

Exercise walk-through

Meat Production Methods ■ 5.7

eXercise

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

Method — 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.

Method — 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.

Method — Greenhouse gases

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

Method — 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.

Practice 2.1 ■ 1 mark

What is a feedlot (CAFO)?

Solution 2.1

Worked steps

A concentrated animal feeding operation where animals are densely confined and fed grain **B1**.

Practice 2.2 ■ 1 mark

Why does meat require more resources than plant food?

Solution 2.2

Method: Meat is resource-intensive

Worked steps

Energy is lost moving up a trophic level, so feeding grain to animals is inefficient **B1**.

Practice 2.3 ■ 1 mark

Which greenhouse gas do cattle release?

Solution 2.3

Method: Greenhouse gases

Worked steps

Methane **B1**.

Exam-style 3.1 ■ 1 mark

Producing meat is less efficient than eating plants directly because of

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

Solution 3.1

Method: Meat is resource-intensive

A the 10% rule (energy lost between trophic levels)



B photosynthesis

C the water cycle

D plate tectonics

Worked steps

A — the 10% rule.

Exam-style 3.2 ■ 2 marks

A region shifts from grain farming to beef feedlots.

- (a) State two environmental impacts.
- (b) Explain why more grain is needed to produce the same food energy as meat.

Solution 3.2

Method: Meat is resource-intensive

Worked steps

(a) Any two: concentrated waste/water pollution, methane emissions, high land/water/grain use **B1 B1**. (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 **M1 A1**.

Exam-style 3.3 ■ 2 marks

Explain one advantage and one disadvantage of free-range meat production versus feedlots.

Solution 3.3

Method: Two methods

Worked steps

Advantage of free-range: waste is spread out (less concentrated pollution) and better animal welfare; disadvantage: it needs much more land per animal **M1** **A1**.