



Province of the  
**EASTERN CAPE**  
EDUCATION

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**JUNE 2017**

**AGRICULTURAL SCIENCES**

**MARKS: 150**

**TIME: 2½ hours**



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This question paper consists of 16 pages.

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**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. You may use a non-programmable calculator.
6. Show ALL your calculations, including formula, where applicable.
7. 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 Rumination consists of four different processes. ONE of the processes listed below is NOT part of rumination:

- A Regurgitation
- B Re-mastication
- C Assimilation
- D Eructation

1.1.2 A thick greyish acidic liquid produced in the stomach as a result of churning the bolus and gastric juices.

- A Cud
- B Succus entericus
- C Bile
- D Chyme

1.1.3 The compartment has many leaf-like folds for grinding feed particles and water absorptions.

- A Omasum
- B Abomasum
- C Reticulum
- D Rumen

1.1.4 ... is the deficiency disease caused by the lack of vitamin D and phosphorus in older animals.

- A Keratinisation
- B Osteomalacia
- C Parakeratosis
- D Keratomalaise

1.1.5 There are about four factors to increase extensive farming production. ONE of the following is NOT CORRECT:

- A Nutrition or feeding
- B Environment
- C Reproduction or breeding
- D General behaviour

1.1.6 Some of the statements below that relate to Feed Conversion Ratio (FCR) are TRUE.

- (i) The higher the FCR the better the ability of an animal to convert feed into product.
- (ii) The FCR value has no units.
- (iii) It is a measure of animal's efficiency in converting feed mass into the desired output.
- (iv) The lower the FCR the better the quality of feed.

Choose the correct combination:

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

1.1.7 The best description of internal parasites of any host animal:

- (i) Live inside the body of the host
- (ii) Can be found on the skin of the host
- (iii) A good example of internal parasite is the nasal worm
- (iv) Attach to the mucous membrane of the small intestines

Choose the correct combination:

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

1.1.8 The foetus is surrounded by three layers while attached to the uterus. ONE of the following is the correct sequence of the layers from the outer to the inner layer.

- A Chorion, allantois and amnion
- B Chorion, amnion and allantois
- C Allantois, chorion and amnion
- D Amnion, chorion and allantois

1.1.9 ONE of the following is NOT a stage of mating:

- A Mounting
- B Ejaculation
- C Courtship
- D Flushing

1.1.10 The failure of animals to show signs of oestrus and is a cause of infertility in cows:

- A Anaoestrus
- B Repeat breeders
- C Oestrus
- D Met-oestrus

(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 (1.2.1–1.2.5) in the ANSWER BOOK, for example 1.2.6 B only.

COLUMN A			COLUMN B
1.2.1	A	Oatmeal	Contains a small percentage of total digestible nutrients and a high crude fibre content
	B	Oats straw	
1.2.2	A	76,7 %	This is the coefficient of digestibility of the feed where the dry material intake of an animal was 15 kg and the dry mass of the manure was 3,5 kg.
	B	33,3%	
1.2.3	A	Foot bath	The tick control method where an animal is completely immersed in a dipping tank
	B	Spray dip	
1.2.4	A	Embryo transfer	The aim of this process is to improve and preserve the genetic potential of the herd
	B	Nuclear transfer	
1.2.5	A	Cryptorchidism	One of or both the testes do not descend into the scrotum and remain in the abdominal cavity
	B	Hypoplasia	

(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 digestive gland in the alimentary canal that secretes both digestive juices and hormones

1.3.2 The process that pushes food through the alimentary canal by the relaxation and contraction of muscles in the walls of the alimentary canal

1.3.3 The period of pregnancy from fertilisation to birth during which the foetus develops inside the mother

1.3.4 The service rendered by the State where animals are kept in isolation for a particular period while being tested for diseases

1.3.5 The term used to describe a male animal that is interested in female animals but lacks the ability to service the female animals (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 Mechanical digestion of food in a fowl takes place in the pro-ventriculus.
- 1.4.2 The battery production system is where there are a small number of animals in a large area with minimal human and technological involvement.
- 1.4.3 The part of the male reproductive organ that is responsible for regulating testicular temperature is the epididymis.
- 1.4.4 Graafian follicle develops on the ovary after ovulation at the position of the burst follicle.
- 1.4.5 The milk produced during the first few days after calving contains pathogens for immunisation against diseases. (5 x 1) (5)

**TOTAL SECTION A: 45**

## SECTION B

## QUESTION 2

Start this question on a NEW page.

