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SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS

AGRICULTURAL SCIENCES P1

MAY/JUNE 2024

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. You may use a non-programmable calculator.
6. Show ALL calculations, including formulae, 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 numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 B.

1.1.1 The largest compartment of the forestomachs in cattle, with a capacity of about 100–150 litres:

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

1.1.2 ONE of the following is NOT required in large quantities by farm animals:

- A Nitrogen
- B Phosphorus
- C Calcium
- D Selenium

1.1.3 The type of digestion whereby large food particles are broken down into smaller pieces by the teeth:

- A Mechanical digestion
- B Chemical digestion
- C Biological digestion
- D Bacterial digestion

1.1.4 The following are functions of rumen microbes:

- (i) Hydrolysis of vitamins
- (ii) Digestion of cellulose
- (iii) Synthesis of vitamins
- (iv) Hydrolysis of proteins

Choose the CORRECT combination:

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

- 1.1.5 The distance farm animals keep between themselves and a threat or danger:
- A Free zone
 - B Flight zone
 - C Fight zone
 - D Danger zone
- 1.1.6 ONE of the following is a guideline when transporting farm animals:
- A Load bulls, cows in oestrus and calves together
 - B Transport all the pregnant animals together
 - C Load animals within a reasonable time before departure
 - D Spray animals with water while transporting them
- 1.1.7 A poisonous plant in the veld that farm animals avoid because of its smell:
- A Maize fungus
 - B Pig weed
 - C Acacia Karoo
 - D Thorn apple
- 1.1.8 The life cycle of a bont tick involves the following:
- (i) Larvae hatch and feed on a dassie
 - (ii) Nymphs feed on a rabbit
 - (iii) Larvae and nymphs feed on a dassie
 - (iv) Larvae drop off, moult and feed on a cow
- Choose the CORRECT combination:
- A (i), (ii) and (iv)
 - B (i), (iii) and (iv)
 - C (ii), (iii) and (iii)
 - D (ii), (iii) and (iv)
- 1.1.9 The removal of the nucleus from the ovum during nuclear transfer is known as ...
- A nucleation.
 - B enucleation.
 - C transplantation.
 - D nucleus expulsion.
- 1.1.10 The following statement about milk production is INCORRECT:
- A There is an inverse relationship between milk yield and butterfat content.
 - B The higher the butterfat content in milk, the lower the milk yield.
 - C Oxytocin stimulates the development of udder and milk synthesis.
 - D The lactation period takes approximately 305 days. (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 numbers (1.2.1 to 1.2.5) in the ANSWER BOOK, e.g. 1.2.6 B only.

COLUMN A			COLUMN B
1.2.1	A:	Pepsin	An enzyme that converts soluble caseinogen into insoluble casein
	B:	Hydrochloric acid	
1.2.2	A:	Tranquilizers	Stimulants used to improve the growth rate of farm animals
	B:	Thyroid regulators	
1.2.3	A:	Dusty and cheap	Materials used for bedding in pig production enterprises
	B:	Good insulator	
1.2.4	A:	Breeding pest-resistant animals	Chemical method to control parasites in farm animals
	B:	Dosing and dipping	
1.2.5	A:	Reproductive cloning	Increase in the number of identical offspring from a single embryo
	B:	Therapeutic cloning	

(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 numbers (1.3.1 to 1.3.5) in the ANSWER BOOK.

- 1.3.1 A process where food is brought back from the stomach to the mouth for rechewing
- 1.3.2 An approach that combines the advantages of modern, traditional and complementary medication to treat farm animals
- 1.3.3 The process that takes place in ovaries to produce female gametes
- 1.3.4 Cows that need to be mated three or more times before conceiving
- 1.3.5 The inability of a bull to service cows that are in oestrus even though it has interest

(5 x 2)

(10)

