

GCSE Biology

Worksheet: Farming techniques

TIME 30 min	TOTAL 30 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Farming techniques

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

Chickens reared for meat are kept in a shed with a floor area of 1200 m^2 . Animal welfare rules allow a maximum of 33 kg of chickens on each square metre of floor. The chickens are sold when each has a mass of 2 kg.

0 1 . 1

Calculate the maximum total mass of chickens allowed in the shed.

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Maximum mass = kg

[1 mark]

0 1 . 2

Calculate the maximum number of chickens that can be kept in the shed when they reach their selling mass.

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Number of chickens =

[1 mark]

0 1 . 3

Explain why keeping the chickens in a shed with limited space increases the efficiency of food production.

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[2 marks]

0 1 . 4

Give **one** ethical objection to keeping chickens in this way.

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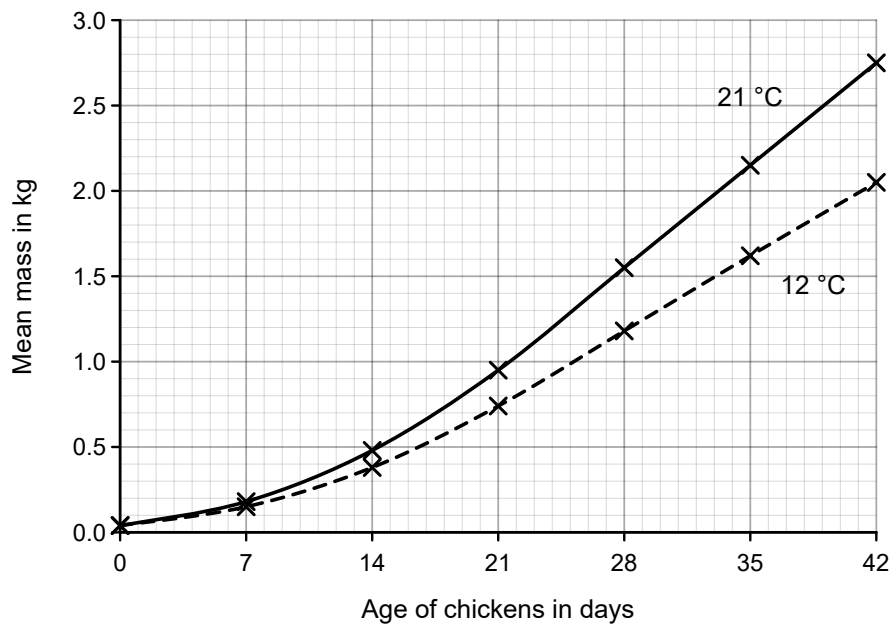
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[1 mark]

0 2

A farmer kept two groups of chickens in sheds at different temperatures, 21 °C and 12 °C. The chickens were given the same food and the same amount of space. Figure 1 shows the mean mass of the chickens in each shed.

Figure 1



0 2 . 1

Give the mean mass of the chickens in each shed at 28 days.

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Mean mass (21 °C, 12 °C) = kg

[2 marks]

0 2 . 2

Calculate the mean growth rate of the chickens at 21 °C between 14 days and 42 days.
Give your answer in kg per day to 2 significant figures.

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Mean growth rate = kg per day
[2 marks]

0 2 . 3

Explain why the chickens at 12 °C grew more slowly, even though they had the same food.

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[3 marks]

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0 3

A farmer investigated the effect of the protein content of pig food on the growth of pigs. Table 1 shows the results.

Table 1

Percentage of protein in the food	Mean growth of the pigs in kg per day
14	0.60
18	0.78
22	0.80

0 3 . 1

Calculate the percentage increase in growth when the protein content of the food was increased from 14% to 18%.

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Percentage increase = %

[2 marks]

0 3 . 2

Explain why pigs fed on more protein grow faster.

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[2 marks]

0 3 . 3

Suggest **two** reasons why the farmer chose food with 18% protein rather than 22% protein.

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[2 marks]

0 4

Table 2 shows data for pigs reared using two different methods.

Table 2

Method	Mean mass of food eaten per pig in kg	Mean mass gained per pig in kg	Time to reach selling mass in days
indoors, heated, limited space	240	90	150
outdoors (free range)	310	90	190

0 4 . 1

Calculate the percentage of the food eaten that was converted into mass gained by the pigs reared indoors.

