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basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P1

NOVEMBER 2021

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 correct 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 following is NOT a part of a pig stomach:

- A Fundus
- B Reticulum
- C Pylorus
- D Cardia

1.1.2 The structure of the alimentary canal of a young ruminant differs from that of an adult ruminant because in the young ruminant ...

- A the rumen and abomasum are well developed.
- B the omasum is fully developed and the abomasum is underdeveloped.
- C only the rumen and reticulum are functional.
- D only oesophageal groove and abomasum are functional.

1.1.3 The mineral elements that are needed by farm animals in large quantities:

- A Potassium, iron and cobalt
- B Phosphorus, chlorine and copper
- C Calcium, magnesium and sulphur
- D Magnesium, selenium and zinc

1.1.4 The statements below refer to essential amino acids:

- (i) They cannot be synthesized by non-ruminants.
- (ii) They are found in the protein of animal origin.
- (iii) Both plant and animal protein contain essential amino acids.
- (iv) They can be provided to animals through the feed.

Choose the CORRECT combination:

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

1.1.5 The rapid spread of infectious diseases over a very large area:

- A Acute
- B Pandemic
- C Sporadic
- D Endemic

1.1.6 Subsistence livestock farmers who cannot afford expensive modern technologies may use the following methods to control parasites:

- (i) Burning the veld
- (ii) Herbal remedies
- (iii) Rotational grazing
- (iv) Electric spray race

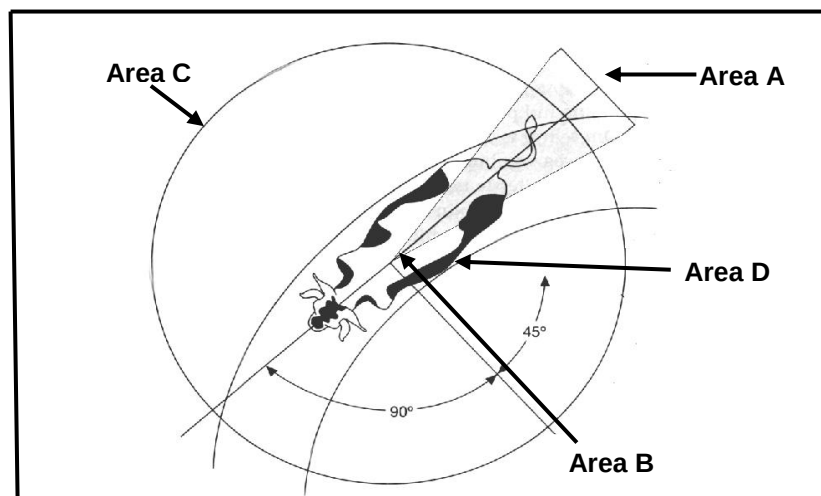
Choose the CORRECT combination:

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

1.1.7 The following is a disadvantage of keeping pigs in a free-range system:

- A Lower feed costs on good pastures
- B Better isolation and disease control
- C May take more time for pigs to reach the marketing stage
- D Decreases waste management problems

1.1.8 The area in the diagram below that represents the distance within which a person can approach an animal before it moves away is ...



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

1.1.9 The scrotum regulates the temperature during spermatogenesis by ...

- A contracting when conditions are cold and relaxing when conditions are hot.
- B pulling the testes up when conditions are hot.
- C relaxing the testes when temperatures are low.
- D contracting when temperatures are high.

1.1.10 A condition where the foetus dies after the hard skeleton and skin have been formed without abortion and secondary infection:

- A Maceration
- B Dropsy
- C Mummification
- D Prolapse

(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:	Bile	Counteracts putrefaction in the stomach of an animal
	B:	Hydrochloric acid	
1.2.2	A:	Dry rolling	Method to increase digestibility of grains
	B:	Dry heating	
1.2.3	A:	Pulse rate	The number of heartbeats in one minute
	B:	Respiratory rate	
1.2.4	A:	Deep litter	The system whereby chickens are kept in small wire cages while laying eggs for their entire lives
	B:	Free range	
1.2.5	A:	Perimetrium	Embryonic membrane surrounding the foetus
	B:	Endometrium	

(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 The total amount of energy released as heat when a feed is completely burnt down

1.3.2 An organism that carries a disease-causing agent

1.3.3 The failure of a cow to expel the placenta within 12–24 hours after parturition

1.3.4 The process by which the male reproductive cells are formed

1.3.5 A device placed around the lower leg of a cow to detect her movement and increased activities during oestrus

(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 numbers (1.4.1 to 1.4.5) in the ANSWER BOOK.