- 2.1 The structures below illustrates the digestive system of ruminants and non-ruminant animals. Analyse the diagrams and then answer questions that follow.

DIAGRAM A

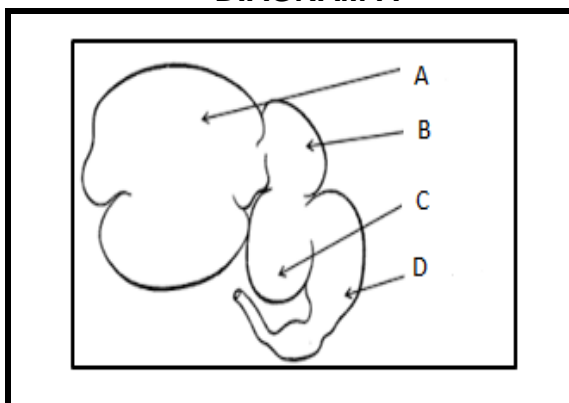
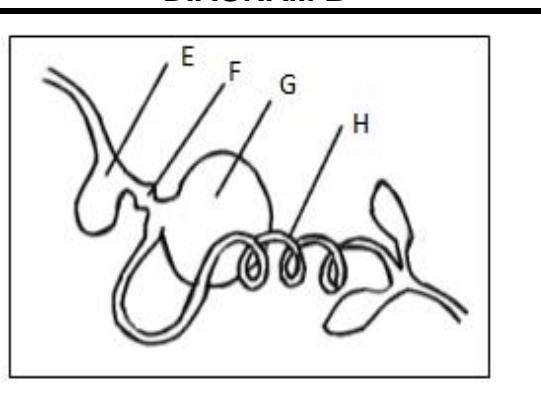
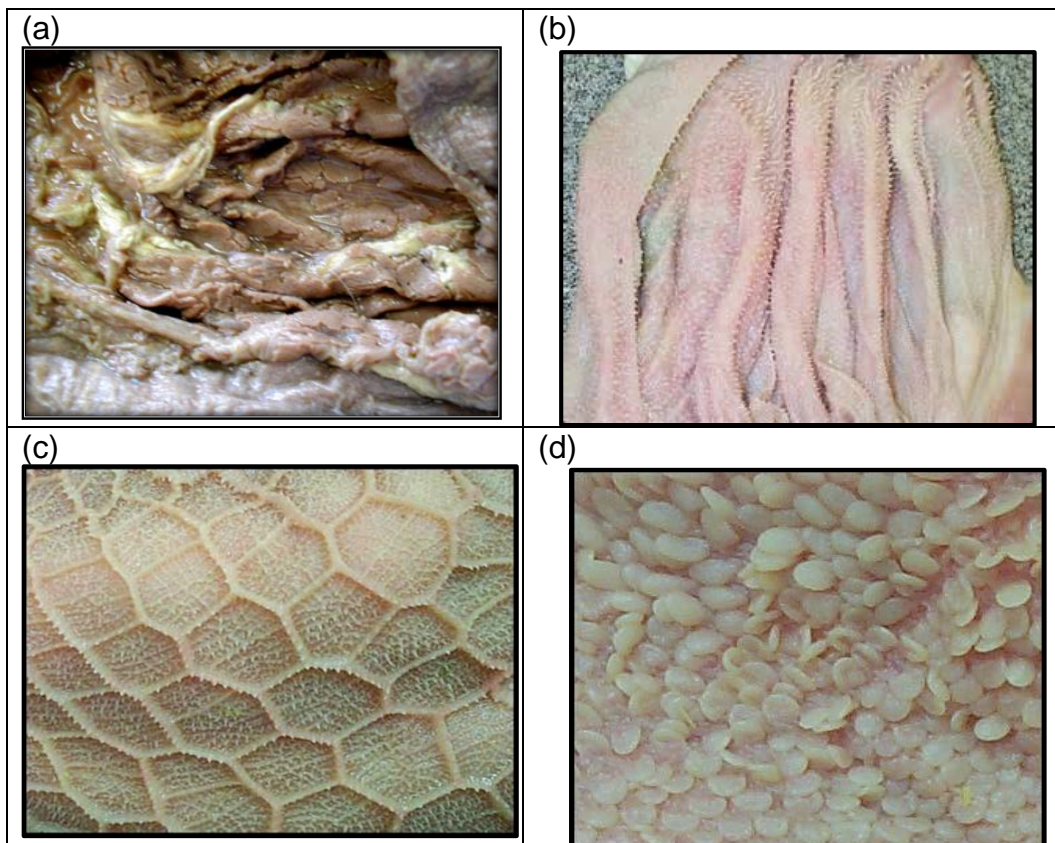


DIAGRAM B



- 2.1.1 Identify the parts labelled **E** and **G**. (2)
- 2.1.2 Supply the main function of the part labelled **F**. (1)
- 2.1.3 The diagrams below shows the inside of the parts in **DIAGRAM A**. Use the letters **A** to **D** from **DIAGRAM A** to match with the structures shown below.



