

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
ADDITIONAL APPLIED SCIENCE A**

A334/01

Agriculture and Food
(Foundation Tier)

**Friday 12 June 2009
Morning**

Duration: 45 minutes

Candidates answer on the question paper
A calculator may be used for this paper

OCR Supplied Materials:
None

Other Materials Required:

- Pencil
- Ruler (cm/mm)



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **36**.
- This document consists of **12** pages. Any blank pages are indicated.

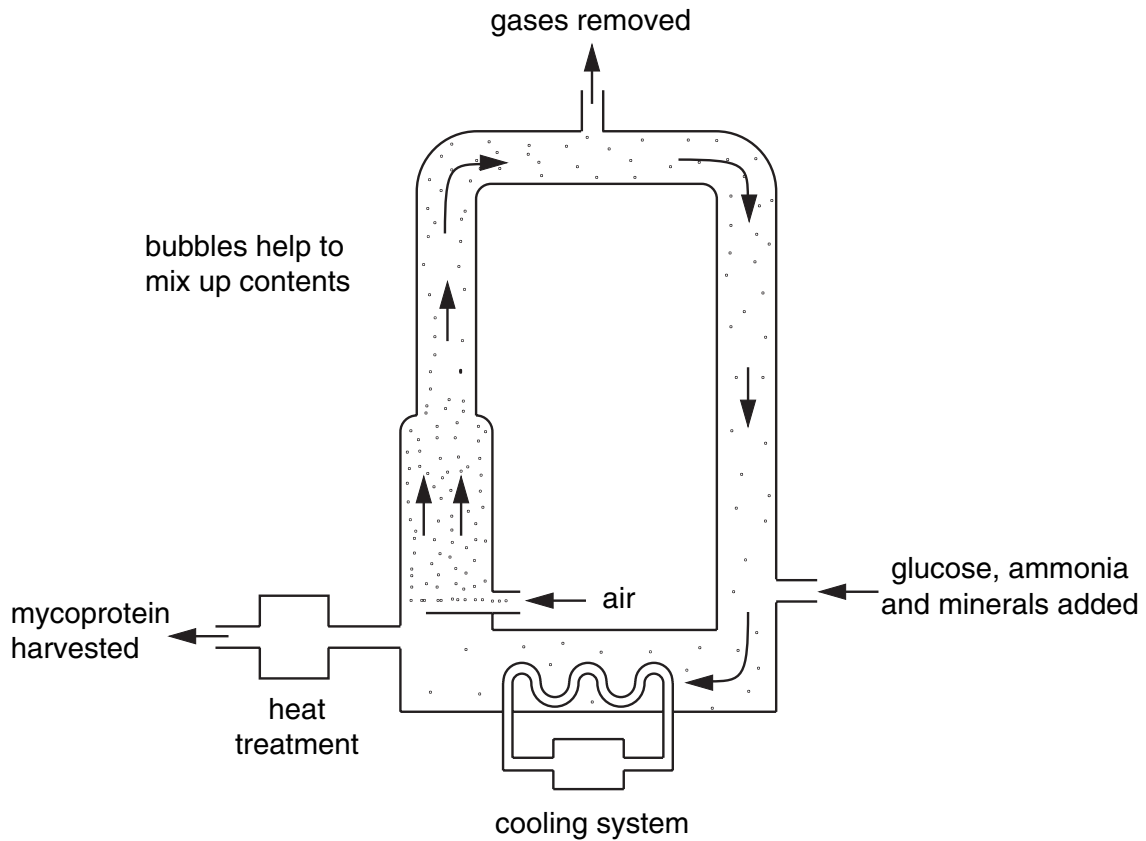
Answer **all** the questions.

1 Protein is an important part of our diet.

A fungus called *Fusarium* is grown in large fermenters.

The fungus produces large amounts of protein called mycoprotein.

Look at the diagram showing the production of mycoprotein.



(a) Complete the sentences about the production of mycoprotein. Put a tick (✓) in the box next to the **correct** answer. Use information in the diagram to help you.