1.4.1 Deformation and ulceration of the cornea of an eye resulting in impaired vision in farm animals is due to a deficiency of vitamin D.

1.4.2 A halter is a fixed handling facility attached to the end of a crush used to restrain cattle by the head.

1.4.3 The sperm duct is a common excretory and reproductive canal in male animals.

1.4.4 Pregnancy is the period that lasts for approximately 305 days in which a dairy cow produces milk.

1.4.5 Hypoplasia is a condition where a male animal shows interest in a female, but lacks the ability to serve the female animals. (5 x 1) (5)

TOTAL SECTION A: 45

SECTION B**QUESTION 2: ANIMAL NUTRITION**

Start this question on a NEW page.

2.1 The table below indicates the intake and flow of food in two farm animals.

COLUMN A	COLUMN B
• Animal ingests food using the lips and tongue • The teeth grind the food • Chemical digestion starts in the mouth through amylase • Food is pushed down the oesophagus into the stomach where it is digested further by enzymes	• Animal ingests food through pecking • Food moves into the oesophagus where it is moistened, softened and stored • Both physical and chemical digestion occur in the stomach

2.1.1 Name the farm animal referred to in:

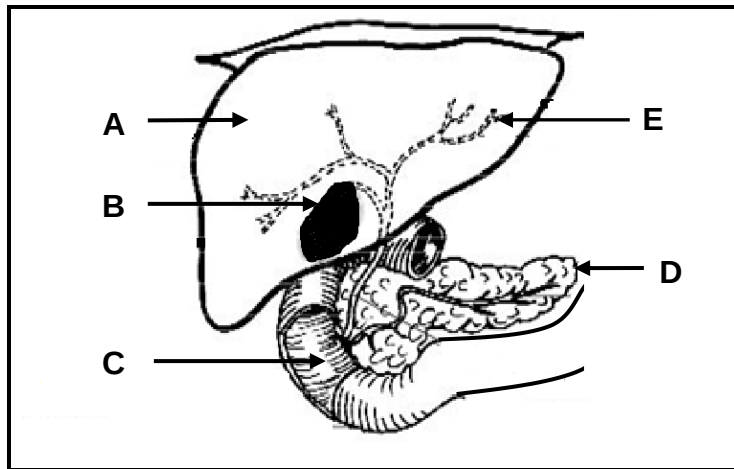
(a) COLUMN A (1)

(b) COLUMN B (1)

2.1.2 Identify, in the table above, a reason for the answers to QUESTION 2.1.1(a) and 2.1.1(b) above. (2)

2.1.3 Give the structural difference in the large intestines of the farm animals in COLUMN A and COLUMN B respectively. (2)

2.2 The diagram below shows a section of the alimentary canal in farm animals.



2.2.1 Write down the letter (A–E) that represents the part where EACH of the following occurs:

(a) Soluble food particles move into the blood stream (1)

(b) Storage of fat-soluble vitamins (1)

2.2.2 Name TWO digestive juices that are deposited into part **C**. (2)

2.2.3 Name the fat-digesting enzyme secreted in part **D**. (1)

2.2.4 Give TWO reasons for the breaking down of fat by the juice contained in part **B**. (2)

2.3 Farm animals may chew foreign objects due to certain mineral deficiencies.

2.3.1 Name the mineral that is deficient in the farm animals in the statement above. (1)

2.3.2 Name the condition where farm animals show the deficiency mentioned in QUESTION 2.3.1. (1)

2.3.3 Give an example of a feed supplement that could be used to address the condition named in QUESTION 2.3.2. (1)

- 2.4 The table below shows different animal feeds with the percentages of digestible protein (DP).