(4)

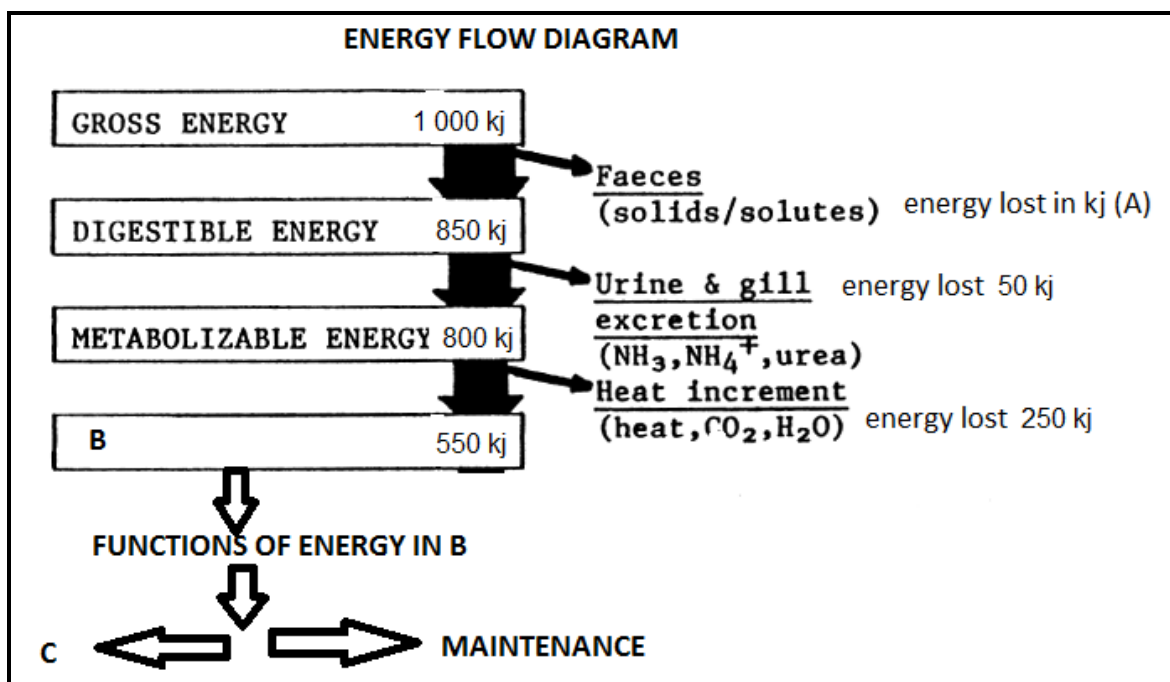
2.2 Name the vitamin or mineral associated with EACH of the following deficiency symptoms:

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

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

2.2.3 Insufficient formation of haemoglobin in the red blood cells (1)

2.3 Analyse the energy flow diagram below and answer the questions that follow.



2.3.1 Identify from the schematic representation above the type of energy represented by the letter **B**. (1)

2.3.2 Calculate the energy lost through faeces represented by **A**. (2)

2.3.3 Suggest the second function (**C**) of the energy type identified in QUESTION 2.3.1. (1)

2.4 Feeds can be divided into TWO main categories namely roughages and concentrates. Give an example of a protein-rich roughage and a carbohydrate-rich concentrate. (2)

