternative water sources such as boreholes and recycling/harvesting water.

Hedgerow Removal

Slide 12: Thousands of kilometers of hedgerows have been removed from intensive farms since the 1940s, to make fields bigger and farms more efficient. This means that many hedgerow animals have nowhere to live and biodiversity is reduced.

Soil Erosion

Slide 13: Intensive farming exhausts the very soil it depends on, as growing so many crops uses up the nutrients. This means more chemical fertilisers are needed to replace the lost nutrients. These chemicals get into the food chain and harm wildlife.

ORGANIC FARMING

Slide 15: Organic food is produced naturally, without the use of (or with very little) chemical pesticides, herbicides or fertilisers. Natural methods are used instead, such as:

- Encouraging natural predators to eat the pests e.g. encouraging more ladybirds to live amongst crops so they will eat greenfly.
- Protecting hedgerow to provide plenty of places for useful predators to live.
- Using techniques such as crop rotation (growing different crops in a field each year) to reduce disease, weeds and pests.
- Using manure and compost instead of chemicals.
- Weeding instead of using herbicides.

Slide 16: Many people believe that eating organic food is healthier, tastes better and is more sustainable in terms of its environmental impact. Demand for organic fruit and vegetables has been rising and is predicted to grow significantly in the future.

Slide 17: However, organic farming does have disadvantages. It costs more to be an organic farmer as it is not possible to produce as much food as an intensive farm. Often more people are needed to work on an organic farm, organic pesticides and fertilisers are more expensive and it takes longer to plant, grow and harvest crops. This means that organic food costs more in supermarkets, where it is competing with so many cheaper foods.

Slide 18: Not everyone believes that organic produce tastes better and it can look less appetising, as fruit and vegetables tend to come in all shapes, sizes and colours! But it is important to weigh up the pros and cons - organic produce is kinder to the environment and possibly better for us.

GENETICALLY MODIFIED FOODS

Slide 20: Genetic modification (GM) is another way of producing lots of food. All living things are made up of millions of cells which contain genes. Scientists have discovered that they can change genes and even move individual genes from one plant or animal to another.

Slide 21: GM crops offer a number of advantages:

- Crops can be made to grow quicker, with increased protein and vitamin levels or with less fat.
- Drought resistant crops could reduce famine in LEDCs (Less Economically Developed Countries), where low rainfall often leads to food shortages.
- Techniques can be developed to make fresh produce last longer, so it can ripen on the plant and then be transported more easily and with less wastage.

Slide 22: The first GM crop (grown in the USA in 1996) was a crop of tomato plants modified so that the tomatoes didn't go soft as quickly as ordinary tomatoes; this meant they would stay firm in the time taken to get from the farm to the shops and fewer were wasted.

Slide 23: But many people are cautious about eating GM foods - can we trust what we are eating and what could be the long term effects? Some of the concerns are:

- The use of insect resistant crops could potentially have severe effects on our biodiversity (by virtually wiping out wild flowers and consequently the insects that feed on them and further up the food chain, the predators that eat the insects).
- Lab tests have shown that pollen from GM maize in the US damaged the caterpillars of the Monarch butterfly. This shows that GM organisms could have the potential to do unexpected harm to other plants and animals.
- Tests have shown there is danger of cross-contamination with wild or non GM plant strains. It's impossible to prevent pollen travelling on the wind or being transported by insects from GM crops to other, possibly organic, versions of the same crop being grown nearby. This could mean all our food crops could contain a proportion of GM elements and we as consumers lose our right to choose whether or not we eat GM foods.
- So far there is no evidence of GM food being harmful to humans. But many scientists think more research is needed. GM crops are being developed for profit and we do not know enough about the consequences for human, plant and animal life.

Slide 24: In the EU, if a food contains or consists of genetically modified organisms (GMOs), or contains ingredients produced from GMOs, this must be indicated on the

label. For GM products sold 'loose', information must be displayed immediately next to the food to indicate that it is genetically modified.

Slide 25: There is no doubt GM crops have short term benefits. But are we altering nature in an unpredictable and dangerous way? What will the long term effects be? Some products now have labels on their packaging reassuring consumers that they do **not** contain GM ingredients.

LIVESTOCK FARMING: INTENSIVE VS. ORGANIC

Greenhouse Gas Emissions

Slide 27: Global meat production is responsible for a considerable proportion of greenhouse gas emissions. The main sources of emissions are:

- Feed production and processing
- Outputs of greenhouse gases during digestion by cows - when cows chew and digest food they burp and 'fart', emitting methane which is a greenhouse gas. Each cow produces 250-500 litres of methane a day.
- Manure decay

Many UK dairy farmers are now working hard to reduce their environmental impacts by adopting better methods. As a result, greenhouse gas emissions from UK dairy farms have declined sharply over the last 20 years. We can also help reduce greenhouse gas emissions by eating less meat.

Chemical Use

Slide 28: Intensive livestock farms use fertilisers and herbicides which can cause water, soil and air pollution. As animals are kept so closely together they are more likely to get ill, so they are given chemical antibiotics to prevent disease.

Water Use

Slide 29: Water is essential to livestock farming - for providing animals with clean drinking water, washing animals and equipment etc. It is possible to reduce the volume of water consumed through new housing and adopting new production techniques. Many farmers are now introducing measures to reduce their water use and some are using rainwater collection as a water source e.g. harvesting rainwater via roof systems.

