basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P1

FEBRUARY/MARCH 2014

MARKS: 150

TIME: 2½ hours

This question paper consists of 17 pages.

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions in the ANSWER BOOK.
2. Start EACH question on a NEW page.
3. Read ALL the questions carefully and answer only what is asked.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Non-programmable calculators may be used.
6. Show ALL your calculations, including a formula, where applicable.
7. Write neatly and legibly.

SECTION A

QUESTION 1

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1.1–1.1.10) in the ANSWER BOOK, for example 1.1.11 A.

1.1.1 The micro-organisms in rumen digest cellulose to produce the following volatile fatty acids:

A Acetic acid, butyric acid and pepsin
B Propionic acid, acetic acid and butyric acid
C Butyric acid, acetic acid and hydrochloric acid
D Propionic acid, butyric acid and methane

1.1.2 The process that pushes food through the alimentary canal by the relaxation and contraction of muscles in the wall of the alimentary canal is called ...

A assimilation.
B absorption.
C peristalsis.
D digestion.

1.1.3 The liver and the pancreas secrete bile and pancreatic juices that are deposited into the ... of the alimentary canal.

A caecum
B duodenum
C colon
D ileum

1.1.4 The dry material intake of an animal was 12 kg and the dry mass of the manure was 3 kg. The coefficient of digestibility of the feed is ...

A 55%.
B 60%.
C 75%.
D 67%.

1.1.5 Sheds with open sides were erected over an open feedlot area. The following statements with regard to this production enterprise are TRUE:

(i) Temperature control was provided for the animals.
(ii) Milk production increased.
(iii) Rotational grazing could now be practised.
(iv) This enterprise is capital intensive.

Choose the CORRECT combination:

A (i), (ii), (iii) and (iv)
B (ii) and (iv)
C (i) and (iii)
D (i), (ii) and (iv)

1.1.6 The following are some of the behavioural patterns that may indicate abnormal behaviour in animals:

(i) Licking and biting of strange objects
(ii) Belching
(iii) Feather or body pecking
(iv) Aggressive movements with excessive saliva secretion

Choose the CORRECT combination:

A (i), (ii), and (iii)
B (i), (iii) and (iv)
C (ii), (iii) and (iv)
D (i) and (iii)

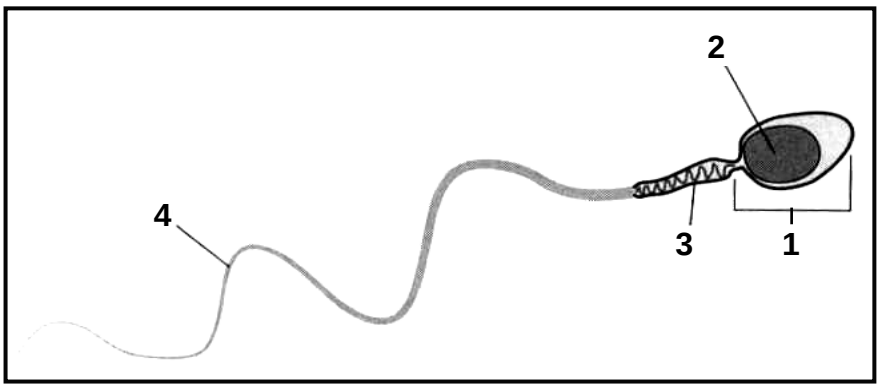
1.1.7 The main reason for drying off a high-producing dairy cow before she starts her next lactation period is to ...

A ensure that the cow becomes pregnant early.
B reduce problems during parturition.
C allow recovery of tissue and glandular material.
D shorten the gestation period.

1.1.8 A piece of equipment used to handle a large ruminant animal so that it can be given an intravenous injection by a veterinary surgeon:

A Crush
B Handling pen
C Kraal
D Grazing camp

1.1.9 Part ... provides the energy for the sperm cell in the diagram below.



A 4
B 1
C 3
D 2

1.1.10 The following are some of the characteristics of external parasites:

(i) Damage the skin of the host animal
(ii) Roundworms and tape worms are good examples
(iii) Lower the production of the host animal
(iv) Transfer diseases into the host animal

Choose the CORRECT combination:

A (i), (ii) and (iv)
B (ii), (iii) and (iv)
C (i), (iii) and (iv)
D (ii) and (iv) (10 x 2) (20)

1.2 Indicate whether each of the statements in COLUMN B applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN A. Write **A only**, **B only**, **both A and B** or **none** next to the question number (1.2.1–1.2.5) in the ANSWER BOOK, for example 1.2.6 B only.

