



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

## **NATIONAL SENIOR CERTIFICATE**

**GRADE 12**

**AGRICULTURAL SCIENCES P1**

**EXEMPLAR 2014**

**MARKS: 150**

**TIME: 2½ hours**

**This question paper consists of 16 pages.**

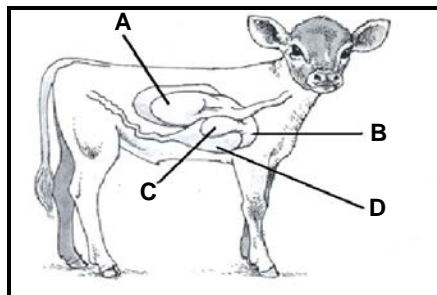
**INSTRUCTIONS AND INFORMATION**

1. This question paper consists of TWO sections, namely SECTION A and SECTION B.
- 2 Answer ALL the questions in the ANSWER BOOK.
3. Start EACH question on a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Non-programmable calculators may be used.
6. Write neatly and legibly.

**SECTION A****QUESTION 1**

- 1.1 Various options are provided 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 diagram below represents a young ruminant. The most functional part of the stomach is labelled ...



- A A.  
B B.  
C C.  
D D.

- 1.1.2 The liver and the pancreas secrete digestive juices into the ... in the alimentary canal.

- A caecum  
B duodenum  
C colon  
D oesophagus

- 1.1.3 The micro-organisms in rumen digest cellulose to produce the following products:

- (i) Carbon dioxide  
(ii) Propionic acid  
(iii) Butyric acid  
(iv) Pepsin  
(v) Methane

Choose the correct combination:

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

1.1.4 In a feed flow programme the feed requirements will guide the quantities and composition of rations supplied to farm animals. The feed requirements of animals depend on the following:

- (i) The production status of the animal
- (ii) The size of the animal
- (iii) The value of the product being produced
- (iv) The season of the year
- (v) The availability of feeds

Choose the correct combination:

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

1.1.5 The following equipment and facilities are normally used for extensive sheep farming:

- (i) Neck clamp
- (ii) Electrical shock apparatus or prod
- (iii) Shearing shed
- (iv) Drinking trough
- (v) Dosing gun

Choose the correct combination:

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

1.1.6 In an intensive animal production unit ...

- A more labourers are employed per unit of production output.
- B a large area of land with a low production output is used.
- C environmental control and management is very important.
- D mechanisation and other technology is NOT important.

1.1.7 Ruminants sometimes die of high concentrations of ammonia in their blood due to ... poisoning.

- A maize fungus
- B poison bulb
- C thorn apple
- D urea

- 1.1.8 The stage of natural mating that is characterised by the bull showing the 'flehmen' reaction is called ...
- A erection.
  - B mounting.
  - C courtship.
  - D ejaculation.
- 1.1.9 The spermatozoa are deposited into ... during the artificial insemination process.
- A the uterus
  - B one of the uterus horns
  - C the vagina
  - D the Fallopian tubes
- 1.1.10 A freemartin occurs in multiple births in cattle when ...
- A a male calf develops in the uterus with a normal female calf having separate placentas and blood supply.
  - B a female calf develops in the uterus with a normal male calf having shared placentas and blood supply.
  - C two female calves develop in the uterus and the placenta and blood supply are shared.
  - D the male calf is larger than the normal female calf and space is restricted.
- (10 x 2) (20)

- 1.2 Indicate whether each of the descriptions 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 to 1.2.5) in the ANSWER BOOK, for example 1.2.6 B only.

COLUMN A			COLUMN B
1.2.1	A	Peristalsis	The alternate and rhythmic relaxation and contraction of the muscles in the wall of the oesophagus
	B	Swallowing	
1.2.2	A	Antibiotics	Substance given to beef cattle in a feedlot to improve their growth rate and meat production
	B	Hormones	
1.2.3	A	Sheep blowfly	No visible external scars on infected farm animals
	B	Liver fluke	
1.2.4	A	Scrotum	The primary reproductive organ of a bull
	B	Penis	
1.2.5	A	Sterile	A bull that has been castrated
	B	Infertile	

(5 x 2)

(10)

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

- 1.3.1 The type of feed that is responsible for the bulk of the ration of a ruminant animal
- 1.3.2 The type of production unit that produces whole chickens for their meat in a short period of time
- 1.3.3 The type of pathogen that causes foot-and-mouth disease in cattle
- 1.3.4 The condition where the placenta and liquids dry out and only a dried-out foetus is left in the uterus
- 1.3.5 The underdevelopment of parts of the reproductive organs of a bull

(5 x 2)

(10)

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

1.4.1 The lining of the rumen contains fingerlike protrusions called villi that act as heating rods for optimal temperature control.

