Thinking Skills: Mysteries

Animal rearing and global warming

Suitable for: Key Stage 3/4.

Learning objectives:
to develop an understanding of the impact of animal rearing on the planet;
to increase political literacy regarding local, national and global issues.

Subject areas
This topic is ideal for an integrated humanities class, a geography or science class, PSHE or citizenship lesson. It has a strong 'Language across the Curriculum' focus as well as promoting thinking skills and collaborative learning.

Resources
A set of statements to be photocopied and cut up and placed in an envelope for each group of 3-4 students.
A Mystery Thinking Frame for the group to record their answers. Some teachers may want each student in the group to have their own frame to support homework set after the lesson or for revision purposes.

Why Mysteries?

Mysteries engage children in a wide range of high order thinking skills. These include:

- classification,
- analysis of problems, events and arguments,
- testing of hypotheses,
- speculation,
- inductive and deductive reasoning,
- the establishment of cause and effect.

Mysteries always have a strong narrative thread that engages pupils and helps them to explore attitudes and values. Pupils consider issues from the different perspectives of interested parties and realise that evidence can be subjected to different interpretations.

Mysteries can provide opportunities for exploring key issues in a way that promotes pupil thinking and brings the content of the issues alive. They can help pupils become more questioning of important ideas in society and promote collaborative learning.

Mysteries pose a central question for children to answer. Clues to help them answer the question are supplied on separate slips of paper, which they sort, arrange and re-arrange to help them make sense of the mystery. Not all the 'clues' will be relevant and may lead them in the wrong direction.

Discussion will help pupils sort out which clues they think are the most important.

Preparation for the mystery:

Cut out the statements provided and place them in an envelope, one for each group.

Write the mystery question on the front of each envelope:

How do animals contribute to the environmental crisis facing the planet?

Organise mixed ability groups of 3-4 children.

Explain what a mystery is and the role the children will play. They will be like detectives trying to solve the mystery; the slips of paper contain the clues they will use to work it out an answer to the mystery. Emphasis that a range of different answers can be produced – as long as they can support their answers with reasons.

Lesson Introduction

The following four factual statements can be displayed on the whiteboard to help the students understand the context for the mystery.

The world's population is expected to stabilise by 2050 at 9-10 billion people (currently 7 billion). All these people have to be fed.

Global warming is caused by a gradual increase in the overall temperature of the earth's atmosphere caused by increased levels of greenhouse gases such as carbon dioxide and methane.

Intensive animal farming or industrial livestock production, also called factory farming, is a modern form of intensive farming that refers to the industrialized production of livestock, including cattle, poultry and fish in confinement at high stocking density.

A feedlot is a type of animal feeding operation which is used in factory farming for finishing livestock, notably beef cattle, but also pigs, horses, sheep, turkeys, chickens or ducks, prior to slaughter.

The Mystery Exercise

Organise groups. Distribute envelopes and the Mystery Thinking Frame.

Ask pupils to read the key question before opening the envelopes and spreading out the statements and reading them. Explain they are going to use the statements to answer the key question. This will involve sorting the statements and identifying links between them. Suggest they take it in turns to read the statements and jointly decide how to organize them.

***Teacher notes**: Some statements tell the students about the process of meat production, others tell them about the impact of animal farming on the natural planet's resources; other statements inform the students about meat eating habits now and in the future and other statements focus on the impact of animal rearing on global warming.*

When they have come up with an answer to the question they should write it on the **Mystery Thinking Frame** in the **Conclusion** box. Evidence to support their answer should be written in their own words in the **Reason** boxes summarized from the statements.

After they have completed the task, a debriefing is very important. Ask the students to state their main conclusions and give their reasons for their choices.

Key questions for teachers to ask

In the debriefing you might like to ask some key questions to ensure the students have understood the implications of the mystery either in class or as homework:

- Why is methane more worrying than CO2 as a greenhouse gas?
- If feedlots produce less methane they sound like a good idea – what other factors do we have to take into account when deciding whether or not to rear animals in feedlots?
- Which animal has the best protein to meat conversion? Should we focus on these animals for food?
- Which animal makes the highest contribution to global warming? Should we stop producing these animals for food?
- Why don't we feed pigs and chickens our food waste?
- Why are people worried about antibiotics in animal feed?
- Why should we be worried about the huge amounts of water needed to produce animals intensively?
- Why are people worried about the massive amounts of manure produced by animals in feedlots?
- What are the implications of cutting down forests to create animal grazing?
- Based on the evidence in the Mystery, what arguments could you put forward for eating less meat?

Research questions

Depending on what lesson this activity is carried out you might want to set research questions for the students. The following are some examples:

- What digestive process produces methane in cows?
- How do cows convert grass into protein in their diet?
- What others sources of protein can we eat and produce sustainably? (they could research mussel production, fish farms and insects as an alternative protein source).
- Should we only rear ruminants naturally on grassland that it is unsuitable for growing crops?
- How much meat should we eat in a healthy diet?
- Is some meat healthier than others?

- What are the arguments put forward in favour of vegetarianism?

Statements to cut out

The United Nations has calculated the carbon footprint of the global livestock system. The methane that comes from ruminant (cows, sheep) digestion adds 2.8 billion tons of methane in the atmosphere every year.

Methane produced by farm animals is an incredibly potent greenhouse gas. Globally we eat twice as much meat as we did 50 years ago.

The average Briton and European eat 80 kilos of meat a year.

A quarter of the ice-free landmass of the earth is devoted to grazing for animals.

Globally the 7 billion people on Planet Earth eat 65 billion animals every year – this is predicted to double in the next few decades.

A third of crop rearing areas on the planet are used to grow crops to feed animals.

A third of the entire landmass of the earth is given over to animals that we either eat or milk – that is 70% more land than a century ago.