2.5 Digestibility of feeds differ from one feed type to another depending on a number of factors.

2.5.1 Name THREE of these factors that can affect the digestibility of feeds. (3)

2.5.2 Suggest any TWO methods the farmer can use to improve the digestibility of feeds. (2)



2.6 The table below shows a fodder flow programme for a period of one year:

Source	Yield (t/ha)	Area (ha)	J	F	M	A	M	J	J	A	S	O	N	D	Total DM(t)
Veld	14	25,5	20	34	13	12	-	-	-	-	-	10	32	30	<b>A</b>
Forage	10	30	38	39	43	44	44	-	-	-	-	-	30	30	<b>300</b>
Lucerne	15	21,1	40	35	54	21	17	10	20	10	40	40	30	46	<b>294</b>
Oats	9	10	-	-	-	40	49	50	46	30	24	20	-	-	<b>90</b>
<b>Total feed</b>			<b>98</b>	<b>108</b>	<b>110</b>	<b>117</b>	<b>110</b>	<b>60</b>	<b>66</b>	<b>40</b>	<b>64</b>	<b>70</b>	<b>92</b>	<b>106</b>	
<b>Livestock requirements</b>			<b>60</b>	<b>67</b>	<b>78</b>	<b>72</b>	<b>79</b>	<b>60</b>	<b>61</b>	<b>60</b>	<b>62</b>	<b>68</b>	<b>71</b>	<b>73</b>	
Shortage			-							20				-	
Surplus			38							-				33	

2.6.1 Calculate the total dry matter (DM) available for **A**. (2)

2.6.2 During the implementation of the feed flow programme in August veld fires destroyed a lot of feed on this farm, even the ones which was stored resulting in a feed shortage of 20 tons as indicated above in QUESTION 2.6. Assume that the farmer had no other alternative except to buy the feed required at a price of R4,28 per kg.

Calculate what the total costs to the farmer will be to buy the 20 tons of feed shortage. (2)

2.6.3 Identify the month where both shortage and surplus were at zero in QUESTION 2.6. (1)

2.7 Maize and sunflower oilcake meal were used to prepare a balanced ration for farm animals. These animals need 18% digestible protein in their ration. Maize has a digestible protein content of 9% and sunflower oilcake meal has 38%.

2.7.1 Use the Pearson square method to calculate the ratio of maize to sunflower oilcake meal needed in the feed mixture. (4)

2.7.2 Use the information in QUESTION 2.7 and/or your calculation in QUESTION 2.7.1 and determine the quantity of maize in kilograms that will be required to compound a ration of 650 kg. (3)

2.8 The feeds below are available to compile a ration for farm animals.

Feeds	COMPOSITION INDICATORS (%)					Nutritive Ratio (NR)
	DM	DP	TDN	Ca	P	
FEED A	85	10	90	0,5	0,3	1 : 8
FEED B	86	30	83	0	0,3	1 : 2

From the table in QUESTION 2.8 deduce the feed that is most suitable for growth and production. Motivate your answer. (2)

[35]

**QUESTION 3**

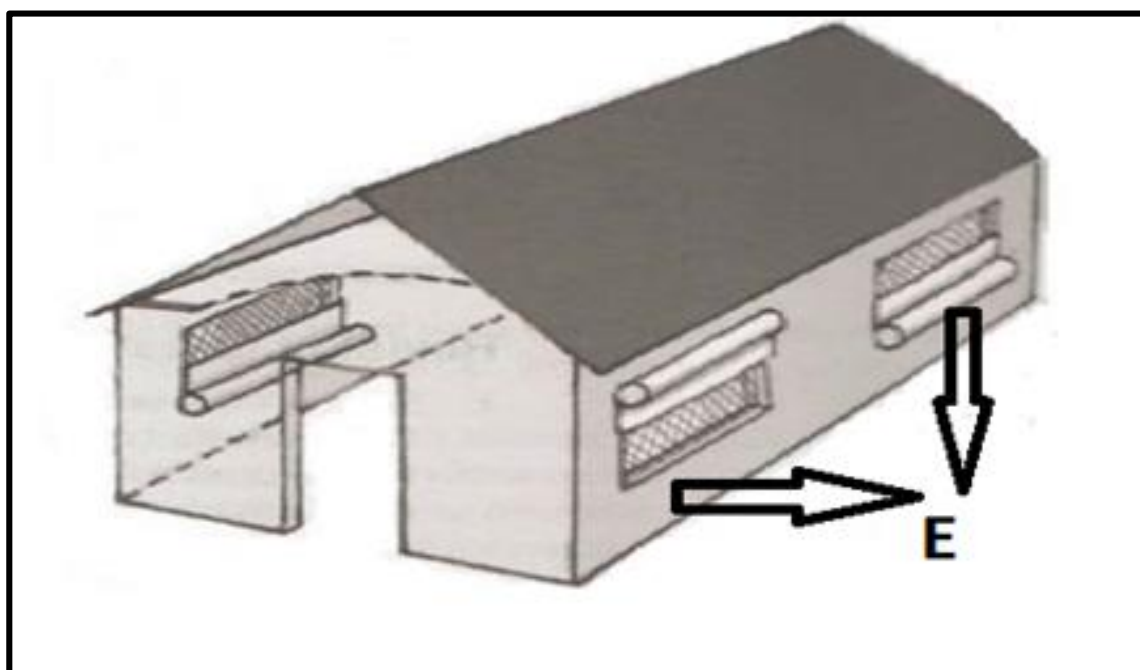
Start this question on a NEW page.