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Percentage = %

[2 marks]

0 4 . 2

A farmer rears 500 pigs.
Calculate how much more food is needed to rear them outdoors than indoors.

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Extra food = kg

[2 marks]

0 4 . 3

Explain why the pigs reared outdoors needed more food to gain the same mass.

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[2 marks]

0 5

Salmon are farmed in large cages in the sea. The fish are kept at a high density and fed on high-protein pellets.

0 5 . 1

Explain why the salmon are fed on high-protein pellets.

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[2 marks]

0 5 . 2

Explain why keeping the fish in cages increases the efficiency of food production.

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[2 marks]

0 5 . 3

Give **two** problems caused by keeping salmon at a high density in sea cages.

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[2 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Biology · Worksheet: Farming techniques · 30 marks

Question 1 (5 marks)

01.1 [1 mark]

Answer: 39 600 kg

- $1200 \times 33 = 39\,600$ (kg) (1)
-

01.2 [1 mark]

Answer: 19 800

- $39\,600 \div 2 = 19\,800$ (1)

Notes: Allow ECF from the previous part.

01.3 [2 marks]

- the chickens move less, so less energy is transferred from them (less food is used in respiration) (1)
 - so more of the food is converted into biomass / the chickens grow faster on the same food (1)
-

01.4 [1 mark]

- the chickens cannot move freely or behave naturally (1)
- crowding causes stress or injuries (1)
- diseases spread easily between crowded birds (1)

Any 1 of the points above.

Question 2 (7 marks)

02.1 [2 marks]

Answer: 1.55 kg and 1.18 kg

- 21 °C: 1.55 kg (allow 1.5–1.6) (1)
- 12 °C: 1.18 kg (allow 1.15–1.2) (1)

02.2 [2 marks]

Answer: 0.081 kg per day

- $(2.75 - 0.48) \div 28$ (allow readings of 2.7–2.8 kg and 0.45–0.5 kg) (1)
- 0.081 (kg per day) (allow 0.079–0.084 from correct readings) (1)

Notes: An answer that is correct for the readings used but not given to 2 significant figures (e.g. 0.0811) scores 1 mark.

02.3 [3 marks]

- at 12 °C more energy is transferred from the chickens to the surroundings (they lose more heat) (1)
- so they use more of their food (glucose) in respiration to keep warm (1)
- so less of the food is used for growth / converted into biomass (1)

Question 3 (6 marks)

03.1 [2 marks]

Answer: 30%

- $(0.78 - 0.60) \div 0.60 \times 100$ (1)
- 30 (%) (1)

03.2 [2 marks]

- protein is digested into amino acids (1)
- the amino acids are used to make new proteins for growth, e.g. muscle and new cells (1)

03.3 [2 marks]

- 22% protein gives very little extra growth (0.80 compared with 0.78 kg per day) (1)
- food with more protein costs more (1)
- extra amino acids are broken down to urea and excreted, so they are wasted (1)

Any 2 of the points above.

Question 4 (6 marks)

04.1 [2 marks]

Answer: 37.5%

- $90 \div 240 \times 100$ (1)
- 37.5 (%) (1)

Notes: Allow 38.

04.2 [2 marks]

Answer: 35 000 kg

- $(310 - 240) = 70$ kg per pig (1)
 - $70 \times 500 = 35\,000$ (kg) (1)
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04.3 [2 marks]

- they move more / lose more heat to cold surroundings, so they use more glucose in respiration (1)
 - so less of the food they eat is used for growth (1)
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Question 5 (6 marks)

05.1 [2 marks]

- protein is needed for growth / to make new tissue (1)
 - so the fish grow faster / reach selling mass sooner (1)
-

05.2 [2 marks]

- the fish cannot swim far / their movement is limited (1)
 - so less energy is used in respiration for movement and more biomass goes into growth (1)
-

05.3 [2 marks]

- diseases / parasites spread easily between the fish (1)
- faeces and uneaten food pollute the water (1)
- escaped farmed fish may compete or breed with wild fish (1)
- chemicals / antibiotics used to treat disease may harm other organisms (1)

Any 2 of the points above.