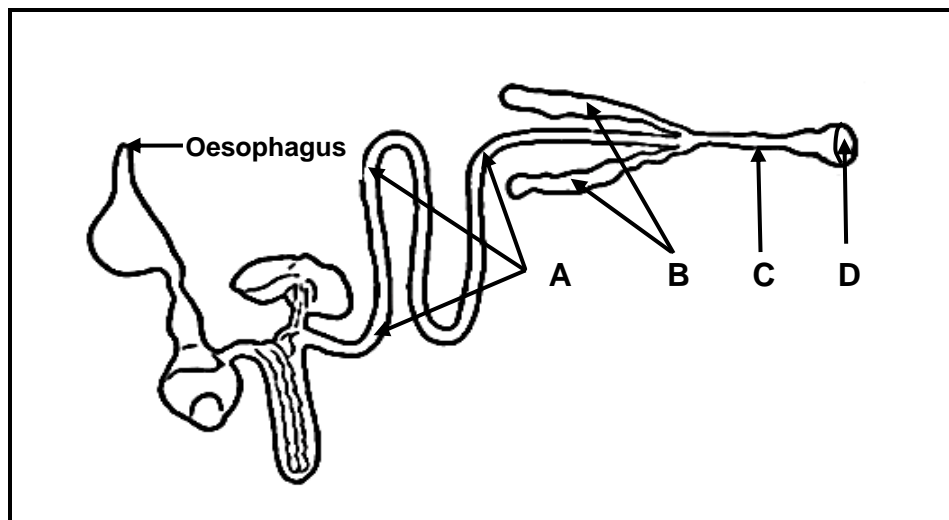
- 1.4 Change the UNDERLINED WORD(s) in each of the following statements to make it TRUE. Write only the answer next to the question numbers (1.4.1 to 1.4.5) in the ANSWER BOOK.
- 1.4.1 Osmosis is the movement of food molecules from a region of high concentration to a region of low concentration.
- 1.4.2 Equipment used when moving pigs around is a prodger.
- 1.4.3 Di-oestrus is when sexually mature female animals show signs of heat.
- 1.4.4 During the embryonic phase, the unborn calf grows rapidly and resembles a fully grown animal.
- 1.4.5 A Foley catheter is a long narrow instrument used to deposit semen into the uterus of a cow during artificial insemination. (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 alimentary canal of a farm animal.



2.1.1 Classify the farm animal represented by the diagram above. (1)

2.1.2 Name the farm animal with the alimentary canal represented above. (1)

2.1.3 Give a reason for the answer to QUESTION 2.1.2 based on part **B**. (1)

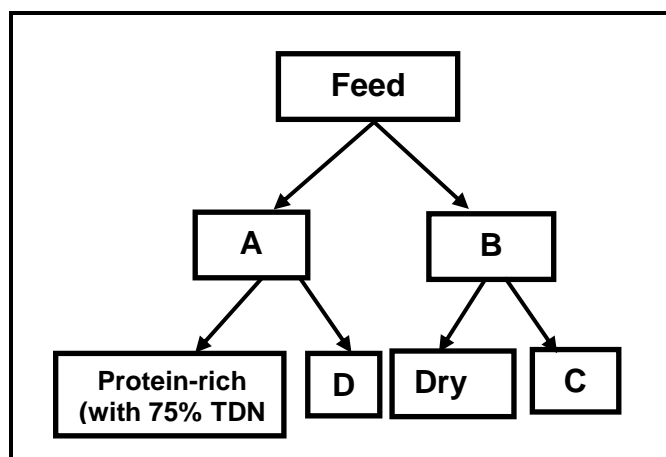
2.1.4 Identify in the diagram above parts **A**, **C** and **D**. (3)

2.2 The micro-organisms in the reticulorumen of cattle play a role in the digestion of feeds with high crude fibre content.

2.2.1 Give TWO examples of micro-organisms that are found in the reticulorumen of ruminants. (2)

2.2.2 State TWO requirements for the normal functioning of rumen micro-organisms. (2)

2.3 The schematic representation below illustrates the types of feed.



2.3.1 Identify the types of feed represented by **A** and **B**. (2)

2.3.2 Identify the letter, in the schematic representation above, that matches each of the following statements. Write down only the letter (A–D).