- 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	
98	100	35
96	90	25
90	50	15
80	25	5
70	5	0

- 3.1.1 It is evident from the table in QUESTION 3.1 that cows have a better growth rate than pigs at an environmental temperature of 5 °C. Support this statement with TWO reasons. (2)
- 3.1.2 Describe TWO methods to protect pigs against extreme cold weather conditions in order to maintain optimal production levels. (2)

- 3.2 The picture below indicates a proper housing structure for broiler production.



- 3.2.1 List TWO examples of equipment commonly found in a poultry houses. (2)
- 3.2.2 Besides roofing material, suggest TWO other ways in which temperature can be regulated in the broiler production enterprise. (2)
- 3.2.3 Give a reason for the use of part **E** in the housing structure in QUESTION 3.2. (1)

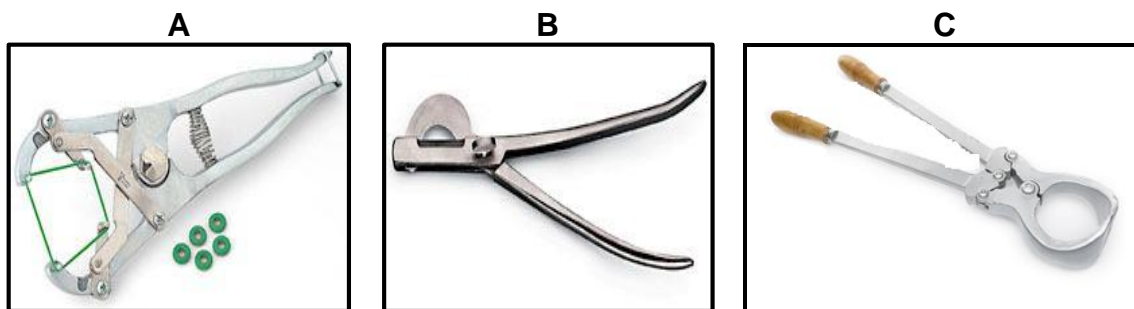
3.3 The picture below shows a production system in farming.



3.3.1 Suggest the name of a production system that can be associated with the picture above. (1)

3.3.2 Motivate your answer in QUESTION 3.3.1 based on what you see in the picture. (1)

3.4 The diagrams below represents equipment used on a farm to maintain control of breeding programs and successfully carry out breed improvement.



3.4.1 Name the management practice (term) that the equipment in QUESTION 3.4 is used for. (1)

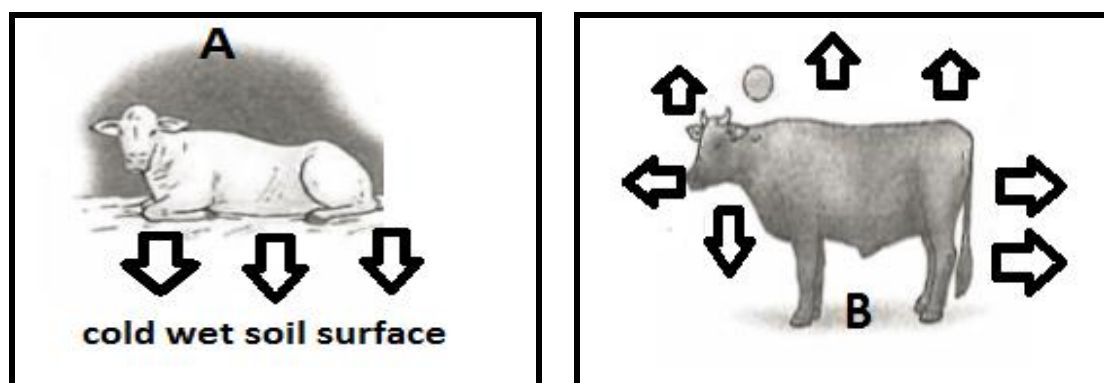
3.4.2 Identify **A**, **B** and **C**. (3)

3.4.3 Choose a tool between **A** and **C** that is the most suitable for use in:

(a) Younger animals (1)

(b) Adult animals (1)

- 3.5 The diagram below represents farm animals and the ways in which they lose heat.



