M1. (a) limiting their movement
or
controlling the temperature of their surroundings

1

reason:
reduces energy transfer

*if no other marks awarded, allow **1** mark for: 'fit more chickens in same space'*

1

(b) (i) without oxygen

ignore 'without air'

1

(ii) any **two** from:
- ethanol

  allow alcohol
- carbon dioxide
- lactic acid.

  ***do not accept** energy / ATP (apply list rule)*

2

(c) enzymes are denatured / change shape

ignore microbes are killed

1

(enzyme) shape is vital for function **or** won't work (as efficiently)

1

(d) (i) 200

1

(ii) 120

allow ecf from (d)(i)

e.g.

$\frac{60}{100} \times$ *(i)*

1

(e) causes global warming

1

one predicted consequence of global warming

eg rising sea levels, climate change, change in migration patterns, change in distribution of species

or
methane is flammable

so might cause fire / damage

*if no other marks awarded, allow methane is a greenhouse gas for **1** mark*

1

[11]

M2. any **three** from:

*maximum **2** marks if only advantages **or** only disadvantages given*

ignore references to cost unqualified

advantages: (max 2)

ignore reference to fresher

- less transport / example of transport **or** less fuel used

  accept implication eg less food miles

  allow no transport / fuel costs

- less pollution / example

  accept eg less carbon dioxide / smaller carbon footprint

  allow no pollution / example

- support of local / UK economy / farmers

disadvantages: (max 2)

- not available all year
- may require use of heat / light
- (production of) heat / light causes pollution

[3]

M3. (a) (i) wheat → humans chain transfers 10 times more energy than wheat → pigs → humans chain

allow 10% if given as a comparison e.g. one is 10% of the other

or

wheat → pigs → humans chain transfers 810 000 (kJ per hectare) less

ignore less unqualified

1

(ii) any **one** reason for energy loss from pigs e.g :

ignore respiration, growth

ignore heat unqualified

- movement
- (maintaining) body temperature
- waste materials

  allow named examples
- not all parts of pig eaten by human
- because there is an extra stage (pigs) in the food chain and energy is lost at each stage

  allow longer food chain so more energy lost

1

(b) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information in the Marking guidance, and apply a 'best-fit' approach to the marking.

0 marks No relevant content.

Level 1 (1-2 marks) There is a basic description of at least one factory farming method
or
identification of an advantage or disadvantage of factory farming.

Level 2 (3-4 marks) There is a description of at least one factory farming

method
and
an advantage or disadvantage is explained.

Level 3 (5-6 marks) There is a description of factory farming methods
and
advantage(s) and disadvantage(s) are explained.

Examples of Biology points made in the response:

factory farming methods e.g.:

- Kept in cramped conditions / battery hens / calf crates / pig barns / fish tanks
- Controlled temperature / heating
- Controlled feeding / modified food given / growth hormones
- Controlled lighting
- Treated with prophylactic antibiotics

Advantages e.g.:

- Increased efficiency / profit / greater food production / cheaper food / faster growth
- Farmer can have more livestock
- Less energy is lost through movement
- Less energy is used keeping warm
- (Food is high in calories / protein) so animals will grow faster / lay more eggs
- Easier to vaccinate all the animals
- Easier to protect animals from predators
- Antibiotic treatment stops infections in animals

Disadvantages e.g.:

- Stress / cruelty / inhumane / unethical
- Restricted movement / overcrowding
- Faster spread of diseases

- Antibiotics in the food chain / residual chemicals in the food chain
- Wasting fossil fuels / increasing global warming
- Increased pollution from animal waste and from additional transport

6

[8]

M4.(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:

- quicker
- suitable for vegetarians
- cheaper
- 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 / healthier (than some meat)

allow source of fibre / prevent constipation

2

[5]

M5.(a) (i) 76.0 / 76

correct answer with or without working gains 2 marks
allow 76.04 for 2 marks
allow 76.04 with extra decimal places eg 76.042 for 1 mark
$\frac{465}{611.5}$ *for 1 mark*

2

(ii) mass of fish declines (until 2008)

ignore use of numbers
allow number of fish decline (until 2008)

1

(due to an) increase in fishing / overfishing

1

and then rises (until 2010)

1

(which could be due to) quotas / net restrictions working

allow any reasonable suggestion, such as countries swapping quotas or restrictions on fishing during breeding seasons
ignore less fishing
*if no other marks awarded allow 1 mark for a decrease in mass **and** an increase in mass if answer relates to sustainable fishing*

1

(iii) (this is due to) public awareness / demand

allow legislation / rules

1

(b) fishing quotas / bans

1

(small) net / mesh size

if size of net is stated then it must be smaller
if size of mesh is stated then it must be larger

1

(c) (fish) cannot move freely / as much

1

(therefore) less <u>energy</u> loss from the fish

*do **not** allow 'no energy is lost'*

ignore references to less heat loss through controlling body temperature

ignore references to respiration

1

(there is) more food available / better quality food / fed more often

accept 'high-protein food (for making cells)'

1

(so) there is more energy for growth **or** (more food) is converted to biomass

1

[13]

M6. (a) it is impossible to weigh all the fish in the sea

1

(b) (i) increase / from 50 to 350 / by 300 thousand tonnes

1

(ii) due to fishing ban / not allowed

1

(c) (i) fishing quotas / limits

1

changes to net size

1

(ii) yes, biomass increases

1

use of figures from graph eg approx 4- times **or** (was effective at first) but numbers decline again after 2004

must use two comparative figures for 2nd marking point

1

(iii) so that breeding continues

alllow prevent extinction / limit impact of fishing on food chain / web

1

(iii) 95%

*correct answer gains **2** marks*

*2000-100=1900 award **1** mark*

2

(d) any **four** from:

- increase in <u>sea / water</u> temperature

  accept ref to lower <u>sea / water</u> temp if shift in Gulf Stream is referred to
- changes in migration patterns / distribution of species

- more eggs may survive (up to 19 °C) and could lead to an increase in herring pop
- reduction in herring pop (because eggs die if >19 °C)

  accept change in other populations of fish which are alternative prey for cod
- (appropriate) change in cod population as a result

4

[14]