(a) An example of a succulent feed (1)

(b) Maize meal as an example of the subdivision of feed (1)

(c) The increase of the bulkiness of a ruminant ration (1)

2.4 A farm animal ingested 18 kg of hay, with a dry matter content of 90% and excreted 5 kg dry manure.

2.4.1 Calculate the digestibility co-efficient of the ingested hay. Show ALL calculations. (5)

2.4.2 Indicate an implication of the digestibility coefficient of the feed calculated in QUESTION 2.4.1. (2)

2.5 The feeds below are sources of protein that have different biological values.

Lucerne	Eggs	Milk
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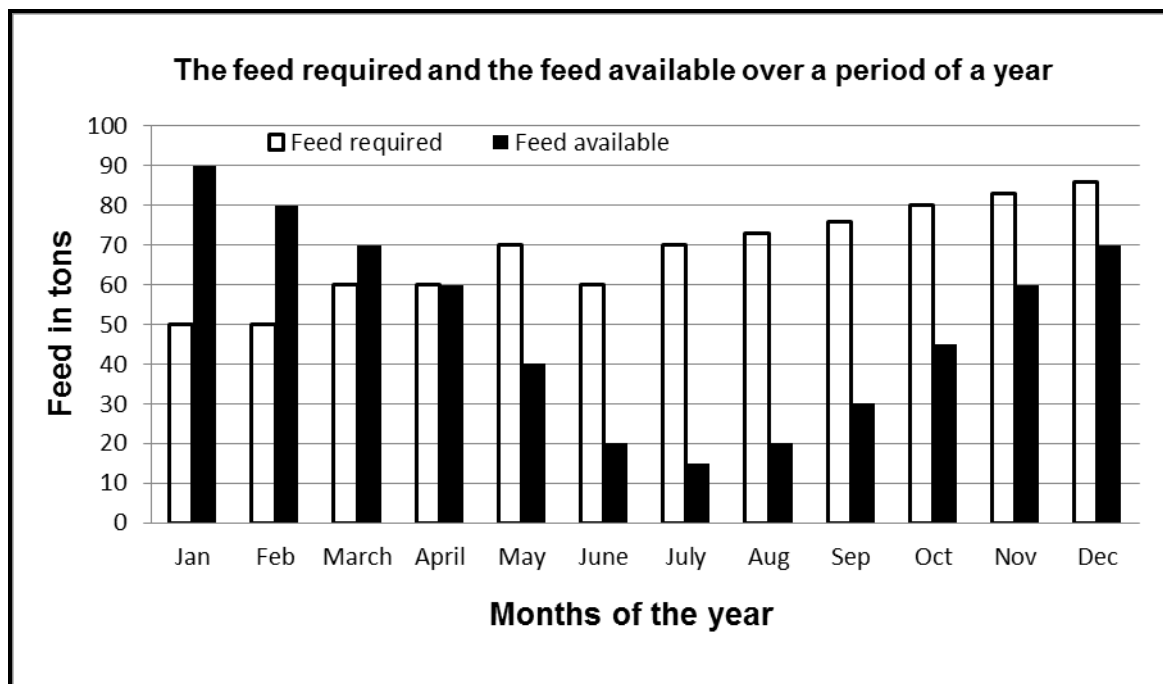
Re-arrange the sources of protein above according to their biological values from the highest to the lowest. (3)

2.6 The nutritive ratio of the feeds provides information to farmers on the suitability of feeds for various purposes.

2.6.1 Define the term *nutritive ratio*. (2)

2.6.2 A feed contains 7% digestible protein and the total digestible nutrients is 79%. Use the formula to calculate the nutritive ratio of the feed. Show ALL calculations. (3)

- 2.7 The graph below shows the animal feed requirements and the total feed available in one year.



