GCSE Biology

Food Production

Mark Scheme

Time available: 55 minutes
Marks available: 46 marks

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1. (a) $0.03 = \frac{\text{output}}{5950 \div 50} \times 10$

*an answer of 1.8 scores **3** marks*

1

$\text{output} = \frac{0.03 \times (590 \div 50)}{100}$

1

1.8

1

(b) indoor % efficiency = $\frac{40}{10000 \div 6000} \times 100$

1

or

$\frac{40}{16000} \times 100$

0.25(%)

*an answer of 8.33 scores **3** marks*

allow 8 / 8.3 / 8.333...

1

$\left(\frac{0.25}{0.03} =\right) 8.33$ (times)

1

(c) any **two** from:

- in faeces / egestion
  or
  not all food is absorbed
- not all food is ingested
- in urine / excretion
- in respiration
- keeping warm
- movement

*do **not** accept 'for respiration'*

allow as 'heat'

2

(d) warmer indoors so less energy wasted in keeping warm

allow less energy lost as 'heat'

1

less movement indoors so less energy wasted

*if no other mark awarded, allow it is warmer and there is less movement indoors for **1** mark*

1

[10]

2.

(a) any **two** from:
- diseases spread more rapidly
- antibiotics can build up in the food chain
  or
  over use of antibiotics
- increased use of fossil fuels (to heat the barn)

2

(b) **Level 2 (3–4 marks):**
Clear statements made identifying the farming methods which are linked to relevant explanations of how this increases the efficiency of food production.

Level 1 (1–2 marks):
Simple statements made identifying the farming methods used, but no attempt to link to explanations of how this increases the efficiency of food production.

0 marks:
No relevant content.

Indicative content

statements:
- kept inside or in a temperature controlled environment
- kept enclosed or in a restricted environment

explanations:
- less energy / heat is lost in controlling body temperature
- less energy required for movement
- so more energy is available for growth
- less energy / heat is transferred to the environment

4

(c) (362 − 67 = 295) / 362 × 100

1

81 / 81.49 / 81.5

*allow 81 / 81.49 / 81.5 with no working shown for **2** marks*

1

(d) aboriginal people can eat other foods (so they may not be in food insecurity)

1

we do not know if other (traditional) food sources have declined

1

[10]

3.

(a) (i) fewer cows

1

any **one** from:

- less methane

  *do **not** allow CH^4*

- less CO_2 in the atmosphere because of less deforestation **or** less plants consumed.

  *allow less CO_2 released into the atmosphere because less fuel used e.g. to heat cowsheds **or** to transport meat*

  *do **not** allow CO^2*

1

(ii) any **two** from:

- could be mass produced to feed an increasing population
- disease free meat
- no / low fat
- no harm to animals or less intensive farming

  allow (may be) suitable for vegetarians

- antibiotic free meat
- more land available for farming crops

  allow no energy loss along a food chain

2

(b) fungus / Fusarium

1

with glucose (syrup)

1

in aerobic conditions **or** in presence of oxygen

ignore air

1

mycoprotein is harvested / purified

allow ammonia added (as source of nitrogen)

ignore stirring / mixing and temperature

1

[8]

4. (a) (i) fungus

1

(ii) oxygen / O_2

accept air

accept O_2

*do **not** allow O^2 / O / O2*

1

(iii) glucose (syrup)

allow carbohydrate / sugar

ignore food / starch

allow oxygen if oxygen / air not given in (a)(ii)

1

(b) any **two** from:

- quick<u>er</u>
- suitable for vegetarians
- cheap<u>er</u>
- more efficient **or** less land / methane

ignore high in protein

ignore sustainability unqualified

ignore less pollution unqualified

allow less animals harmed / killed

*allow food chain is shorter **or** has less trophic levels*

allow less energy lost (from the food chain)

*do **not** allow no energy lost*

allow low(er) in calories (than some meat)

allow low(er) in fat / healthi<u>er</u> (than some meat)

allow source of fibre / prevent constipation

2

[5]

5. (a) any **one** from:

- increase / give light
- increase temperature / make warmer

award marks if the method by which these could be done is given
eg leave lights on all night **or** use a heater

- increase / give CO_2
- add fertiliser / nutrients / minerals / named

allow nitrogen

ignore 'food'

1

(b) (i) any **two** from:

- cheaper

allow grow faster / more grown

- better quality / flavour

ignore size

- available all year

accept converse if clear that answer refers to use of British tomatoes

allow 'Fair Trade'

2

(ii) any **two** from:

- greater distance **or** more food miles **or** more transport

idea of more needed only once

- transport needs (more) energy / fuel
- reference to eg greenhouse effect / global warming / pollution / CO_2 release / carbon footprint

ignore ozone

2

[5]

6. (a) kills microorganisms / bacteria / fungi / viruses / microbes

allow to remove microorganisms / bacteria / fungi / viruses / microbes

ignore germs

allow so mycoprotein is not contaminated

1

(which) compete for food / oxygen
or
which make toxins

allow so mycoprotein is safe to eat

or
which are pathogens
or
which might kill the fungus / *Fusarium*

1

(b) 30 °C

1

(c) for (aerobic) respiration

*do **not** accept anaerobic*

1

(which) releases energy (for growth)

*do **not** accept produces energy*

allow glucose is used to make other organic substances e.g. protein

1

(d) any **two** from:

so *Fusarium* can

- grow faster / better
- get sufficient food / glucose / minerals

  allow more / enough

- get sufficient oxygen

  allow more / enough

- get rid of sufficient carbon dioxide

  allow more / enough
  allow waste

- be kept at a (suitable) temperature

  allow to avoid 'clumping'

2

(e) 200 grams

1

[8]