

Module 2: Food and Health
2.2.1 Diet and Food Production
June 2009-January 2013
Questions

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (a) define the term <i>balanced diet</i> ; |
| (b) explain how consumption of an unbalanced diet can lead to malnutrition, with reference to obesity |
| (c) discuss the possible links between diet and coronary heart disease (CHD); |
| (d) discuss the possible effects of a high blood cholesterol level on the heart and circulatory system, with reference to high density lipoproteins (HDL) and low-density lipoprotein (LDL) |
| (e) explain that humans depend on plants for food as they are the basis of all food chains. (No details of food chains are required); |
| (f) outline how selective breeding is used to produce crop plants with high yields, disease resistance and pest resistance |
| (g) outline how selective breeding is used to produce domestic animals with high productivity |
| (h) describe how the use of fertilisers and pesticides with plants and the use of antibiotics with animals can increase food production |
| (i) describe the advantages and disadvantages of using microorganisms to make food for human consumption |
| (j) outline how salting, adding sugar, pickling, freezing, heat treatment and irradiation can be used to prevent food spoilage by microorganisms. |

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..... [8]

(c) Microorganisms can also be responsible for food spoilage. In order to prevent this spoilage, a range of food preservation methods are used.

Complete the table below to explain how the **three** methods of food preservation reduce food spoilage.

Method	Explanation
Freezing	
Pickling	
Irradiation	

[3]

[Total: 12]

Question 8 begins on page 22

3 Cholesterol is an important biological molecule.

(a) State **two** roles of cholesterol in living organisms.

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- 2
- [2]

(b) Fig. 3.1 represents the structure of a cholesterol molecule.

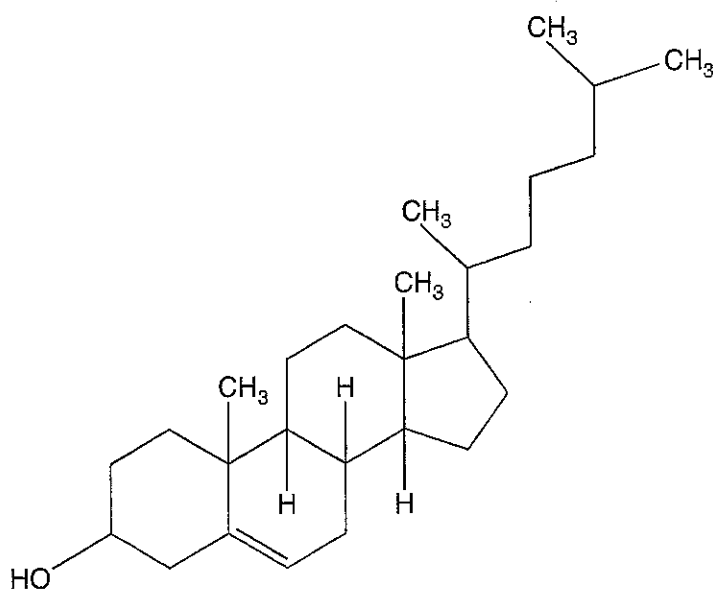


Fig. 3.1

(i) Identify **one** way in which the molecular structure of cholesterol is similar to the molecular structure of a carbohydrate.

..... [1]

(ii) Cholesterol is transported in the blood within molecules of low-density lipoprotein (LDL).

Name **two** molecules that combine with cholesterol to form LDLs.

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..... [2]

- (c) (i) In countries such as the UK, in which red meat forms a large part of the diet, people tend to have high levels of blood cholesterol compared with people in countries in which little red meat is eaten.

Suggest why diets with a high red meat content are associated with high blood cholesterol.

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..... [2]

- (ii) Name a disease, other than atherosclerosis, for which high blood cholesterol is a risk factor.

..... [1]

[Total: 15]

Answer **all** the questions.

- 1 (a) Plants are the producers in most food chains.

Complete the following passage by using the most appropriate terms from the list to fill the gaps.

A term should **not** be used more than once.

cellulose	nucleic acids	respiration
lipids	photosynthesis	starch
monomers	proteins	sucrose

Plants carry out the process of in which energy from the sun is used to produce a storage carbohydrate such as

Plants also absorb phosphates which are used to produce

..... . When humans eat the plants, the various polymers are

hydrolysed to and absorbed, but molecules such as

..... cannot be digested by humans and are egested. [5]

- (b) Fig. 1.1 shows the yield of rye plants (in tonnes per hectare) grown on the same soil for 80 years. These plants were grown without the addition of nitrogen fertiliser.