- 3.5.1 Animals can lose heat in different ways. Identify the ways in which heat (energy) is lost in animals depicted in **A** and **B**. (2)

- 3.5.2 Name any other way not depicted in QUESTION 3.5, in which animals lose heat. (1)

- 3.6 Different methods are used to administer medicines to animals.

Supply the most suitable equipment (tool) that can be used to administer medicine to animals in the following scenarios:

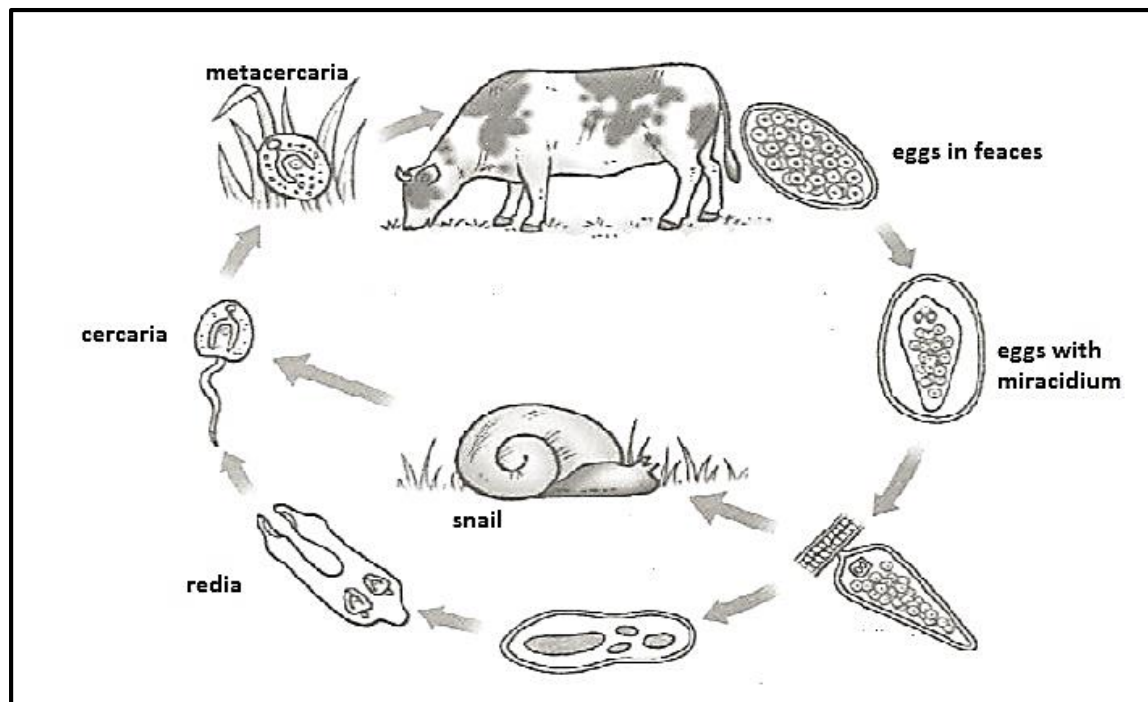
- 3.6.1 Capsules or pills placed in the mouth for swallowing (1)
- 3.6.2 Liquid medicine given to an animal orally (1)
- 3.6.3 An animal that is unable to eat is given a bolus (1)

- 3.7 Differentiate between *pulse rate* and *respiratory rate*. (2)

3.8	DISEASE	PATHOGEN INVOLVED	MAJOR SYMPTOM OF THE DISEASE	ANIMAL HOST
	<b>A</b>	Virus	Green diarrhoea, twisted neck, lameness, listlessness, rapid breathing	Poultry
	Lumpy wool	Fungus	<b>B</b>	Sheep/Cattle/Goats/Horses
	<b>C</b>	Protozoa	High fever, anaemia, constipation, weakness	Cattle/Sheep/Goats/Human
	<b>D</b>	Bacteria	High fever, swelling on the body, bloody discharge from mouth, nose and rectum	All farm animals

Complete the table by identifying **A** to **D**. (4)

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



3.9.1 Internal parasites are divided into three main groups. Identify the main group of internal parasites represented in the schematic representation in QUESTION 3.9. (1)

