AP ENVIRONMENTAL SCIENCE • EXERCISE SHEET

5.7 Meat Production Methods

Name: _____ Class: _____ Date: _____ **Total: 10 marks**

Objective

Build the skills to answer exam questions on **meat production methods**.

You must be able to:

- compare **feedlots (CAFOs)** and **free-range** methods
- explain the high resource cost of meat
- link meat to greenhouse gases and land/water use

1 Worked examples

Study these first. Each one shows the method for a question type used later —follow the steps and you can do the Practice and Exam-style questions yourself.

Two methods

- **Feedlots (CAFOs)** —animals densely confined, fed grain; high output but concentrated **waste** and antibiotic use.
- **Free-range/grazing** —animals roam and graze; lower waste concentration but needs more land.

Meat is resource-intensive

Producing meat needs far more **land, water, and grain** than plant food, because energy is lost moving up the trophic level (the 10% rule) —feeding grain to animals is inefficient.

Greenhouse gases

Livestock (especially cattle) release **methane**, a potent greenhouse gas; manure and feed production add more emissions.

A worked comparison

A kilogram of beef needs far more water and grain than a kilogram of grain eaten directly, because most of the feed's energy is lost as the animal lives.

2 Practice

Now apply the methods above.

2.1 What is a feedlot (CAFO)? [1]

2.2 Why does meat require more resources than plant food? [1]

2.3 Which greenhouse gas do cattle release? [1]

3 Exam-style questions

3.1 Producing meat is less efficient than eating plants directly because of [1]

- **A** the 10% rule (energy lost between trophic levels)
- **B** photosynthesis
- **C** the water cycle
- **D** plate tectonics

3.2 A region shifts from grain farming to beef feedlots.

(a) State two environmental impacts. [2]

(b) Explain why more grain is needed to produce the same food energy as meat. [2]

3.3 Explain one advantage and one disadvantage of free-range meat production versus feedlots. [2]

4 Go further

You are now ready for the real exam questions on this subtopic:

- work through the **5.7 Meat Production Methods** lesson on the **Learn** page;
- read the **Meat Production Methods** section of the AP Environmental Science handout on the **Know** page.

Solutions

2.1 A concentrated animal feeding operation where animals are densely confined and fed grain.

2.2 Energy is lost moving up a trophic level, so feeding grain to animals is inefficient.

2.3 Methane.

3.1 A —the 10% rule.

3.2 (a) Any two: concentrated waste/water pollution, methane emissions, high land/water/grain use. (b) Only ~10% of the grain's energy becomes animal tissue, so much more grain is needed to yield the same food energy as meat.

3.3 Advantage of free-range: waste is spread out (less concentrated pollution) and better animal welfare; disadvantage: it needs much more land per animal.