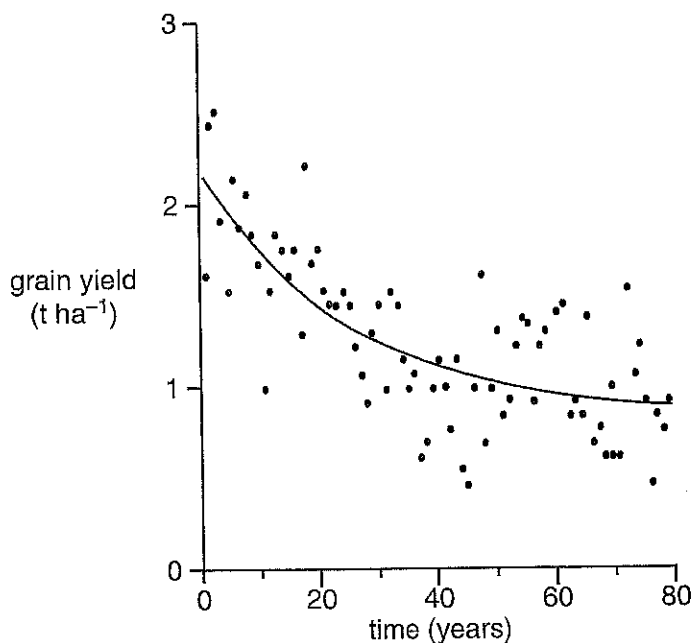


Fig. 1.1

3

Using Fig. 1.1 and your own knowledge, explain why nitrogen fertiliser needs to be applied to farmland.

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..... [3]

(c) Insect pests, such as aphids, can reduce yield in rye plants by piercing the phloem and removing materials.

Aphids can be killed using an insecticide. However, over a period of time, an increasing concentration of insecticide is required to control the aphid population.

Explain why this is the case.

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..... [4]

[Total: 12]

6 An important aspect of food production is maximising productivity. Maximum productivity can be achieved in a number of different ways.

(a) In selective breeding, humans look for variation between members of the same species and use this variation to improve productivity.

(i) State the **two** different causes of variation.

1

2 [2]

Fig. 6.1 is a scattergraph that shows the growth rate and egg productivity in a flock of chickens.

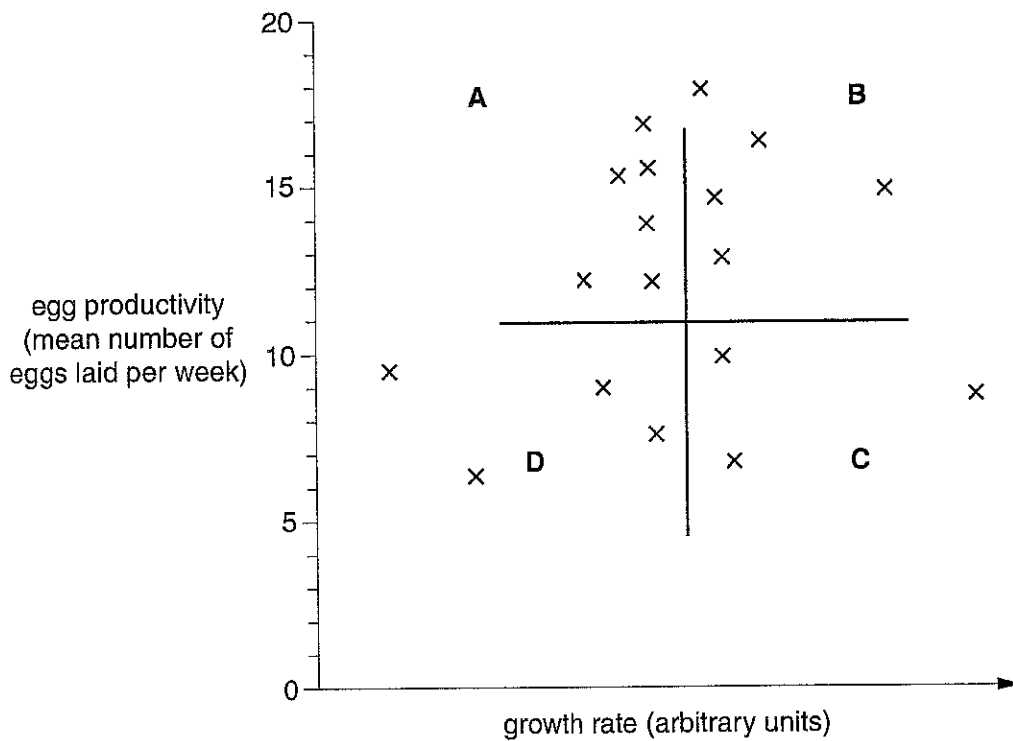


Fig. 6.1

(b) In the past, domestic chickens were given antibiotics as a growth promoter.

(i) When antibiotic growth promoters were used, it was claimed that the meat was of better quality, with less fat and increased protein content.