3.9.2 Name the intermediate host in the schematic representation above. (1)

3.9.3 State TWO financial implications and detrimental effects of internal parasites. (2)

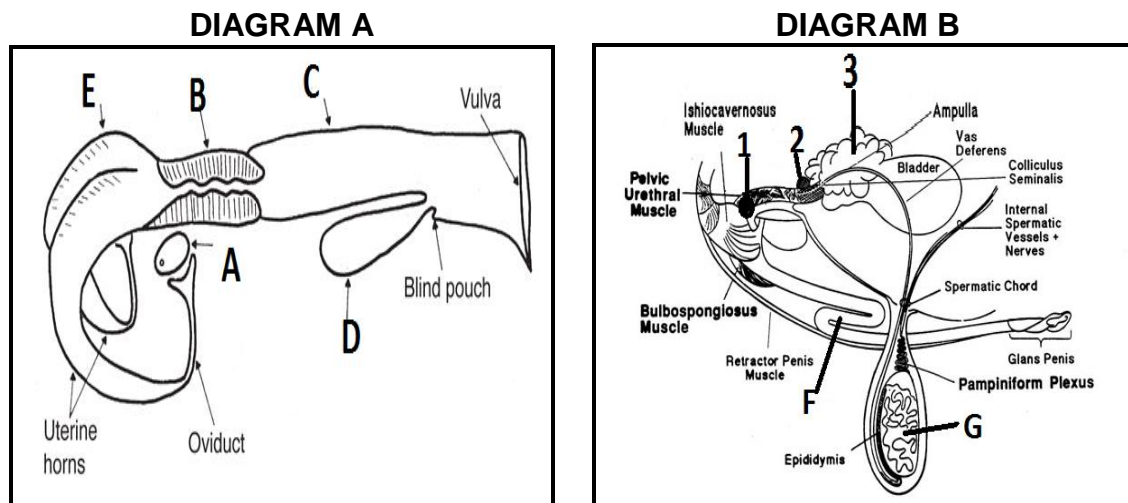
3.9.4 Suggest TWO measures how pasture management can be used to control this type of parasite. (2)

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### QUESTION 4

Start this question on a NEW page.

4.1 The illustration below indicate the steps involved during a reproductive process.



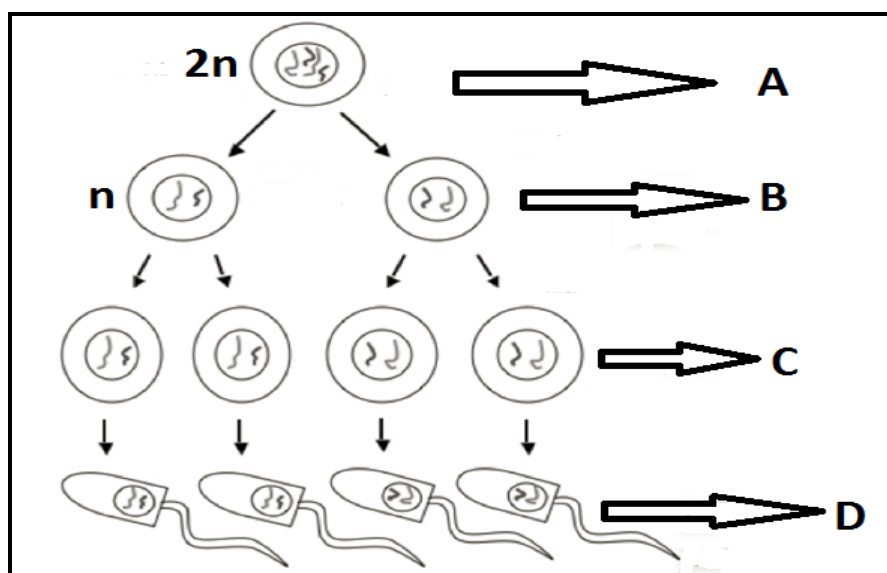
4.1.1 Identify the parts labelled **A**, **C** and **E** in DIAGRAM A. (3)

4.1.2 Suggest the main function of the part labelled **B** in DIAGRAM A. (1)

4.1.3 Supply the functions of the glands labelled **1**, **2** and **3** from DIAGRAM B. (3)

4.1.4 Identify parts **F** and **G** in DIAGRAM B. (2)

4.2 The diagram below represents the process of sperm formation.



4.2.1 Provide the name of the process represented in QUESTION 4.2. (1)

4.2.2 Refer to the diagram and identify the type of cell division that occurs when cell **A** divides to the cells at **B**. Motivate your answer. (2)