- 2.7.1 Identify the month with the smallest amount of feed available in the graph above. (1)
- 2.7.2 Give a reason for the significant decline in the quantities of total feed available from April to July. (1)
- 2.7.3 Calculate the total feed requirement from January to June. (2)
- 2.7.4 Deduce the trend of the feed available between August to December. (1)
- [35]**

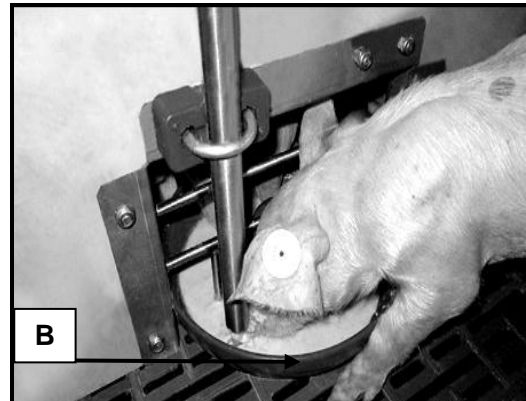
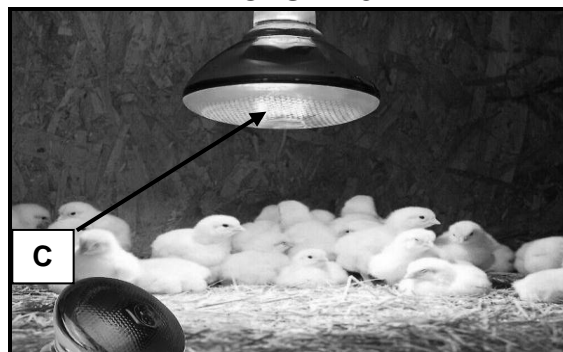
QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

Start this question on a NEW page.

- 3.1 A farmer plants maize and vegetables in a 1 ha field. The farmer has 3 goats and 2 cows to sustain the family. The animals search for food in a large communal area.

- 3.1.1 Identify EACH of the following in the scenario above:
- (a) Farming system (1)
 - (b) Production system (1)
- 3.1.2 Justify the answer to QUESTION 3.1.1(b) by referring to a phrase in the scenario above. (1)
- 3.1.3 Differentiate between the farming system identified in QUESTION 3.1.1(a) and the one NOT practised by the farmer in the above scenario. (2)
- 3.1.4 State TWO factors that should be considered to increase animal production in the system in QUESTION 3.1.1(b). (2)

- 3.2 The pictures below show equipment used in different intensive production systems.

PICTURE 1**PICTURE 2****PICTURE 3**

- 3.2.1 Identify the equipment labelled **A**, **B** and **C** in **PICTURES 1**, **2** and **3**. (3)
- 3.2.2 Give TWO reasons for keeping chickens under shelter. (2)

- 3.3 The pictures below show the different ways to handle cattle.

PICTURE A**PICTURE B**

- 3.3.1 Give the reason for handling cattle as depicted in **PICTURES A** and **B**. (2)
- 3.3.2 Indicate TWO basic guidelines when handling cattle. (2)

3.3.3 State TWO effects of the incorrect handling of farm animals. (2)

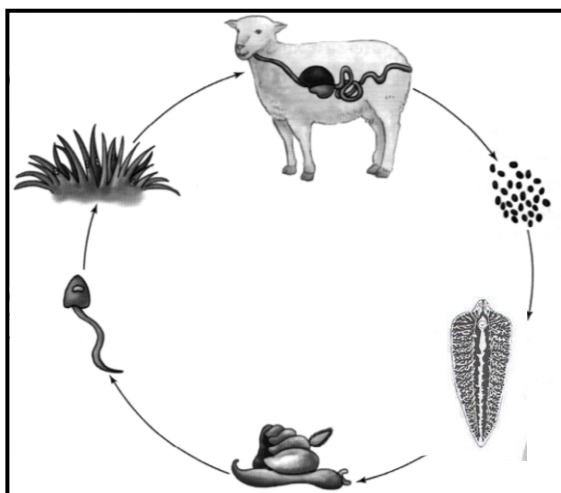
3.4 The table below shows pathogens, diseases, symptoms and types of farm animals affected.

PATHOGEN	DISEASE	SYMPTOMS	TYPE OF ANIMAL
Fungi	A	Round lesions with a scabby surface form on the skin of farm animals	All farm animals
B	Heartwater	Neurological signs, including uncontrollable chewing movements, tongue protrusion, eyelids twitching and circling	Ruminant farm animals
Bacteria	C	Inflammation of the udder leading to a drop in milk production	Mostly dairy breeds
D	Rabies	E	Most farm animals, including cattle, sheep and dogs

3.4.1 Complete the table above by writing down ONLY the missing information for **A**, **B**, **C**, **D** and **E**. (5)

3.4.2 Suggest TWO economic implications of contagious diseases in farm animals. (2)

- 3.5 The diagram below represents the life cycle of a parasite that affects farm animals.