FEED	PERCENTAGE OF DP (%)
A. Maize meal	9
B. Maize stalk	4
C. Fish meal	36

- 2.4.1 Classify maize meal and maize stalk into main types of feeds. (2)
- 2.4.2 Indicate the importance of feeding maize stalk to EACH of the following farm animals:
- (a) Young ruminant (1)
- (b) Adult ruminant (1)
- 2.4.3 Calculate the ratio at which maize meal and fish meal should be mixed to get a feed with 15% DP. (Show ALL calculations.) (4)

- 2.5 A farm animal consumed 15 kg of hay with a dry matter content of 84% and excreted 3,5 kg dry manure.

- 2.5.1 Calculate the digestibility co-efficiency of the feed in the statement above. (Show ALL calculations.) (5)
- 2.5.2 Give the percentage of excreted material. (1)

- 2.6 The table below shows the fodder flow plan over a period of six months.

MONTHS	JAN.	FEB.	MARCH	APRIL	MAY	JUNE
Grazing available (kg/ha)	1 400	1 200	950	800	500	100
Supplementary feed requirement (kg/animal/day)	0	0	2	3	5	8

- 2.6.1 Identify the month in which it will be most advisable to reduce the number of farm animals. (1)
- 2.6.2 Refer to the data above to justify the answer in QUESTION 2.6.1. (1)
- 2.6.3 Calculate the total feed available (in tons) for the month April if the farmer has 5 hectares available for grazing. (Show ALL calculations.) (3)
- [35]**

QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

Start this question on a NEW page.

3.1 The picture below shows animal behaviour under hot conditions.



3.1.1 Identify TWO visible actions that the cattle in the picture above take to reduce the effects of heat. (2)

3.1.2 Indicate TWO reasons why shelter is important to farm animals. (2)

3.1.3 State TWO requirements of the vehicle that transports farm animals. (2)

3.2 The table below shows relative changes in the expected dry matter intake (DMI), milk yield and water intake with increasing environmental temperature.

TEMPERATURE (°C)	DRY MATTER INTAKE (kg)	MILK YIELD (LITRES)	WATER INTAKE (LITRES)
20	18,2	27	68
25	17,6	25	74
30	16,9	23	79
35	16,7	18	120
40	10,2	12	106

3.2.1 Identify the main farm product produced in the table above. (1)

3.2.2 Describe the relationship between dry matter intake, milk yield and water intake when the environmental temperature increases. (3)

- 3.3 The graph below shows the average live weight of farm animals for farmers A and B who use different production systems.



- 3.3.1 Identify the farmer that represents EACH of the following:

- (a) Extensive production system (1)
- (b) Intensive production system (1)

- 3.3.2 Justify the answers to QUESTION 3.3.1(a) and 3.3.1(b). (2)

- 3.3.3 Identify a disadvantage with regard to the input costs of the intensive production system. (1)

- 3.4 The Department of Agriculture reported several foot-and-mouth disease (FMD) outbreaks in different areas of South Africa. This led to a ban on the export of animals and their products. Veterinarians were then deployed to the affected areas and infected animals were separated from non-infected animals.

