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 <u>equivalent</u> 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 <u>more</u> protein

it = beef
must be comparative

or

<u>better</u> 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 <u>concentration</u> / 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 <u>and</u> 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]