- 3.5.1 Classify the parasite in the diagram above based on where it occurs. (1)
- 3.5.2 Identify TWO hosts that are necessary for the survival of the parasite in the diagram above. (2)
- 3.5.3 State TWO pasture management practices a farmer can put in place to control infestation of farm animals by the parasite above. (2)

- 3.6 The table below shows the stages of development of the external parasites and their negative impact on farm animals.

PARASITE A	PARASITE B	PARASITE C
Lays larvae around the nostrils causing irritation of sinuses	Microscopic six-legged parasite that causes scab and mange in farm animals	Eggs hatch and maggots emerge resulting in a blowfly strike

- 3.6.1 Identify **PARASITES A** and **B**. (2)
- 3.6.2 State ONE symptom in farm animals infested with **PARASITE A**. (1)
- 3.6.3 Name TWO ways the farmer can prevent infestation of animals with **PARASITE C**. (2)

[35]

QUESTION 4: ANIMAL REPRODUCTION

Start this question on a NEW page.

- 4.1 Match EACH of the statements with the organs listed below. Write down ONLY the letters (A–G) next to the question numbers (4.1.1 to 4.1.4).

- 4.1.1 A cylindrical structure responsible for implantation (1)
- 4.1.2 A single tightly coiled tube that stores spermatozoa until maturity (1)
- 4.1.3 The structure where the egg cell and the sperm cell unite to form a zygote (1)
- 4.1.4 An elastic tube for copulation that receives semen during mating (1)

- A Fallopian tube
B Scrotum
C Uterus
D Epididymis
E Vagina
F Testis
G Ovary

- 4.2 Name the hormone that plays a role in EACH of the situations represented by QUESTIONS 4.2.1–4.2.4 below.

- 4.2.1 Stimulates the growth, development and functioning of the Graafian follicles (1)
- 4.2.2 Develops the secondary sex organs and onset of behavioural oestrus (1)
- 4.2.3 Inhibits the secretion of FSH and suppresses development of follicles preventing cows from coming into heat (1)
- 4.2.4 Regulates the growth and development of the dominant follicle and maturation of the oocytes (1)

- 4.3 Sterility and infertility in farm animals are caused by several factors.

Name the condition stated below which leads to sterility in farm animals:

- 4.3.1 Underdeveloped testis or ovaries (1)
- 4.3.2 Testes stay attached to the body cavity and do not move down to the scrotum (1)

- 4.4 The table below represents the duration (in days) of the different stages of the oestrus cycle in different farm animals.

STAGES OF OESTRUS CYCLE	CATTLE (DAYS)	SHEEP (DAYS)	PIGS (DAYS)	GOATS (DAYS)	HORSES (DAYS)
Pro-oestrus	4	2	3	2	3
Met-oestrus	4	2	3	3	3
Di-oestrus	14	10	13	11	12

Draw a combined bar graph to represent the duration of pro-oestrus and di-oestrus in different farm animals.

(6)

- 4.5 Beef farmers have a common practice of administering hormones to a group of cows making them come to heat at approximately the same time.

