

# 5.7 Meat Production Methods

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Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

Total: 10 marks

KEY WORDS methane 甲烷

## Objective

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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

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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

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Now apply the methods above.

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

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

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**2.3** Which greenhouse gas do cattle release? [1]

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## 3 Exam-style questions

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**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
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**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]

## Solutions

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**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.