1.4.2 Vitamin K is essential for the formation of prothrombin that is essential for blood formation.

1.4.3 The concept of nutritive ratio is used to give an indication of the fat content of a feed.

1.4.4 A microphone is used to listen to the respiratory rate and heart rate of an animal.

1.4.5 The epididymis is a tube of muscular tissue and is the common excretion canal for urine and semen.

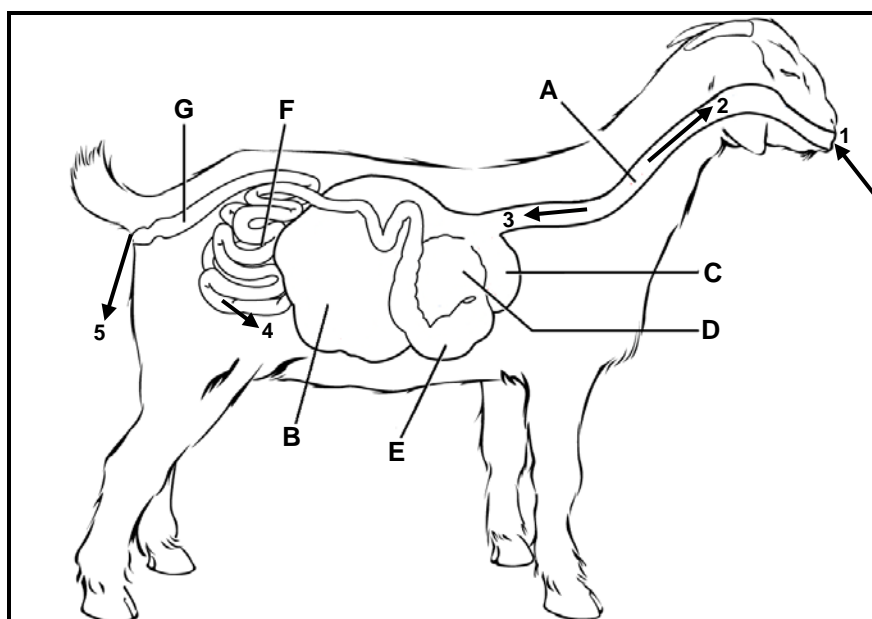
(5 x 1) (5)

**TOTAL SECTION A: 45**

**SECTION B****QUESTION 2: ANIMAL NUTRITION**

Start this question on a NEW page.

- 2.1 The diagram below represents the digestive system of a ruminant farm animal.



- 2.1.1 Identify the parts labelled **B**, **C**, **D** and **E** in the diagram above. (4)
- 2.1.2 Write down the LETTER of the part of the digestive system above where the following processes take place:
- (a) Secretion of hydrochloric acid (1)
  - (b) Grinding of food particles (1)
  - (c) Urea changes to microbial protein (1)
  - (d) Water reabsorbed from undigested food (1)
- 2.1.3 Some nutritional processes are indicated by numbers and arrows in the diagram above. Write down the NUMBER that represents each of the following processes:
- (a) Egestion (1)
  - (b) Assimilation (1)
  - (c) Regurgitation (1)
- 2.1.4 Give the main reason why the animal in the diagram above is classified as a ruminant. (1)