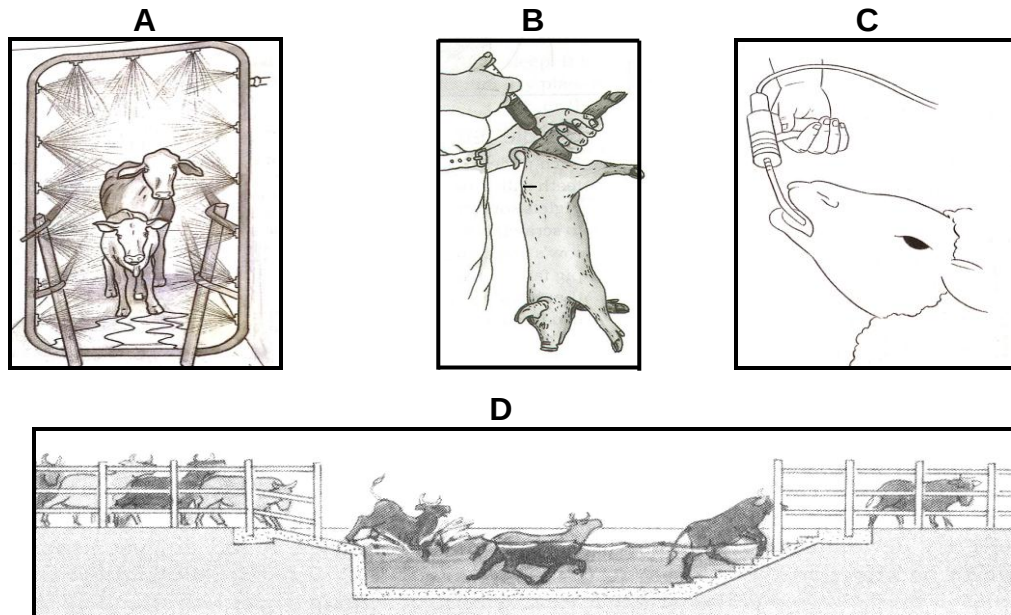
- 3.4.1 Indicate the pathogen that causes the disease in the scenario above. (1)

- 3.4.2 Give TWO main symptoms of foot-and-mouth disease in farm animals. (2)

- 3.4.3 Identify, in the scenario above, TWO roles of the state regarding animal disease control. (2)

- 3.4.4 State TWO economic impacts of foot-and-mouth disease on South Africa. (2)

- 3.5 The pictures below show different methods used to administer medication to farm animals.

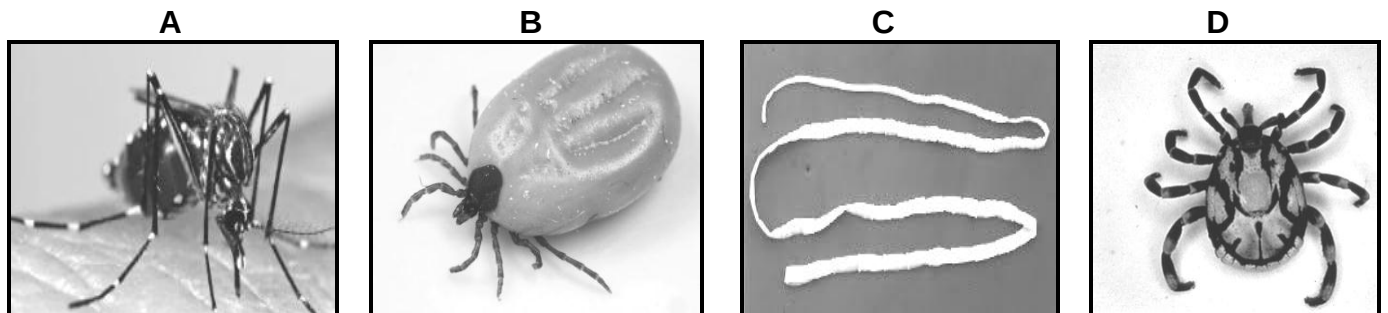


Write down the letters (A–D) that represent TWO methods in the pictures above that can be used for the following:

3.5.1 Control of external parasites (2)

3.5.2 Treatment of internal parasites (2)

- 3.6 The pictures below show different organisms harmful to farm animals.



3.6.1 Give a term that describes the organisms in **A**, **B**, **C** and **D**. (1)

3.6.2 Classify the organisms in **B** and **C**. (2)

3.6.3 Identify the organism (A, B, C or D) that is responsible for transmitting EACH of the following diseases:

(a) Redwater (1)

(b) Rift Valley fever (RVF) (1)

(c) Heartwater (1)