COLUMN A			COLUMN B
1.2.1	A	Anaemia	Vitamin A deficiency disease
	B	Night blindness	
1.2.2	A	Creep feeding	Results in a higher weaning weight in piglets
	B	Maintenance feeding	
1.2.3	A	Seminiferous tubules	Produce the seminal fluid for the lubrication of the urethra
	B	Leydig cells	
1.2.4	A	Libido	A bull does not take an interest in a cow on heat
	B	Impotence	
1.2.5	A	Dosing	Chemical method used by livestock breeders to control parasites in farm animals
	B	Dipping	

(5 x 2) (10)

1.3 Give ONE word/term for each of the following descriptions. Write only the word/term next to the question number (1.3.1–1.3.5) in the ANSWER BOOK.

1.3.1 The mineral element needed for normal production of the hormone thyroxin

1.3.2 Gross energy value of a feed minus the energy lost through faeces, urine and digestive gases, as well as the energy lost as heat

1.3.3 A small area where sheep are kept and fed for maximum production output

1.3.4 The structure that develops on the ovary after ovulation at the position of the burst follicle

1.3.5 The most common bacterial disease that affects the udder and milk production (5 x 2) (10)

1.4 Change the UNDERLINED WORD(S) in each of the following statements to make the statements TRUE. Write only the correct word(s) next to the question number (1.4.1–1.4.5) in the ANSWER BOOK.

1.4.1 Bile that is responsible for the emulsification of proteins, is secreted by the liver.

1.4.2 A battery system is where there are a small number of animals in a large area with minimal human and technological involvement.

1.4.3 A tool used to clip the seminal tube above the testis without cutting the scrotum during the castration of animals is called a/an elastrator.

1.4.4 The milk produced during the first few days after calving contains pathogens for immunisation against diseases.

1.4.5 The part of the male reproductive organ that is responsible for regulating testicular temperature is the epididymis. (5 x 1) (5)

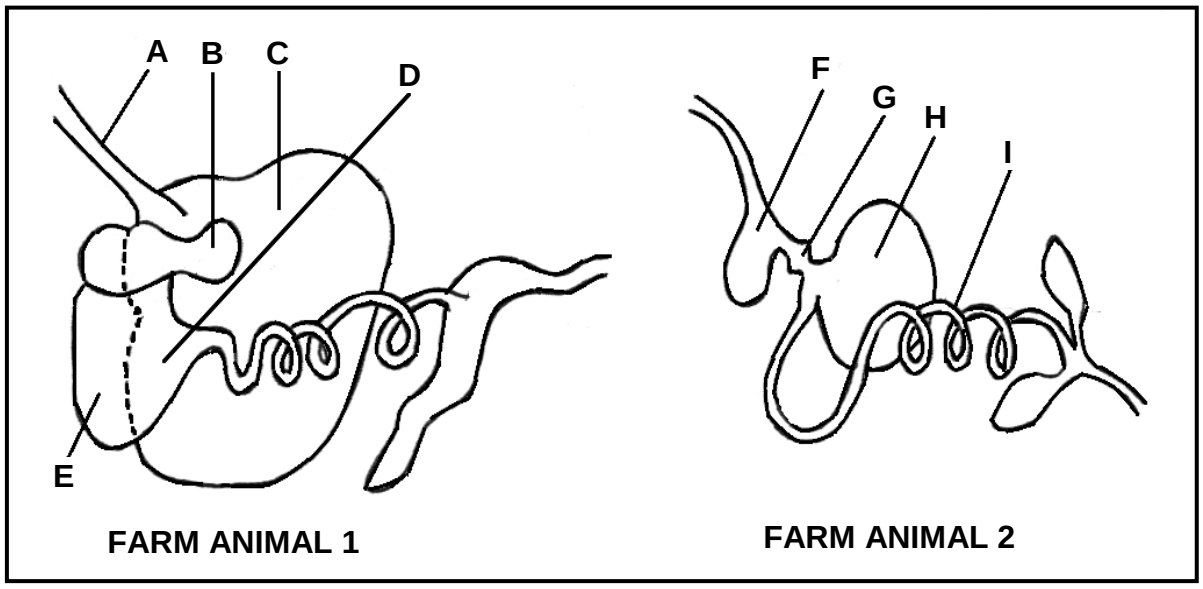
TOTAL SECTION A: 45

SECTION B

Start this question on a NEW page.