2.2 Write down the mineral that causes the following deficiency diseases:

2.2.1 Milk fever in dairy cattle (1)

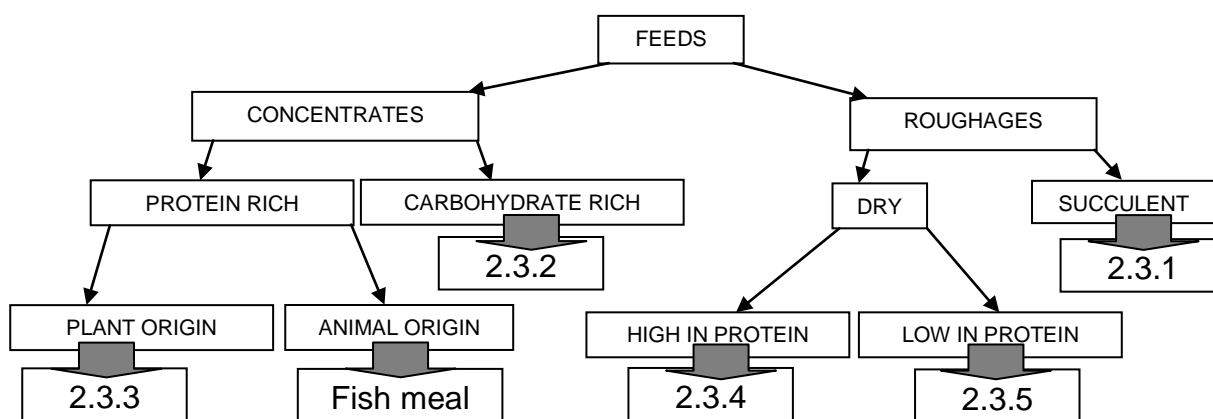
2.2.2 Sway-back in sheep (1)

2.2.3 Parakeratosis in chickens (1)

2.3 The following feeds are available to a farmer:

- Yellow maize meal
- Silage
- Peanut oilcake meal
- Oats straw
- Lucerne
- Bone meal

Complete the schematic representation below by including the appropriate example of a feed from the list above in each case.



(5)

2.4 The table below represents the nutritional information of four feeds labelled A to D.

FEED	DM %	TDN %	DP %	CF %
A	89	68	28	13
B	88	88	9	2
C	89	76	13	11
D	24	55	11	20

**Key:**  
 DM = Dry material  
 TDN = Total digestible nutrients  
 DP = Digestible protein  
 CF = Crude fibre

2.4.1 Identify a feed that would represent a roughage and give a reason from the data in the table above to support your answer. (2)

2.4.2 An animal ingested 30 kg of Feed D in a digestion experiment. The amount of manure released from this feed was measured as 8 kg with a moisture content of 45%.

Calculate the coefficient of digestibility of Feed D. Show ALL calculations. (5)

- 2.4.3 Calculate the nutritive ratio of Feed C and indicate its suitability as part of a high-protein lick to improve the production output of animals. (4)
- 2.4.4 A herd of dairy cows have a nutritive requirement of 14% digestible protein (DP). Use the Pearson square method to calculate the ratio in which Feed A and Feed B need to be mixed to meet this requirement. (3)
- 2.4.5 Give a reason for including urea in a feed mixture such as the one in QUESTION 2.4.4. (1)
- [35]**

### QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

Start this question on a NEW page.

- 3.1 The table below represents the average quantities of milk produced by a dairy herd at different levels of additional feeding under the same environmental conditions.

Level of additional feeding (kg per day)	Average milk production (litres per day)
0	8
3	14
6	22
9	32
12	36
15	34

- 3.1.1 The research question during the above scientific investigation was described as follows:
- Will additional levels of feeding for a dairy cow lead to a proportional increase in milk production?
- Write a hypothesis based on this research question. (2)
- 3.1.2 Identify the following from the data given above:
- (a) Dependent variable (1)
- (b) Independent variable (1)
- 3.1.3 Explain the reason for keeping the environmental conditions the same during the trial period where different levels of additional feed were provided to dairy cows. (2)
- 3.1.4 Give TWO examples of environmental conditions that were controlled during this experiment. (2)

3.2

A small-scale farmer selected the Nguni breed for his farming system and location. Characteristics of this breed include fertility, hardiness, a pleasant temperament and multiple colours which define it as a proudly South African breed. The farm is in a severe redwater and heartwater area. The objective is to breed a true-to-type animal that will be used in a small-scale agro-ecological farming system. The manure from the cattle will be used in orchards, in cropping systems and for biogas.