(i) <i>Fusarium</i> uses	air	<input type="checkbox"/>	as food.	[1]
	glucose	<input type="checkbox"/>		
	water	<input type="checkbox"/>		

(ii) <i>Fusarium</i> needs	carbon dioxide	<input type="checkbox"/>	from the air.	[1]
	carbon monoxide	<input type="checkbox"/>		
	oxygen	<input type="checkbox"/>		

(iii) <i>Fusarium</i> uses	aerobic		respiration.	[1]
	anaerobic			
	antibiotic			

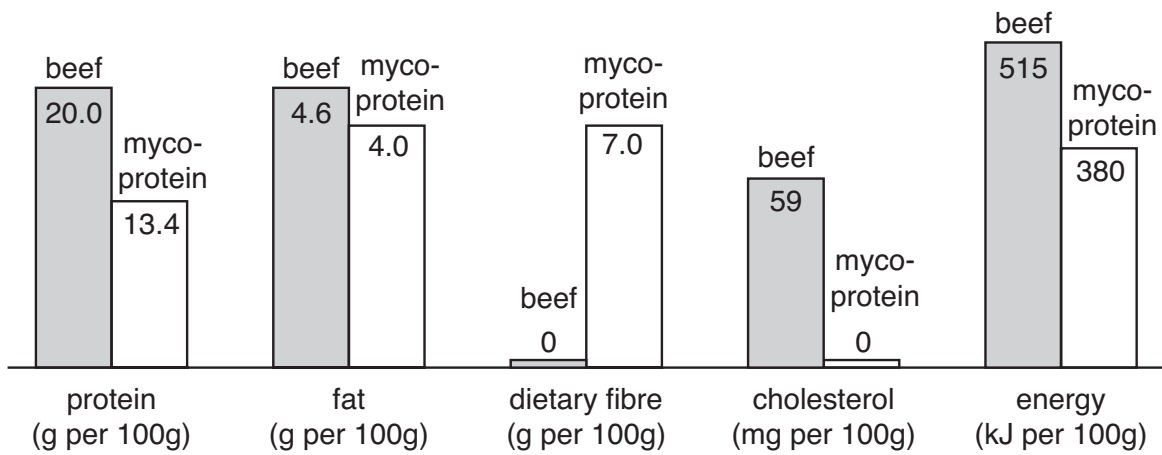
(iv) In the fermenter	stirrers		mix up the contents.	[1]
	bubbles of air			
	minerals			

(b) Suggest reasons why the mycoprotein is heated.

.....

..... [2]

(c) Beef contains protein.
Look at the information comparing mycoprotein with beef.



Mycoprotein could be a better food than beef.
Use this information to suggest reasons why.

.....

..... [2]

[Total: 8]

2 (a) Milk is a gathered harvest.

It comes from cows.

What is a **gathered harvest**?

Put a tick (✓) in the box which best describes why milk is a gathered harvest.

- Cows are female cattle.
- Cows die after producing milk.
- Cows produce beef.
- Cows still live after producing milk.

[1]

(b) The Milk Development Council helps farmers.

How does it help farmers?

Put a tick (✓) in the box next to the best description.

The Milk Development Council helps farmers by ...

- ... doing research on milk quality.
- ... selling the milk.
- ... collecting the milk from farms.
- ... processing the milk.

[1]

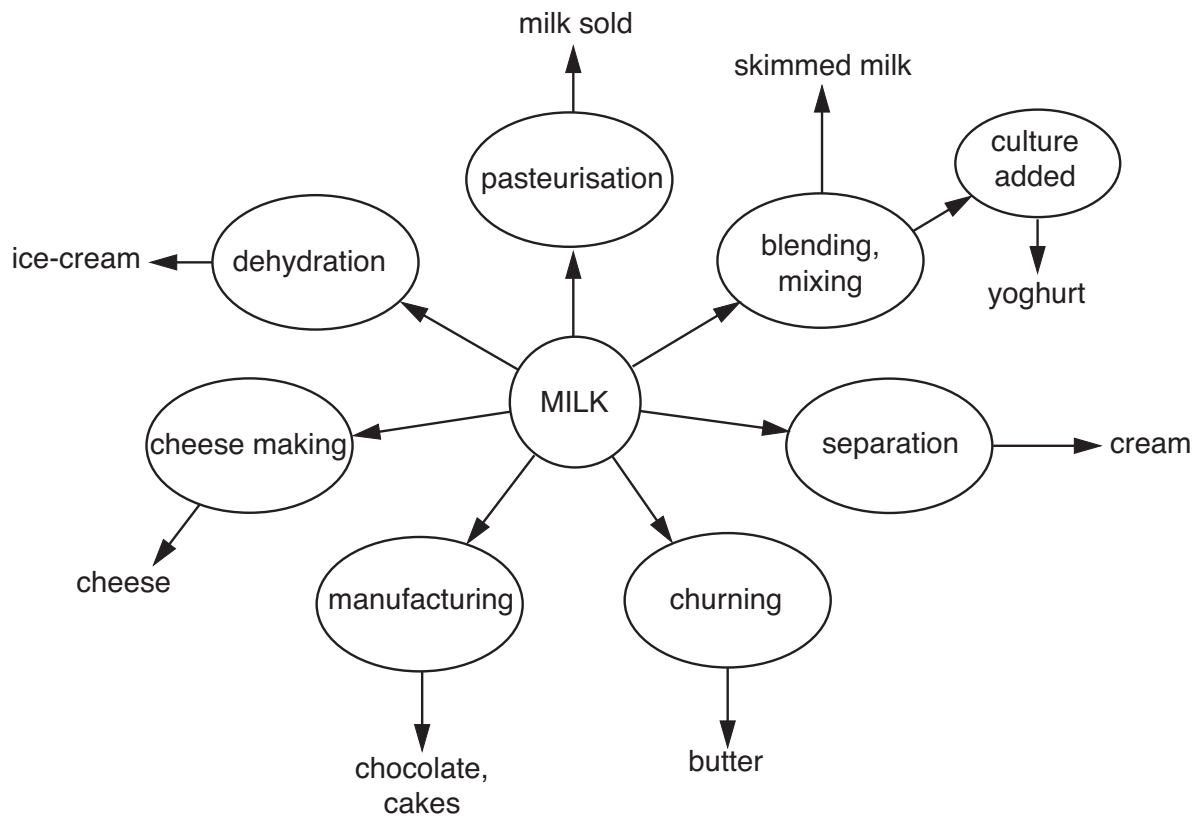
(c) Suggest why the price of milk can change.