QUESTION 2: ANIMAL NUTRITION

2.1 The diagrams below show the digestive systems of two different farm animals.



2.1.1 Identify parts **A**, **B** and **I**. (3)

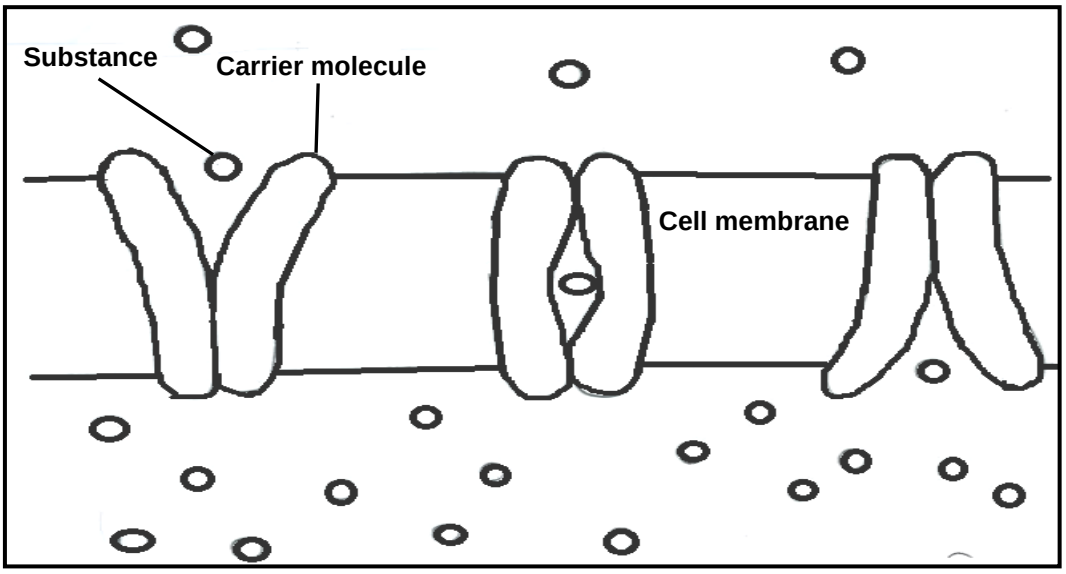
2.1.2 State ONE function of part **F**. (1)

2.1.3 State the function of part **C** in FARM ANIMAL 1 that corresponds with part **F** in FARM ANIMAL 2. (1)

2.1.4 Determine the level of maturity of FARM ANIMAL 1. (1)

2.1.5 Identify and describe the structure in FARM ANIMAL 2 that makes the mechanical digestion of maize possible. (2)

2.2 The diagram below illustrates the absorption of substances through a cell membrane by means of the carrier-molecule theory.



2.2.1 Name the type of absorption process that is represented by the carrier-molecule theory above. (1)

2.2.2 Describe the process in QUESTION 2.2.1 above. (2)

2.3 Name the vitamin or mineral associated with EACH of the following deficiency symptoms:

2.3.1 Deformation and ulceration of the cornea of the eyes (1)

2.3.2 Muscular dystrophy (stiff-lamb disease) (1)

2.3.3 Insufficient formation of haemoglobin in red blood cells (1)

2.4 The following feeds and feed supplements are available to livestock farmers:

yellow maize meal; bone meal; urea; lucerne; silage; salt; fish meal

Choose the most suitable feed or feed supplement from the list above that matches each of the following descriptions:

2.4.1 A concentrate to be used as an energy source (1)

2.4.2 A substance that is used to regulate the lick intake of grazing animals (1)

2.4.3 A cheap protein supplement in the ration of ruminant farm animals (1)

2.4.4 A protein-rich concentrate that can be fed to pregnant farm animals (1)

2.4.5 A protein-rich hay that is fed to growing calves (1)

2.5 The table below shows feeds (A, B, C and D), their respective digestible protein (DP) and their cost. Animals in a feedlot require 16% digestible protein.