Animal Welfare

Slide 30: When a farm concentrates on producing as much food as possible cheaply, animal welfare can suffer. Animals are not always kept in a comfortable and humane way; they are often kept indoors in small cages or pens with no access to open fields.

This causes many problems, including:

- Prevention of normal exercise and behaviour
- Lack of daylight or fresh air and poor air quality
- Social stress and injuries caused by overcrowding

Organic Livestock Farming

Slides 31-32: Organic livestock farms ensure that animals are looked after better e.g. not kept indoors all the time, fewer in a field and a more natural lifestyle than those reared intensively. When shopping, look for meat and milk that has been produced organically.

Slide 33: As a nation we eat a lot of eggs. But it's important to think about the lives of the hens which lay our eggs.

Slide 34: The **barren battery cage** has been banned in Europe since January 1st 2012. These cages prevent hens from carrying out their natural behaviour e.g. wing flapping, perching and foraging. The space allowance per bird is less than a letter size sheet of paper and the height is just enough to allow the hen to stand. The cages are usually artificially lit and ventilated. It is now illegal to sell eggs from these cages but there are still countries that do.

Slide 35: British poultry farmers have replaced the barren battery cage with larger **'enriched' cages**. These give the birds a little more space to move around. They also allow hens to express more of their natural behaviours as they have perches, litter for scratching and darkened laying areas. But the RSPCA believes that they offer very few benefits over the barren cages; the additional usable space is equivalent to less than the size of a beer mat, so the cages still severely restrict movement. Caged hens may never experience natural light or fresh air. Although some supermarkets refuse to stock eggs from enriched cages, many of our leading supermarkets still do.

Slide 36: **Free-range** hens have constant daytime access to the outdoors, allowing them daylight and fresh air. This means they can perform their natural behaviours and have a far higher quality of life.

Slide 37: The simplest thing that we can do to help the hens that lay our eggs is to buy free-range eggs. Lots of food products also contain eggs e.g. mayonnaise, cakes, biscuits, quiches; unless the ingredients say free-range eggs or barn eggs, they are likely to be from caged hens.

Slide 38: In the UK, food assurance schemes such as **Red Tractor** help to provide consumers with guarantees that food has been produced to particular standards. It covers many food groups which have all been grown, processed and packaged in

Britain. The Red Tractor standard ensures:

- that farmers protect the countryside by preventing pollution of watercourses, soil, air and wildlife habitats
- that animals have everything they need for a good quality of life and are treated with compassion.

COMMERCIAL FISHING

Slide 40: Commercial fishing is like intensive farming but in the sea. Much of the fish we eat is caught from the sea by big fishing boats (trawlers) using enormous nets. So many fish are caught each year that there is concern that not enough of some species will be left and that they may become rare or even extinct.

Slide 41: Dolphins like to swim together with a type of tuna called "yellowfin". In the past this has caused problems when nets catch not only the fish but trap the dolphins too. If they cannot get to the surface to breathe, they will drown. Now there are rules so nets have to have "escape hatches' through which dolphins can get out.

Slide 42: To help animals like dolphins and turtles, buy tuna fish that says **"dolphin friendly" or "dolphin safe"** on the tin. This means that the tuna fish have been caught using nets designed to prevent dolphins and turtles drowning in them.

Slide 43: Fish farms are floating cages in lakes and the sea where fish such as salmon and trout are bred. Often a very large number of fish are kept in the cages and fed concentrated artificial food and chemicals to make them grow better without getting ill. These chemicals can get into the surrounding water and affect wild fish.

Slide 44: The **Marine Stewardship Council** ensures that fish are responsibly caught, handled with care and can be traced right back to a sustainable source.

SUGGESTED ACTIVITIES FOR FARMING AND THE ENVIRONMENT

Class Debate

Hold a class debate on one of the issues covered e.g:

- Intensive vs. organic farming?
- Should GM food be allowed?
- Animal welfare or cheaper food?

Students should research the two sides of the argument, provide accurate facts and see whether it is easy to make a decision at the end.

Persuasive Writing

Possible title: 'Should our food cost the Earth?'

Research Tasks

1. Research the initiatives now being taken by British farmers to reduce the environmental impact of their activities and protect the environment.

2. By examining food products at home and in shops, carry out an investigation of the information on food packaging. Look out for food assurance scheme logos and find out what the symbols mean. Draw or cut out each logo/symbol and next to it give a brief description of what it tells us.

3. Which supermarkets insist on food being in particular food assurance schemes? Why do they use these schemes? How many and which types of products have them?

Design Tasks

1. Design an informative leaflet to highlight one or more of the issues surrounding farming and the environment.

2. Design your own food and farming logo for your own food standard.

GM Role Play

Ask students to imagine that there is a proposal in their local area for a trial field of GM oil seed rape and a meeting is to be held to discuss it. They should each take a different role, such as:

- Local farmer
- Local resident
- Local government
- GM company
- Environmental activist

At the end of the meeting when all the different opinions have been heard, ask students to vote themselves on whether such a trial should be allowed to go ahead.

We value your feedback!

Let us know what you thought of this lesson plan by completing this Google Form https://forms.gle/cGAwi9AWXfSZgrYa9. **Thank you!**