

Exercise walk-through

5.7

Meat Production Methods

AP Environmental Science

Irrigation and water

Irrigation methods

differ in waste:

- **flood** wastes most;
- drip** wastes least

Over-watering causes **salinization** and **aquifer depletion**.

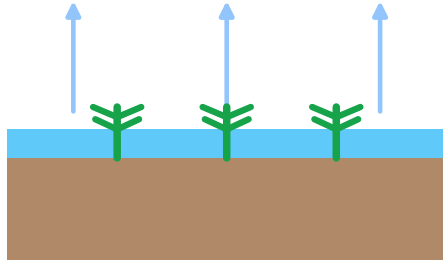


Rice terraces

Irrigation methods, and what each costs

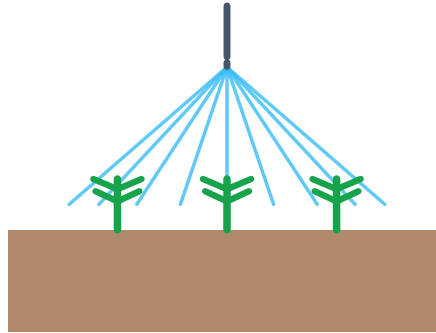
Flood / furrow

much evaporates
& runs off



water efficiency
~50%

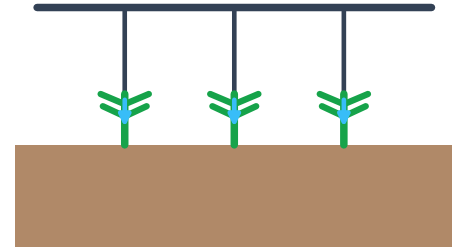
Spray / sprinkler



water efficiency
~70%

Drip

water to the roots



water efficiency
~90%

AP Environmental Science · U5 · three irrigation methods, from low to high water efficiency

Flood irrigation is cheap and wasteful; drip delivers water to the root and wastes least. The trade-off is always **cost against water lost**.

Exam tips

- Explain the **tragedy of the commons** – shared, unowned resources get overused – and how rules/ownership prevent it.
- Weigh the trade-offs of the green revolution, irrigation (salinisation, aquifer depletion), and mining/urbanisation.
- Compute an **ecological footprint** in “number of Earths” (footprint $\div$ biocapacity per person); it is measured **per person**.
- List the harms of **deforestation** (erosion, flooding, lost habitat, more CO₂).
- Define **sustainability** (meeting needs without harming future generations) and give sustainable methods (IPM, crop rotation, quotas).

Exercises 2.1-2.3

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]

Exercises 2.1-2.3

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

2.1

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

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

2.2

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

2.3 Which greenhouse gas do cattle release? [1]

2.3

- Methane

Exercise 3.1

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

Exercise 3.1

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

3.1 A

- the 10% rule

Exercise 3.2 (a)

3.2 A region shifts from grain farming to beef feedlots.

(a) State two environmental impacts.

[2]

Exercise 3.2 (a)

3.2 A region shifts from grain farming to beef feedlots.

(a) State two environmental impacts.

[2]

(a)

- Any two: concentrated waste/water pollution, methane emissions, high land/water/grain use

Exercise 3.2 (b)

3.2 A region shifts from grain farming to beef feedlots.

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

Exercise 3.2 (b)

3.2 A region shifts from grain farming to beef feedlots.

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

(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

Exercise 3.3

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

Exercise 3.3

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

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