TYPE OF FEED	DIGESTIBLE PROTEIN (DP) (%)	COST PER UNIT (R/kg)
FEED A	36	R2,90
FEED B	42	R3,50
FEED C	9	R1,10
FEED D	12	R1,40

2.5.1 Use the Pearson square method to determine the ratio needed to mix FEED A and FEED C to meet the feeding requirements stated above. (4)

2.5.2 If FEED B is mixed with FEED D to meet the feeding requirement then four parts of FEED B must be mixed with 26 parts of FEED D.

Use the data above to calculate the cost per unit of the following mixtures:

(a) FEED A and FEED C (2)

(b) FEED B and FEED D (2)

2.5.3 A farmer must choose between the mixture of FEED A and FEED C and that of FEED B and FEED D. Recommend the cheapest mixture and support your answer with a reason. (2)

2.6 The table below gives the nutritional information of selected feeds.

FEED	CRUDE PROTEIN (%)	TDN (%)
Lucerne hay	25	62
Maize meal	9,5	80
Silage	7,5	75

2.6.1 Calculate the nutritive ratio (NR) of lucerne hay. Show ALL calculations. (3)

2.6.2 Classify the scale of the NR value of lucerne hay calculated in QUESTION 2.6.1. (1)

2.6.3 Justify the suitability of lucerne hay for the fattening of matured animals by referring to the data above. (2)

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QUESTION 3: ANIMAL PRODUCTION

Start this question on a NEW page.

3.1 The table below shows the temperature ranges of farm animals and the expected growth rates expressed as percentages of their average production.

GROWTH RATE (% COMPARED TO THE AVERAGE)		TEMPERATURE (°C)
COWS	PIGS	
110	130	35
100	90	25
90	50	15
80	25	5
70	5	0

3.1.1 Draw a line graph to compare the growth rate of cows and pigs according to the temperature differences (°C). (6)

3.1.2 Describe TWO methods to protect pigs against extreme cold weather conditions in order to maintain optimal production levels. (2)

3.1.3 Cows have a better growth rate than pigs at an environmental temperature of 5 °C. Support this statement with THREE reasons. (3)

3.2 The scenarios below describe the farming experiences of two farmers (**A** and **B**).

FARMER A	FARMER B
The farmer decided to farm with broilers. He bought day-old chicks and wanted to slaughter them after six weeks. The farmer wanted to sell the chickens to a school hostel at the same age. A hotel nearby offered the farmer only rice left-overs from its kitchen. The farmer fed the broilers these left-overs, but after five weeks they had not grown enough. The hostel will only buy chickens that weigh 2 kg each.	The farmer farms in a summer rainfall area of the country. Hot summers and very cold winters are typical of the area. The farmer considers starting a feedlot to increase production and create job opportunities on the farm. Currently the farmer is farming extensively with beef cattle and sells weaners at the local auction.

