

M1. (a) (i) tick in box of FIRST pyramid

1

(ii) any **one** from:

- less energy / biomass lost / wasted
- greatest biomass / energy for humans
ignore human box is bigger
ignore .food. for humans
- shortest food chain **or** less stages **or** least number of different organisms **or** only one predator **or** only 2 boxes tall **or** least boxes
allow only one stage

1

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

- quicker / more growth **or** grow fatter
- less* urine **or** less faeces
- less* heat (lost)
- less* movement
assume for pigs indoors
allow converse if clear for pigs outdoors
(* **do not allow no for less**
ignore less space

2

(ii) any **one** from:

- less cruelty **or** more ethical **or** better animal welfare
ignore more natural
ignore ideas referring to against God's will
- better flavour / quality (of meat)
*ignore pig health **or** free range / organic*

- less pollution / etc / less fossil fuel used for heating
ignore quality of life
assume for pigs outdoors
allow converse if clear for pigs indoors

1

[5]

M2. (a) 30

*award **both** marks for correct answer, irrespective of working
100 – (33 + 27 + 10) or equivalent for 1 mark*

2

(b) 2 or 1.98

*award **both** marks for correct answer, irrespective of working
(33 / 100) × 6 or equivalent for 1 mark*

2

(c) respiration

1

(d) (i) less / no heat loss / movement

*do **not** accept 'energy' / warmth unqualified*

1

(ii) any reference to cruelty eg stress to calf / cramped conditions

ignore references to disease / hygiene

1

[7]

M3. (a) *idea that*

- so they don't get too hot / cold
for high temperatures
- don't lose condition / weight **or** don't become ill
- don't lose too much water / become dehydrated
(*allow don't sweat too much*)
for low temperatures
- reduce heat loss from pigs
- less energy wasted in maintaining body temperature
for 1 mark each

2

(b)

- reduce energy loss by movement
- so more is available for growth*
(**credit this point if given in (a) but only credit once*)
- don't use body mass to provide energy
- easier to handle / monitor
for 1 mark each

2

(c) *idea that*

- less humane / not natural / cruel / no room to exercise / stressful
- more intensive labour
- increased risk of disease / (often) in contact with faeces
- antibiotic residues in meat
any two for 1 mark each

2

[6]

- M4.**
- (a) (i) bacteria 1
- (ii) 8 1
- (iii) 4 tonnes 1
- (b) (i) mycoprotein contains less fat 1
- or**
- less circulatory problems
- mycoprotein contains (more) fibre
- or**
- reduces colon cancer
it = mycoprotein
fat must be comparative 1
- (ii) beef contains more protein
it = beef
must be comparative
- or**
- better for growth / making cells /
 enzymes / antibodies 1

[6]

- M5.** (a) (i) cholesterol 1
- fat
in this order 1
- (ii) mycoprotein has (approx) half amount of protein / has 11.8 (g) protein while chicken has 22.0 (g)
accept has less protein
ignore less fat 1
- (b) (i) increased 1
- (±) constant rate **or** (from 0) to 9.2 / by 9.2(cm) **or** about 1 cm a day **or** increase slower at the beginning and / or at the end 1
- (ii) species **A** grows faster / more than species **B**
or
species **A** has larger diameter **or** is bigger
or
the growth of species **B** slows down after 6 weeks
accept use of approximate figures 1
- (c) any **two** from:
- pH / acidity / alkalinity
ignore references to carbon dioxide / waste products
 - (speed of) stirring
ignore time in the fermenter
 - oxygen (concentration) / aeration

ignore initial amount of Fusarium

- ion concentration / named eg -NH_4^+
allow ammonia
- pressure

2

[8]

M6. (a) C 1

(b) otherwise species may disappear altogether
allow to avoid extinction 1

(c) any **two** from:

- regulate net size
if mesh size specified, must be larger
- impose fishing quotas
- limit fishing during breeding seasons
- bans on discarding of fish
- bans on fishing in certain areas

2

[4]

M7. (a) 3 (.0)

*correct answer, irrespective of working gains 2 marks.
if the answer is incorrect or there is no answer, award 1 mark
for use of correct figures (0.5 and 3.5) [and no other figures]*

2

(b) as faeces

*if more than two boxes ticked deduct 1 mark for each
additional tick*

1

as carbon dioxide from respiration

1

(c) (i) pigs kept inside are kept in small pens

*if more than two boxes ticked deduct 1 mark for each
additional tick*

1

pigs kept inside are kept warm in the winter

1

(ii) any **one** from:

- faster growth
ignore bigger / less flavour / fatty
- need less food
ignore references to movement / energy
- ready for market sooner
ignore ethical arguments

1

[7]

M8. (a) (i) any **two** from:

- more milk
*(about) 50 litres milk compared to (up to) 20 litres / 30 litres
more
ignore costs / profit*
- electricity produced
- farmers can keep more cows in the space
answers must refer to number of cows and space

2

(ii) any **two** from:

- less stress for cow **or** not cruel to cow **or** cows have freedom to move around
ignore references to ethical / unnatural without qualification
- crops fertilised
- less disease **or** disease not as easily spread

2

(b) more

1

less

in this order

1

[6]