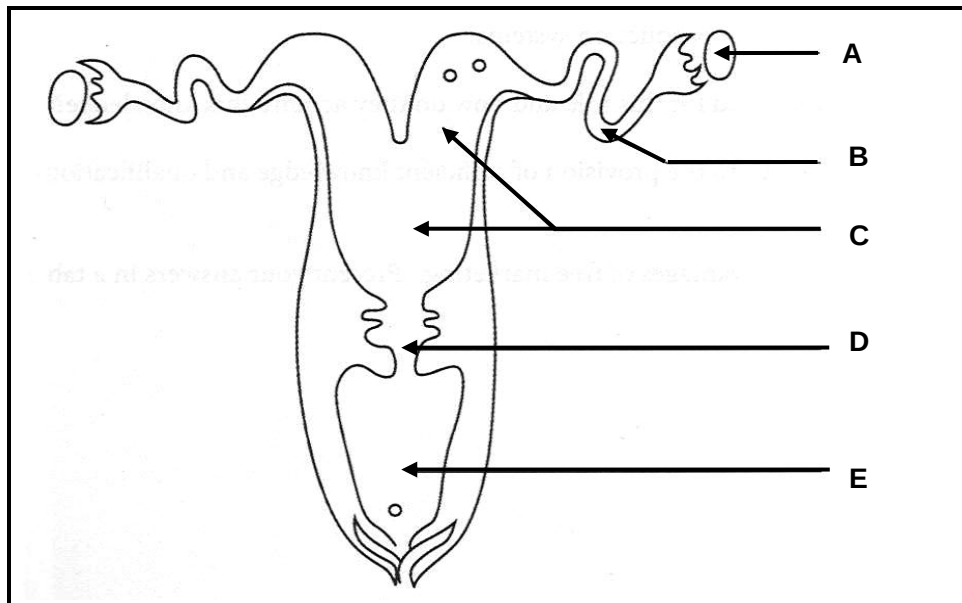
- 3.7 List THREE plants that are poisonous to farm animals. (3)

[35]

QUESTION 4: ANIMAL REPRODUCTION

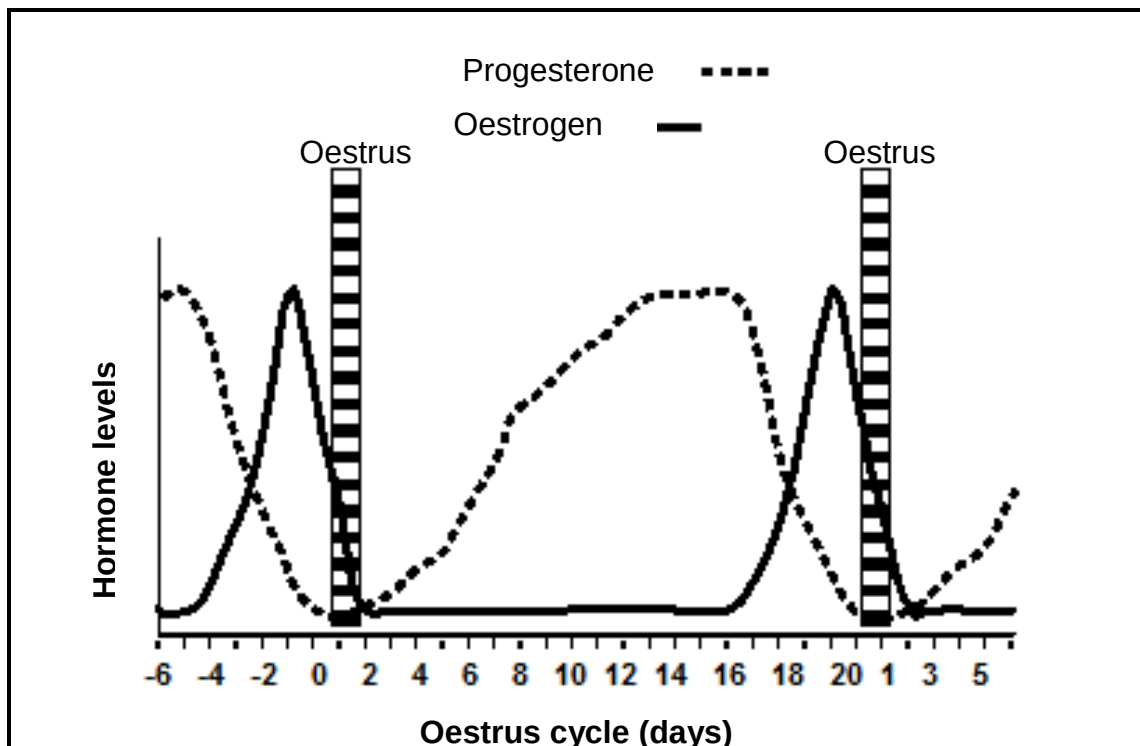
Start this question on a NEW page.