3.2.1 Give the main reason why FARMER A's broilers did not grow at the expected growth rate. (1)

3.2.2 Indicate how the farmer can correct the problem identified in QUESTION 3.2.1 above. (2)

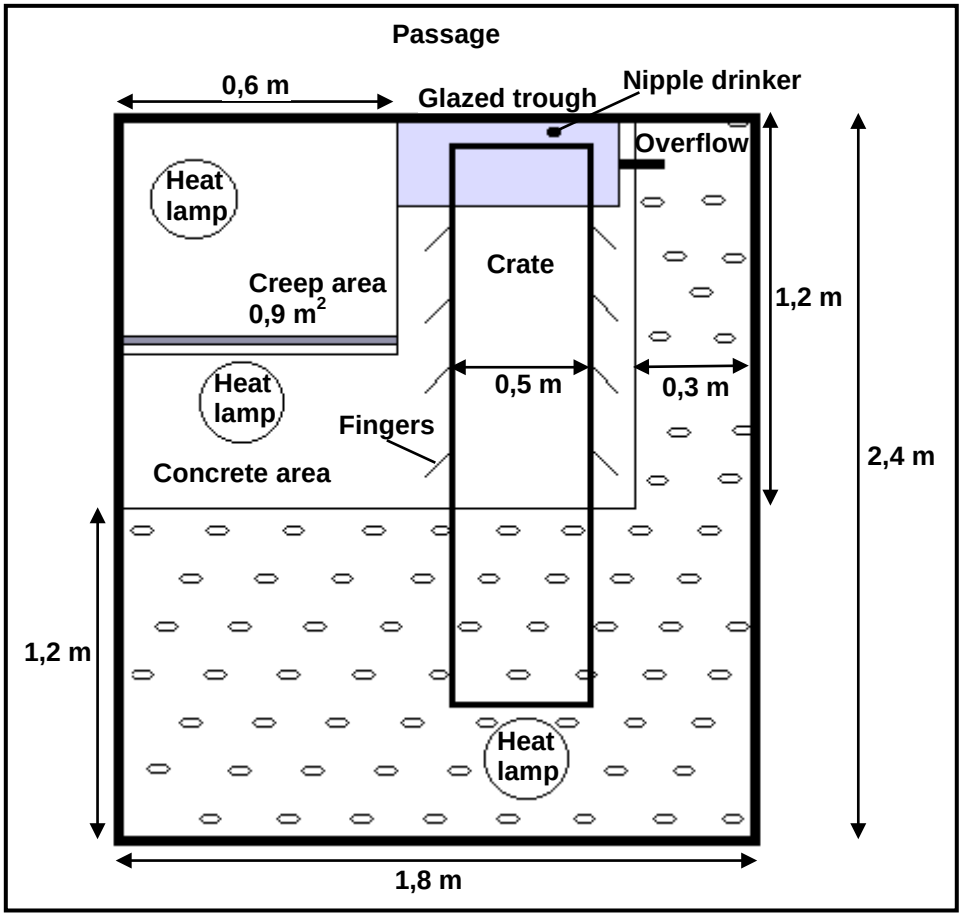
3.2.3 Identify the production system that is practised by FARMER B. Support your answer with a reason. (3)

3.2.4 Identify TWO environmental factors experienced by FARMER B which are a risk for animal production on the farm. (2)

3.2.5 Explain THREE major management aspects that need to be considered in the feedlot planned by FARMER B that would increase the production of this enterprise. (3)

3.3 The illustration below indicates the design and map of a farrowing pen in a pig production unit:

- Crate: Houses the sow
- Creep area: Where the litter feeds
- Fingers: Easy suckling from the mother lying on the other side of the crate
- Nipple drinker: To access water
- Overflow: To allow excess water to drain