All the cattle are named, as this is common in the local culture. Their names are linked to their patterns rather than personality and behaviour. Breeding these remarkable landrace animals is very exciting. Apart from the traits, you never know what patterns and colours you will get. Their unique patterns are landscapes in themselves and it is easy to understand how these animals were central to the life of some cultural groupings and inspired many praise songs and poetry.

- 3.2.1 Give the possible reason why the Nguni breed is called proudly South African. (1)
- 3.2.2 State the characteristic of the Nguni breed mentioned in the case study that would make it suitable for the following:
- (a) Survive under harsh African climatic conditions (1)
  - (b) Easy to handle (1)
  - (c) Produce calves with a high weaning mass (1)
  - (d) Easy identification of each individual animal (1)
- 3.2.3 Give TWO reasons why these animals can be kept successfully in a severe heartwater and redwater region. (2)
- 3.2.4 State TWO uses for the Nguni animals in an agro-ecological farming system that are mentioned in the case study. (2)
- 3.2.5 Write down evidence from the case study to show that these animals have a special cultural value. (1)

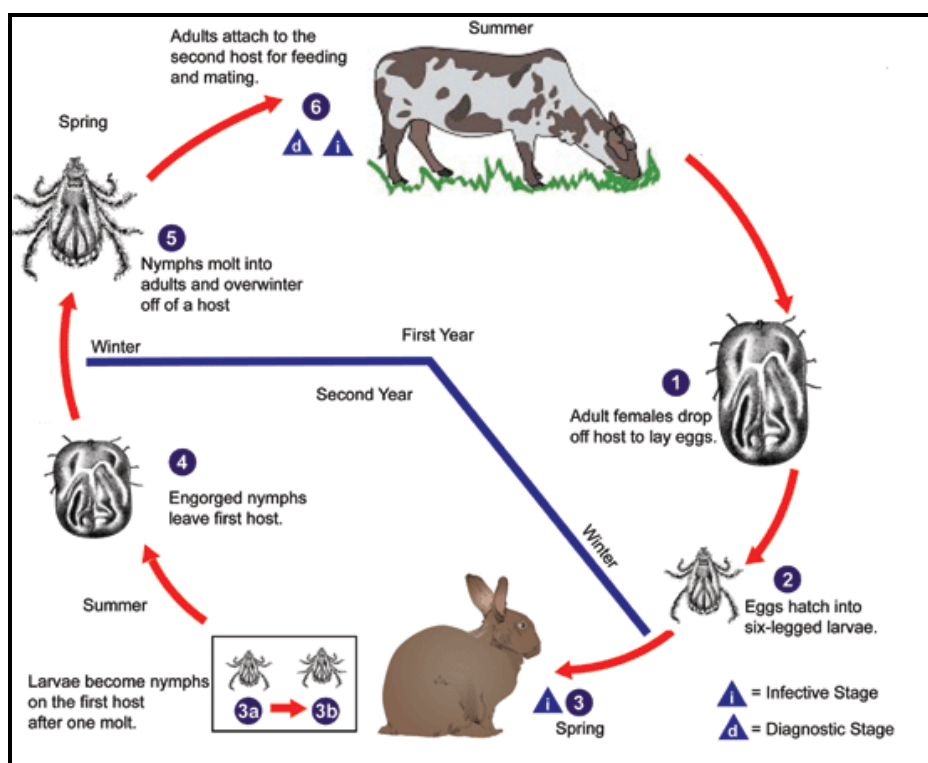
3.3 The list below shows actions and aims of agricultural production:

- Minimisation of risk
- Maximisation of profit
- Specialisation and mechanisation
- Local multipurpose breeds are mostly used
- High-performance breeds are mostly used
- Sustainable use of vegetation and resources which have no other use
- High use of energy, production of large amounts of animal waste
- Capital intensive

3.3.1 Write down THREE of the actions or aims above that are directly linked to large-scale intensive livestock production. (3)

3.3.2 Identify an aim from the list above that addresses the implication of expensive environmental control by the provision of housing and shelter. (1)

3.4 The schematic representation below shows the life cycle of a parasite.



3.4.1 Classify the parasite above based on the following:

(a) Place or site of infestation (1)

(b) Life cycle (1)

3.4.2 Name the FOUR forms in which this parasite appears during its life cycle. (4)

- 3.4.3 Name TWO seasons of the year in which these parasites will most likely affect host animals. (2)

3.5

Bacteria cause diseases in several ways.