4.2.3 State the stages of the process named in QUESTION 4.2.1 represented by **C** and **D** respectively. (2)

4.3 Usually, after detecting signs of oestrus in the cow, the farmer takes a bull to the cows for mating to take place.

4.3.1 Mention the average number of days for the oestrus cycle in a cow. (1)

4.3.2 Apart from visible and behavioural signs that a cow may show, name TWO devices a farmer may use to detect oestrus in a cow. (2)

4.3.3 Give FOUR reproductive hormones, in sequential order, that are produced by a cow from gestation to parturition. (4)

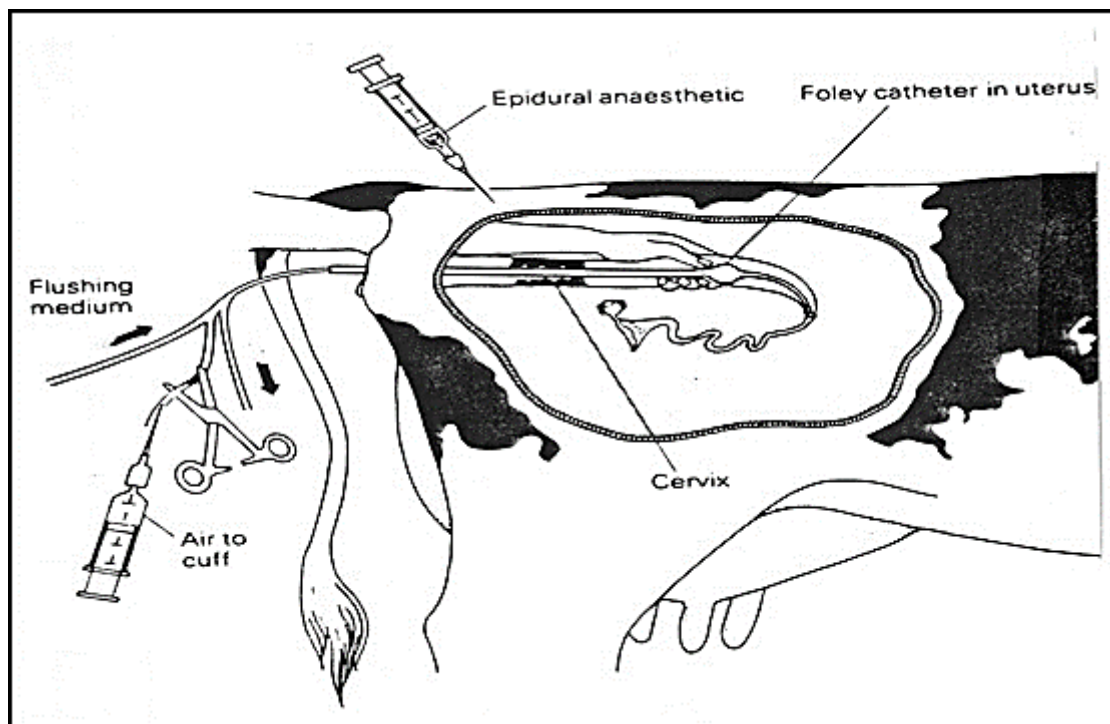
4.4 The table below indicates the characteristics of the ejaculates of different species:

Species	Volume (mℓ)	Sperm concentration (x 10 <sup>9</sup> /mℓ)	% Motility	% Normal
Bull	8,0	1,5	75	95
Ram	1,0	3,0	95	95
Boar	200	0,25	70	90
Stallion	80	0,15	80	40–90
Man	2–6	0,15	65	30–70

Use the information from the table in QUESTION 4.4 to draw a bar graph indicating the percentage motility of different species. (5)



4.5 The diagram below shows a breeding technique.



4.5.1 Identify the breeding technique shown in the diagram in QUESTION 4.5. (1)

4.5.2 Suggest the name given to the cow above. (1)

4.5.3 Supply ONE disadvantage of the process in QUESTION 4.5. (1)

4.6 The diagram below shows the layers covering the foetus.

Sometimes animals experience difficult birth. Difficult births require more labour and attention. It may result in placenta retention and the death of both the cow and the calf. It is a heritable characteristic which occurs more frequently in heifers and bull calves. It can be corrected by means of proper management.

4.6.1 Provide the scientific term for *difficult births*. (1)

4.6.2 Give TWO reasons for difficult births in heifers. (2)

4.6.3 The parturition process has three distinct stages. List them according to their sequence. (3)

[35]

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