3.3.1 Indicate TWO items that would contribute to the running cost of the farrowing pen above. (2)

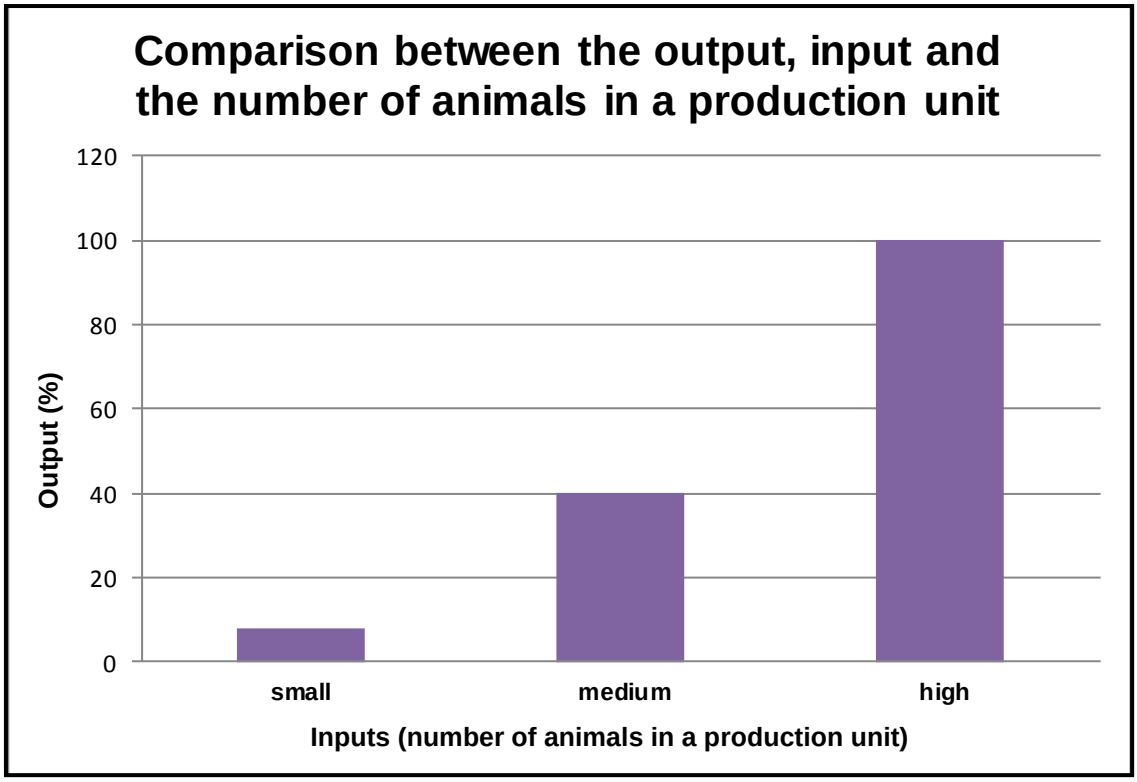
3.3.2 Indicate the necessity of the following in the farrowing pen:

(a) Holes on the floor area (1)

(b) The nipple drinker closer to the creep area (1)

3.3.3 Justify the use of heat lamps in all areas of this farrowing pen. (1)

3.4 Learners compared the output of an animal production unit with the input and number of animals. The gathered data is reflected in the graph below. It was also noted that only the large production units could afford the latest technology.



3.4.1 Describe the relationship between the output and input used in the production units above. (2)

3.4.2 Justify why large production enterprises could afford the latest technology as stated in the data above. (2)

3.5 Beating, rushing and exposing animals to stress, pain and fear before slaughtering might have an effect on the quality of their meat.

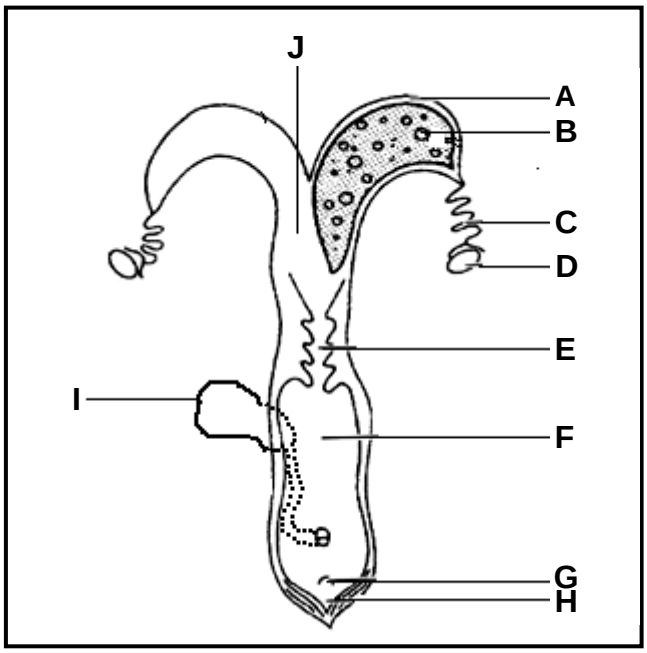
3.5.1 Describe TWO physical effects of the poor treatment of animals on the quality of meat. (2)

3.5.2 State TWO economic implications of the poor treatment of animals for the farmer. (2)
[35]

QUESTION 4: ANIMAL REPRODUCTION, PROTECTION AND CONTROL

Start this question on a NEW page.