Some produce powerful poisons or toxins, like the tetanus bacillus, and others cause local or general death of body tissue or block the flow of blood. Some may even cause severe irritation.

Tuberculosis may be caused by bacteria of the genus *Mycobacterium*. Humans must be protected from cattle with tuberculosis by periodic testing of milk cows and by examination of beef animals at slaughter.

Anthrax, caused by *Bacillus anthracis*, affects humans and domestic animals. Resistant spores are carried in the hair or hides of animals or in floodwaters, which account for the sudden appearance of this bacterial disease from time to time.

Pasteurellosis is caused by the bacterium of the genus *Pasteurella*, which includes fowl cholera, and affects wildlife, domestic poultry, rabbits and other animals.

- 3.5.1 Briefly describe TWO effects of toxins on animals infected by bacteria. (2)

- 3.5.2 Give TWO reasons for classifying bacterial diseases as infectious diseases. (2)

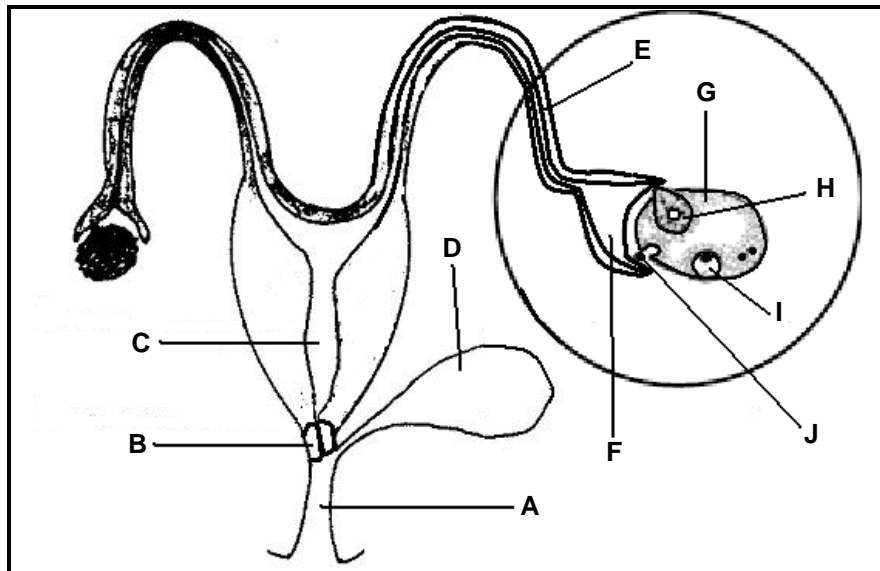
- 3.5.3 Name the most effective treatment for a bacterial infection. (1)

**[35]**

**QUESTION 4: ANIMAL PROTECTION, REPRODUCTION AND CONTROL**

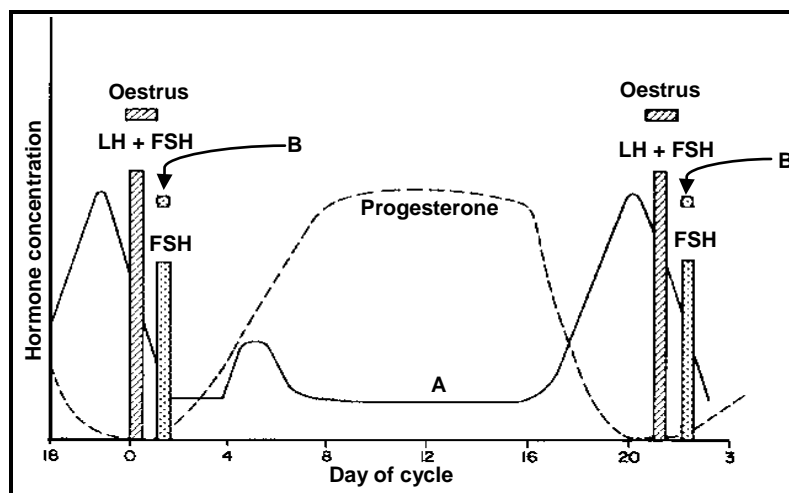
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4.1 The diagram below represents important structures in reproduction.