4.5.1 Name the process referred to in the statement above. (1)

4.5.2 Indicate TWO methods used when performing the process named in QUESTION 4.5.1. (2)

4.5.3 State TWO disadvantages of the process named in QUESTION 4.5.1 above. (2)

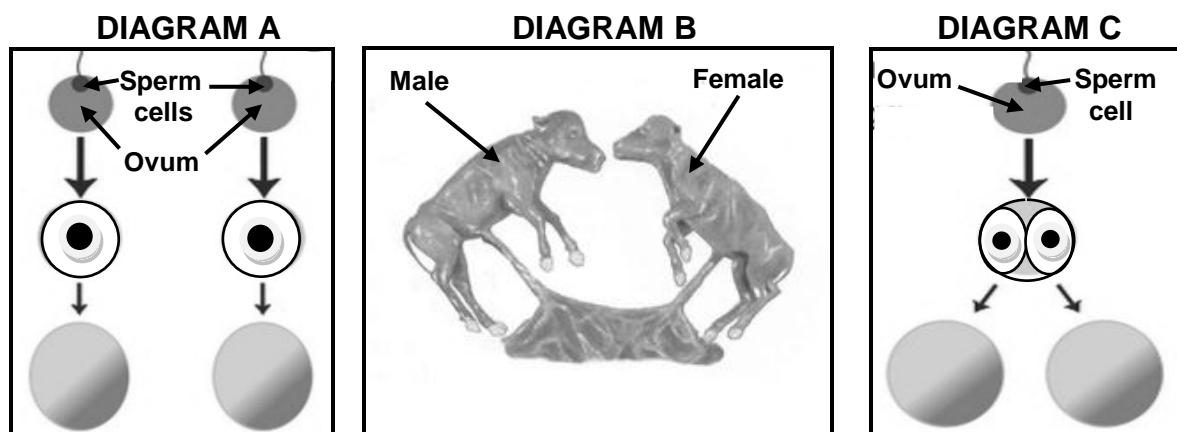
- 4.6 A reproductive technique where semen is collected from superior bulls and placed into the reproductive tract of cows in oestrus is practised on farms.

4.6.1 Identify the reproductive technique in the statement above. (1)

4.6.2 Indicate TWO methods of collecting semen. (2)

4.6.3 State ONE advantage of the reproductive technique identified in QUESTION 4.6.1 above. (1)

4.7 The diagrams below illustrate multiple births in farm animals.



4.7.1 Identify the types of twins illustrated in **DIAGRAMS A** and **C**. (2)

4.7.2 Indicate the **DIAGRAM (A and C)** that represents the twins with the following characteristic:

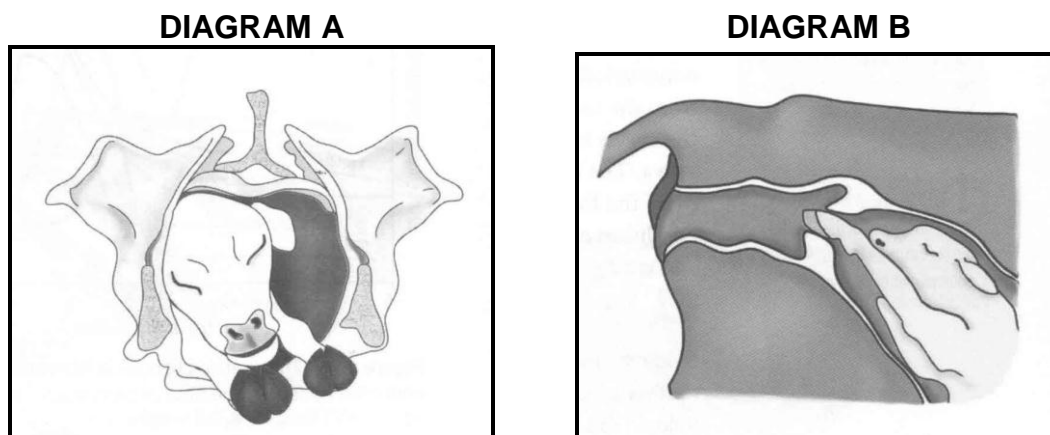
(a) Are of the same sex (1)

(b) Physical appearance differ (1)

4.7.3 Give the term that refers to the female in **DIAGRAM B**. (1)

4.7.4 State the condition of the female in **DIAGRAM B** that will affect breeding negatively. (1)

4.8 The diagrams below represent particular stages of parturition in a cow.



4.8.1 Identify the stages of parturition illustrated in **DIAGRAMS A** and **B**. (2)

4.8.2 Indicate the stage of parturition that follows the stage in **DIAGRAM A**. (1)

4.8.3 State ONE behavioural sign displayed by a cow when approaching the stage represented in **DIAGRAM A**. (1)

[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150