4.1 The diagram below illustrates the reproductive system of a cow.



4.1.1 Identify the parts of the reproductive system labelled **A**, **C**, **E** and **F**. (4)

4.1.2 Write down the letter (A–J) of the part in the diagram above that is associated with EACH of the following:

(a) Serves as a birth canal (1)

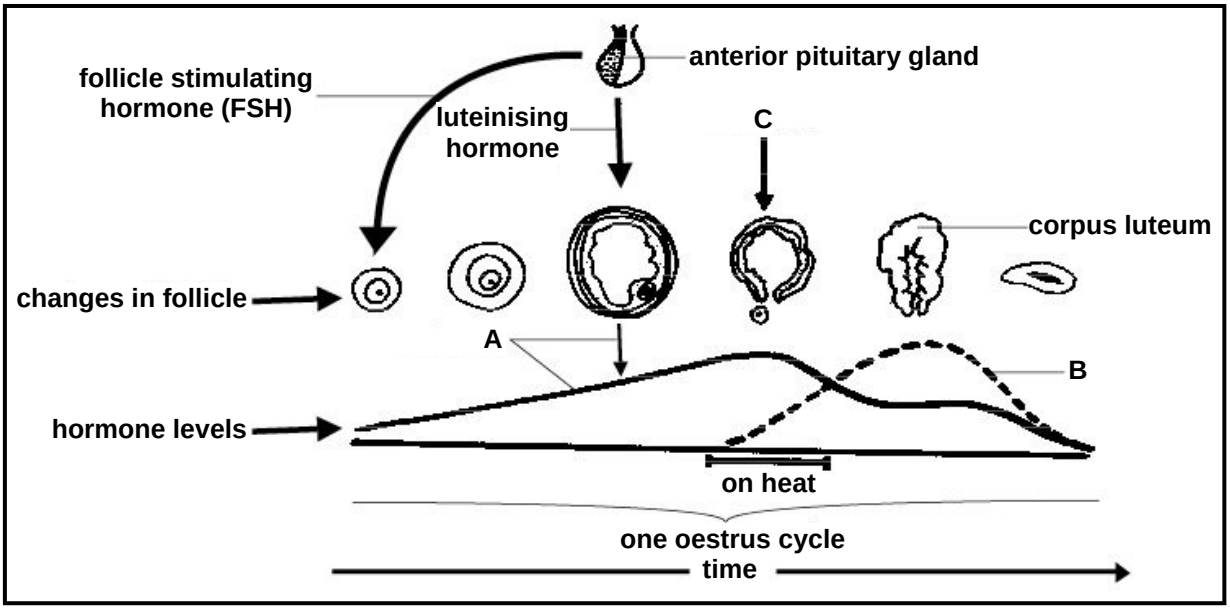
(b) Site of fertilisation (1)

(c) Organ not directly involved in reproduction (1)

(d) Deposition of semen during artificial insemination (1)

4.1.3 Explain how the caruncles represented by **B** contribute to the implantation of the embryo. (2)

4.2 The schematic representation below indicates the sequence of hormonal changes that occur during the oestrus cycle and some structures that are involved.



4.2.1 Identify hormone **A** and hormone **B**. (2)

4.2.2 Identify and briefly describe process **C** in the schematic representation above. (2)

4.2.3 State FOUR visible signs that the cow will display when hormone **A** is at its peak. (4)

4.2.4 What is the main function of the following hormones in the schematic representation above:

(a) FSH (1)

(b) LH (1)

4.3 The table below illustrates some infectious reproductive diseases in cattle.

DISEASE	PATHOGEN	SYMPTOMS	PREVENTION AND CONTROL
Trichomonias	**A**	• Low-grade uterine infection with early abortion • Temporary infertility	• Use AI with disease-free semen • No specific treatment for cows • Bulls can be successfully treated
Brucellosis	Bacteria	• Abortion, usually after five months • Retained placenta • Infertility • Undulant fever in humans	• Heifers must be vaccinated • No cure – destroy infected animals
Vibriosis	**B**	• Abortion and temporary infertility • Bulls are carriers but show no symptoms	• Vaccination • Test for possible infection • Use disease-free semen in AI