- 4.1.1 Identify the parts labelled **A**, **B**, **C**, **D** and **E** in the diagram above. (5)
- 4.1.2 Briefly describe the shape and function of the structure labelled **F** in the diagram above. (2)
- 4.1.3 Write down the LETTER of the structure in the diagram above that is associated with each of the following descriptions:
- (a) The structure that develops in the position of the released egg cell (1)
  - (b) The site of fertilisation (1)
  - (c) The site of implantation (1)
  - (d) The structure that contains a substance responsible for protecting the uterus against infections (1)
- 4.1.4 Name the hormone that is responsible for the development of the structure marked **I**. (1)

- 4.2 The graph below represents the levels of hormones at different stages in the oestrus cycle of a cow.



- 4.2.1 Indicate the length, in days, of this oestrus cycle. (1)
- 4.2.2 Name the structure that secretes progesterone during this oestrus cycle. (1)
- 4.2.3 Name the hormone indicated by **A** in the graph above. Give a reason from the data above to support your answer. (2)
- 4.2.4 Name the process represented by **B** in the graph above. (1)
- 4.2.5 Name TWO visible signs that will be observed from this cow on day 0 or on day 21. (2)

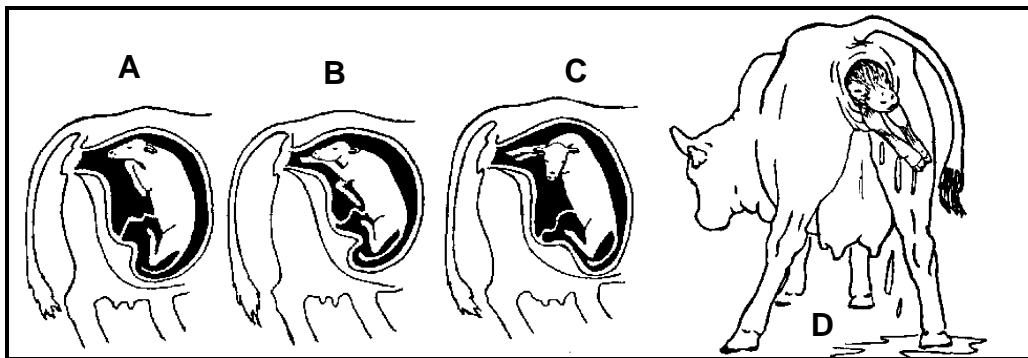
- 4.3 The table below represents different processes, **A**, **B** and **C**, that are used in animal reproduction.

PROCESS OF REPRODUCTION		
<b>A</b>	<b>B</b>	<b>C</b>
Semen of selected farm animals is collected, processed and used for animal reproduction.	As many embryos as possible are harvested from selected farm animals after being fertilised and are then used for reproduction.	The nucleus of a cell from one animal is removed and placed into a prepared egg cell to be used for reproduction.

- 4.3.1 Identify the process of reproduction (**A**, **B** or **C**) that is associated with the following:
- (a) Embryo transplantation (1)
- (b) Cloning (1)
- (c) Artificial insemination (1)

- 4.3.2 List THREE characteristics of good quality semen used in some of these reproduction processes. (3)
- 4.3.3 Briefly describe the main aim of embryo transplantation. (2)
- 4.3.4 Explain the main reason why cloning could lead to dystocia in animal reproduction. (2)

4.4 The diagrams below represent a cow at different stages of parturition.



- 4.4.1 Name the stage of parturition represented by diagrams **A** and **D** respectively. (2)
- 4.4.2 State TWO visible changes that will occur in the udder of the cow in diagram **D**. (2)
- 4.4.3 Write down the letters of TWO diagrams that represent possible difficulty with birth due to the wrong leg position of the foetus. (2)

[35]

**TOTAL SECTION B: 105**  
**GRAND TOTAL: 150**