Suggest **two further** benefits of using antibiotics.

1

2 [2]

(ii) The use of antibiotics as growth promoters in animal production was banned in the European Union in 2006.

Suggest a concern that led to this ban.

..... [1]

[Total: 13]

Animal fats are thought to raise blood cholesterol levels. High blood cholesterol levels can lead to premature death.

Fig. 1.1 shows the relationship between blood cholesterol level and annual death rate per 10 000 of the population.

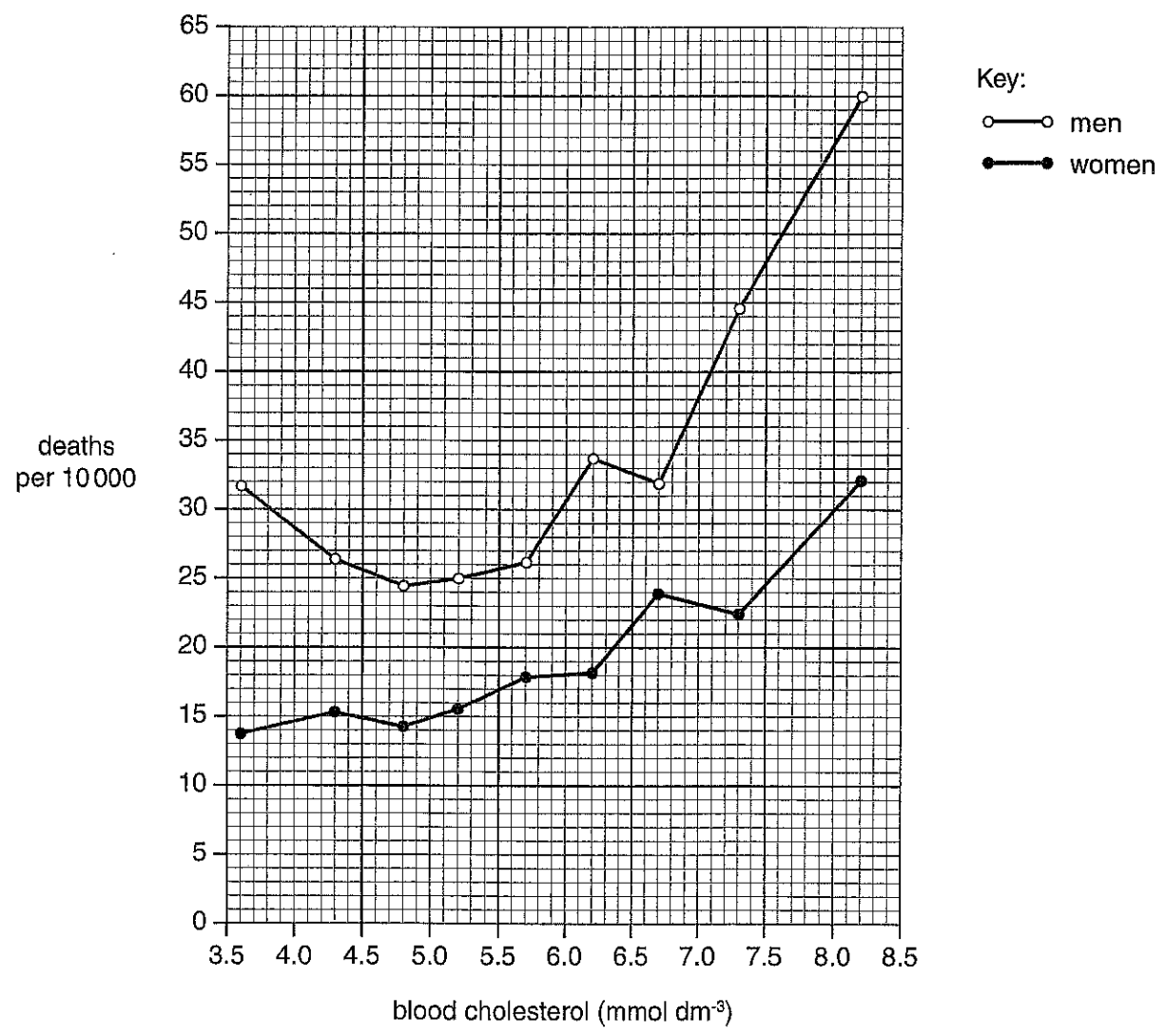


Fig. 1.1

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(ii) Describe the trends shown in Fig. 1.1.

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..... [3]

(iii) Increased blood cholesterol levels are associated with certain medical conditions.

Suggest **two** medical conditions that may be associated with increased blood cholesterol levels.

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..... [2]

[Total: 16]

(iii) Food can be preserved by keeping it at low temperature in a refrigerator or freezer.