4.3.1 Name pathogens **A** and **B** in the table above. (2)

4.3.2 Identify TWO diseases in the table that may be transmitted by a bull to a dairy cow. (2)

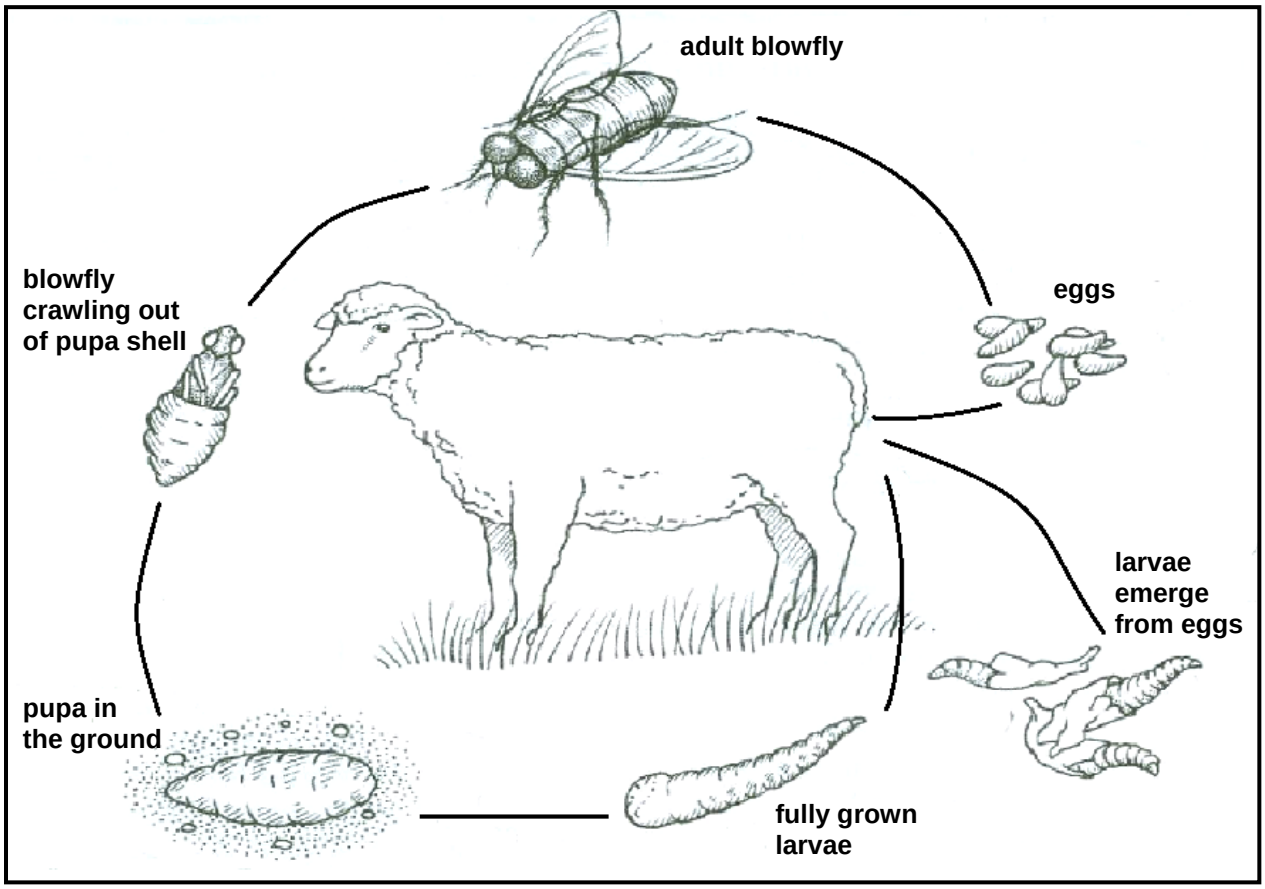
4.3.3 Name a common symptom of all THREE of these major diseases. (1)

4.3.4 State a control measure for brucellosis in heifers. (1)

4.3.5 Give the main reason for being cautious when handling an animal with an unknown disease. (1)

4.3.6 Brucellosis is fatal. Support this statement by referring to the information above. (1)

4.4 The diagram below shows the life cycle of a parasite that affects some farm animals.



4.4.1 Identify the external parasite in the diagram above. (1)

4.4.2 Indicate TWO environmental conditions that favour development and multiplication of this parasite. (2)

4.4.3 State TWO economic implications a farmer will experience due to an attack by this parasite. (2)

4.4.4 Name TWO methods a farmer can employ to control these attacks. (2)
[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150