.....

.....

..... [2]

(d) Look at the diagram about some uses of milk.



(i) Write down **three** products from milk.

- 1
- 2
- 3

[2]

(ii) Name **one product** from milk that is made using microorganisms.

.....

[1]

(iii) Name **one type of food processing** shown in the diagram that kills microorganisms.

.....

[1]

(e) Explain how microorganisms can spoil some food products.

.....

[2]

[Total: 10]

Turn over

3 Read the newspaper story about a monster pig.

A monster pig!

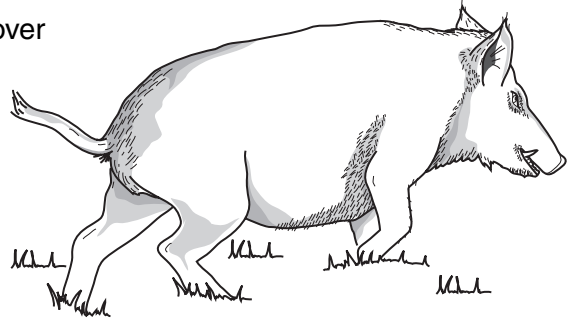
A large male pig weighing 477 kg and measuring over three metres long has been hunted and shot in America.

It could produce about 320 kg of sausages!

A spokesperson said, "It's a pity it is dead.

It could have been used in a selective breeding programme."

The technique of artificial insemination would have been used.



(a) Explain how the monster pig would have been used in a **selective breeding** programme.

.....

.....

..... [2]

(b) Look at the following descriptions.

- A** Sperm is extracted from a male and placed inside a female.
- B** Fertilised eggs are taken from a pregnant female and put into other females.
- C** During sexual reproduction a sperm fertilises an egg.
- D** Sperm and eggs are cloned.

Which description best describes the following processes?

Choose from **A, B, C** or **D**.

Each letter may be used once, more than once or not at all.

- a natural breeding programme
- an artificial insemination programme
- implanting embryos

[3]

- (c) Natural breeding programmes have about a 70% chance of a successful pregnancy.
Artificial insemination programmes have about a 90% chance of a successful pregnancy.
Embryo implantation programmes have about a 20% chance of a successful pregnancy.

Which method has the greatest chance of success?

Explain why.

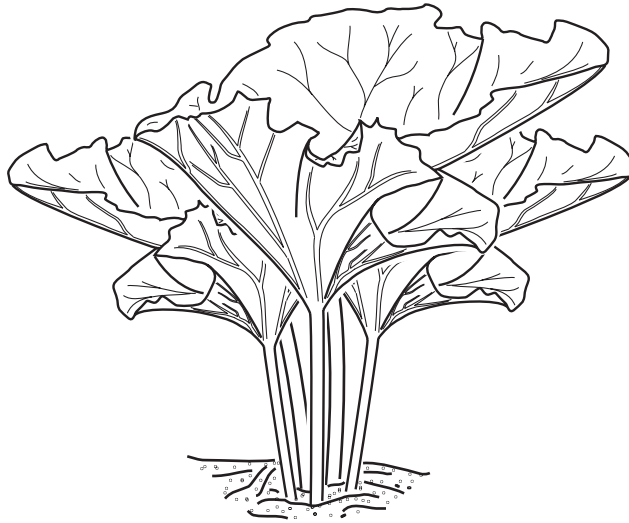
.....