Meat consumption is set to double in the next few decades – we could rapidly run out of space for farm animals.

Cows naturally eat grass. A cow can eat about 50 kilos of grass a day and convert it into a kilo of meat.

An adult cow can produce 500 litres of methane every single day – equivalent to a family car.

You can dramatically reduce the amount of methane a cow produces by changing its diet.

Demands for cattle for meat rose from 100 million a hundred years ago to an estimated 1.5 billion today.

The majority of American beef is produced on a feedlot.

A side effect of cows eating is the production of methane whenever they belch.

Some feedlots have been criticized for poor animal welfare and pollution of the local environment.

Industrial agriculture needs huge amounts of water to irrigate crops that are grown to feed farm animals.

Industrially raised chickens are more environmentally efficient than free-range farming when it comes to carbon emissions.

Nearly 40% of the grain grown in America is fed to livestock reared in feedlots.

Cows in a feedlot are fed a mixture of corn turned into cornflakes mixed with other ingredients to maximize weight gain.

The Argentinian countryside is being destroyed to create soya farms to feed the factory-farmed animals in Britain and Europe.

In intensive farming feedlot cattle are fed growth hormones and antibiotics (some of which are banned in Europe).

Pigs and chickens fed only on food waste could produce 110 million tons of meat a year.

The economic efficiency of a feedlot can lead to environmental gains. Cows produce 40% less methane that grass-fed cattle.

Chickens are reared indoors in large sheds. One farm in the UK can have 54,000 birds in one shed and produce 5-6 million chickens a year.

14.5% of total man-made greenhouse gas emissions can be blamed on the animals that we either eat or milk.

In Brazil and Argentina vast areas of land are being ploughed up to create soya plantations. The soya is then exported around the world to feed chickens or other livestock.

Managing the manure created by farm animals creates 700 mil tons of greenhouse gases.

Feedlots get cows to market weight in less days – you get more beef for less environmental impact.

Carbon stores lost by chopping down forests and degrading habitats to create land for beef cattle adds 700 mil tons of C02 in the atmosphere.

Animals on feedlots produce three times as much manure as grazing animals. Unless this is managed properly it can cause environmental

pollution of land and water releasing antibiotics and other chemicals into the water cycle.

Chickens are bred by scientists to grow as quickly and efficiently as possible; a chicken today can grow to almost twice the size of a 1950s chicken in half the time.

Growing crops to feed animals is responsible for 2.6 gigatons of greenhouse gases (a gigaton is one billion metric tons).

The use of antibiotics in raising animals has led to resistant bacteria which attack humans and cause drug-resistant illness.

100 million tons of greenhouse gases are created through the transport of crops to feed animals and their meat around the world.

Cattle live on enormous feedlots with 1000s of cows. Their diet is based on corn. Cows arrive at the feedlot, stay about six months and put on about 100 kilos in weight and then go for slaughter.

Globally we slaughter and consume 300 million cattle, 1.4 billion pigs, 1 billion sheep and goats, 5 million horses, 2 million camels, 3 and a half billion ducks and turkeys and 60 billion chickens per year.

Industrial agriculture is very oil-hungry: oil is needed to produce pesticides and fertilisers and to power machines.

All the world's cars, planes, boats and trains combined produce the same amount of greenhouse gases as the global livestock industry.

There is not enough land and resources to meet future demand for meat sustainably.

A chicken needs 75gms of protein in its diet to produce 100 gms meat; a pig needs 110 gms of protein to produce 100gms of meat; sheep take 800 gms protein to produce 100gms meat; cows consume 400gms protein to produce 100gms cooked beef.

The carbon footprint of the meat we buy in our supermarkets is different depending on the animal: for every kilo of meat cattle produce 16kg of C02; sheep produce 13 kg; a pig produces 5kg of C02 at and a chicken produces 4.4 kilos of C02.

Industrial agriculture needs huge amounts of water to irrigate crops that are grown to feed farm animals.

In South America demand for new pasture for cattle has meant cutting down millions of acres of Amazon rainforest. This has led to a huge loss of wildlife.

Pigs could eat the 15 million tons of food we throw away each year.

Britain eats 19 million chickens a week; 1 billion a year.

The process of producing chickens is mechanized. Billions of eggs are hatched each week and delivered to farms at 1 day old. They are fed for the next 5 weeks in giant sheds before slaughter.

America is the most carnivorous country in the world, each American gets through 120 kilos of meat a year per person.

Chicken has become a very cheap source of meat. Globally we eat 5 times more than we did 50 years ago.

Chinese meat consumption has risen from 11gms of meat a year 50 years ago to 55 kilos and is set to further increase as China becomes wealthier.

In sub-Saharan Africa, over-grazing of cattle is degrading the land and in some areas leading to desertification.

As countries become wealthier meat consumption increases. Coupled with population growth the demand for meat is expected to increase dramatically. By 2050 we will have to produce twice as much meat to meet demands.

Over 30% of the crops we grow are devoted to raising livestock.

It will be difficult to increase meat production without putting dramatic strain on the earth's resources.

Ruminants are very good at digesting difficult, fibrous stuff, things we can't eat like grass or leaves on land not suitable for grain or crops.

A single cow produces as much greenhouse gas as the average family car.

The last big outbreak of foot and mouth disease in 2001 was traced back to pigs that had been fed waste food (swill) that had not been properly treated leading to the compulsory slaughter of 10 million cows and sheep in the UK.

Environmentalists believe we could produce 190 metric tons of meat a year with a small environmental impact. That works out as approximately 40 kilos for each person on the planet – half of what we eat in Britain today – a little over 100 gms a day.

If waste food is not adequately heat-treated before feeding to animals it can transmit disease.

Intensive farming can be the best option when looking at greenhouse gas emissions.