Name **two other** methods of food preservation and state how each method works.

method

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how the method works

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method

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how the method works

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[4]

QUESTION 3(c) STARTS ON PAGE 10

- (c) Microorganisms, such as the fungus *Fusarium*, can be grown and then purified to produce mycoprotein. This mycoprotein can be used as a food source for humans.

Table 3.1 compares mycoprotein with beef.

Table 3.1

food	content per 100g					
	energy (kJ)	protein (g)	carbohydrate (g)	total fat (g)	saturated fat (g)	iron (mg)
mycoprotein	357	12	9	2.9	0.6	0.1
beef	1163	26	0	18.2	7.0	2.6

Use the data in Table 3.1 to **describe and explain** the advantages and disadvantages of using microorganisms to produce food for human consumption.



In your answer you should make comparisons using the information in Table 3.1.

advantages

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disadvantages

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[8]

[Total: 20]

Answer **all** the questions.

- 1 (a) A balanced diet is essential for good health.

Complete the following passage by using the most appropriate terms from the list to fill the gaps.

Each term **should not** be used more than once.

- haemoglobin** **iron** **collagen** **obese**
calcium **anorexic** **sodium**

A balanced diet is one which provides an adequate intake of energy and nutrients for the maintenance of our body. If energy intake exceeds energy usage over a period of time, an individual can become

The deficiency disease anaemia can be caused by a lack of the mineral in the diet. As a result of this deficiency, the body is unable to produce sufficient amounts of the protein in red blood cells. [3]

- (b) The Body Mass Index (BMI) is one way of determining whether a person is underweight or overweight.

BMI can be calculated using the formula:

$$\text{BMI} = \frac{\text{mass in kg}}{(\text{height in m})^2}$$

Calculate the BMI of a female of mass 69 kg and a height of 1.67 m.

Show your working. Give your answer to **one decimal place**.

Answer = [2]

- (c) Another way of determining whether a person is underweight or overweight is to use a graph showing the relationship between height and body mass.

Fig. 1.1 is an example of this type of graph.

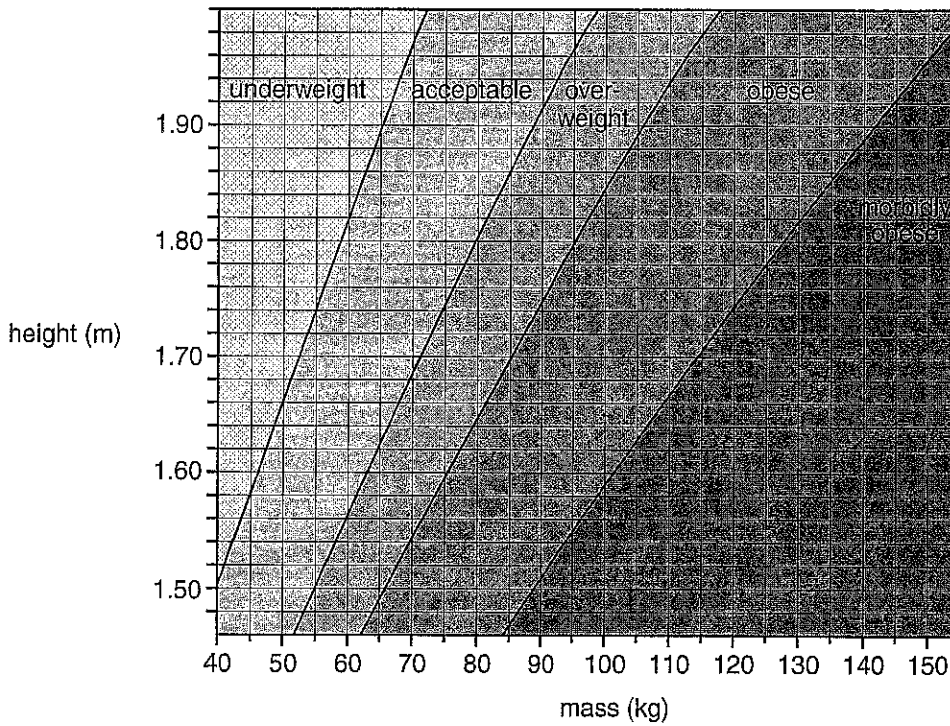


Fig. 1.1

- (i) Using Fig. 1.1, state the category into which a female who has a body mass of 69 kg and a height of 1.67 m is placed.

..... [1]

- (ii) There are many factors that determine the category into which a person is placed. Fig. 1.1 does not take into account all of these factors.

Suggest why the female in (c)(i) might be placed in the wrong category.

.....

 [2]

- (d) Name **two** diseases associated with obesity.

1
 2 [2]

[Total: 10]

Turn over