.....

..... [2]

[Total: 7]

- 4 Charlie grows rhubarb in her garden.
She harvests the rhubarb and sells it.



- (a) Charlie knows that the rhubarb leaves use light to photosynthesise.

Which is the **correct** word equation for photosynthesis?

- A carbon dioxide + water \Rightarrow oxygen
- B carbon dioxide + water \Rightarrow glucose + oxygen
- C glucose + oxygen \Rightarrow carbon dioxide + water
- D glucose \Rightarrow oxygen + carbon dioxide

The correct word equation is

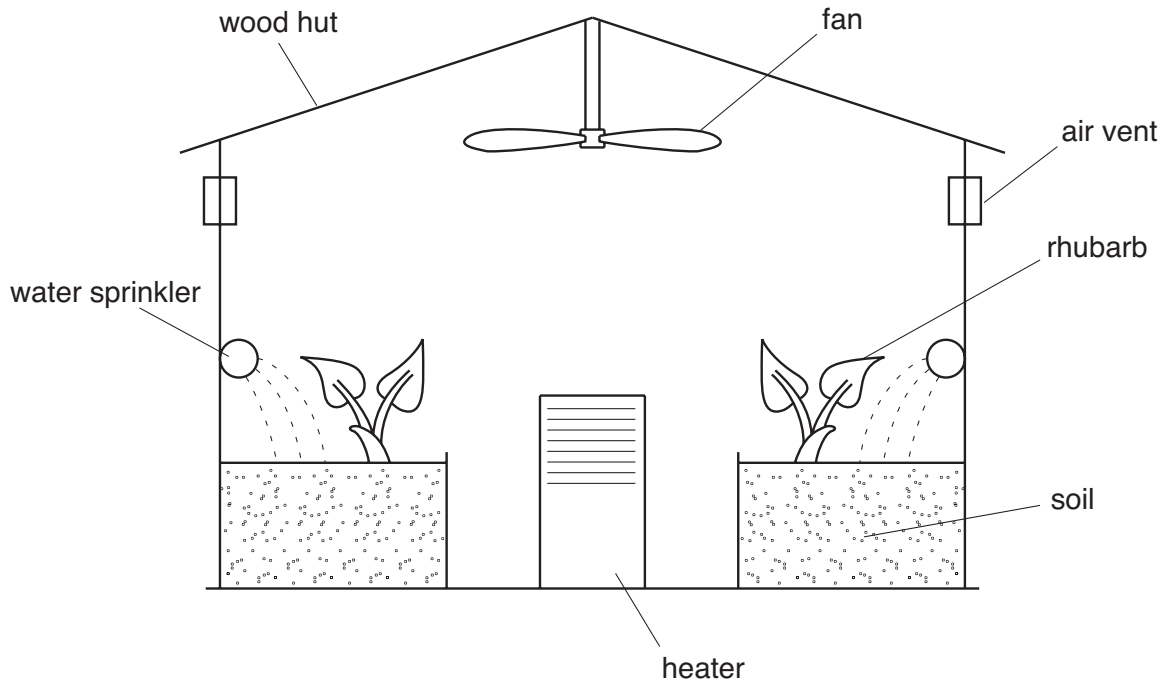
[1]

(b) Charlie does a web search.

She finds out that rhubarb can also be grown inside.

She uses a hut to grow rhubarb in controlled conditions.

The rhubarb grows much quicker and is soft and tender.



(i) Write down **one** condition, apart from light, that is being controlled in the hut.

Describe its effect on the growth of plants such as rhubarb.

condition

effect

..... [2]

(ii) Charlie does tests as the rhubarb grows.

Draw a straight line from each **description** to the correct **type of test**.

description	type of test
uses a pH meter to test the soil	semi-quantitative
inspects leaves for mineral deficiency	qualitative
uses pH indicator paper to test the soil	quantitative

[2]

- (c) Charlie grows the same number of rhubarb plants in both her garden and her hut. She compares the two crops every year for three years.

year	mass of rhubarb crop from garden (in kg)	mass of rhubarb crop from hut (in kg)
1	30.5	40.1
2	28.5	44.5
3	23.5	46.2
total mass		130.8
average mass	27.5	

(i) Complete the table by calculating the **two** missing values. [2]

(ii) Suggest why the crop yield from the hut is higher than that from the garden.

.....

.....

.....

..... [2]

(iii) Explain why Charlie can charge more for the rhubarb grown in her hut.

.....

.....

..... [2]

[Total: 11]

END OF QUESTION PAPER

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