4.1 The diagram below shows the reproductive system of a female farm animal.



- 4.1.1 Write down the letters (A–E) that represent TWO secondary sex organs in the diagram above. (2)
- 4.1.2 Write down the letter (A–E) that represents the part where EACH of the following occurs:
- (a) Fertilisation (1)
 - (b) Secretion from these glands provides nutrients for developing embryos (1)
- 4.1.3 State the function of **D** under the following conditions:
- (a) During mating (1)
 - (b) During pregnancy (1)

- 4.2 The graph below shows the hormonal levels of a female farm animal during the reproduction cycle.



- 4.2.1 Define the concept *oestrus*. (2)
- 4.2.2 Indicate whether the female farm animal represented in the graph above is pregnant or not. (1)
- 4.2.3 Give a reason, based on the data in the graph, to support the answer to QUESTION 4.2.2. (1)
- 4.2.4 Indicate the expected level of FSH of this female farm animal from day 17 to day 20. (1)

- 4.3 The table below shows the percentage (%) fat, protein and lactose in the milk of dairy cows during certain times.

WEEKS	FAT (%)	PROTEIN (%)	LACTOSE (%)
5	4,0	3,0	5,0
10	4,1	3,2	4,9
15	4,2	3,5	4,8
20	4,3	3,6	4,8
25	4,4	3,7	4,6
30	4,5	3,8	4,4
35	4,1	4,0	4,3
40	4,5	4,1	4,2
45	4,6	4,2	4,1

- Draw a combined bar graph showing the fat and protein percentages from week 5 to week 25. (6)

4.4 Cattle breeders can increase the number of offspring by artificially bringing all the cows in oestrus at approximately the same time.

4.4.1 Identify the process in the scenario above. (1)

4.4.2 Name TWO techniques or methods used in the process identified in QUESTION 4.4.1. (2)

4.4.3 State TWO disadvantages of the process identified in QUESTION 4.4.1. (2)

4.5 Arrange the statements relating to the stages of mating below in sequential order. Write down ONLY the letters (A–E).

A Penetration of the vagina (1)

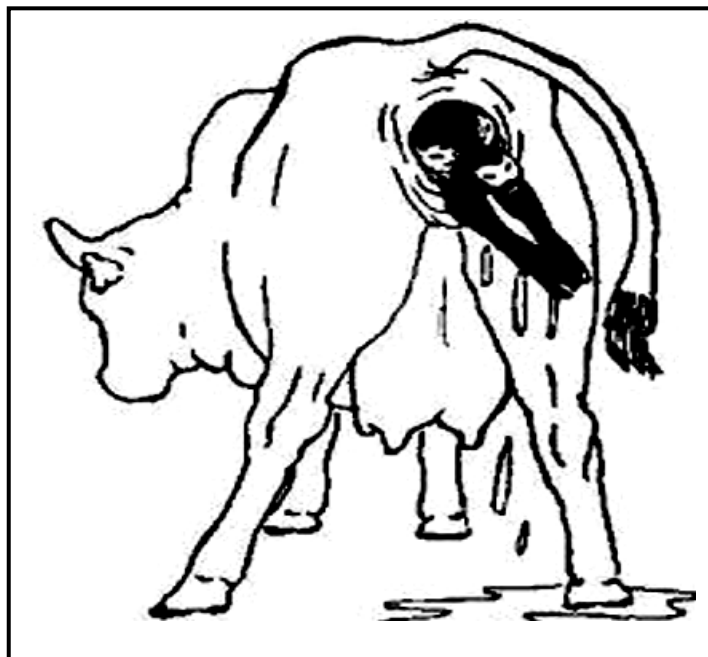
B Bull jumps off (1)

C Bull shows interest in cows due to increased level of pheromones (1)

D Bull stands on its hind legs with chest on the female animal's rump (1)

E Bull releases sperm cells (1)

4.6 The picture below shows a cow in the process of giving birth.

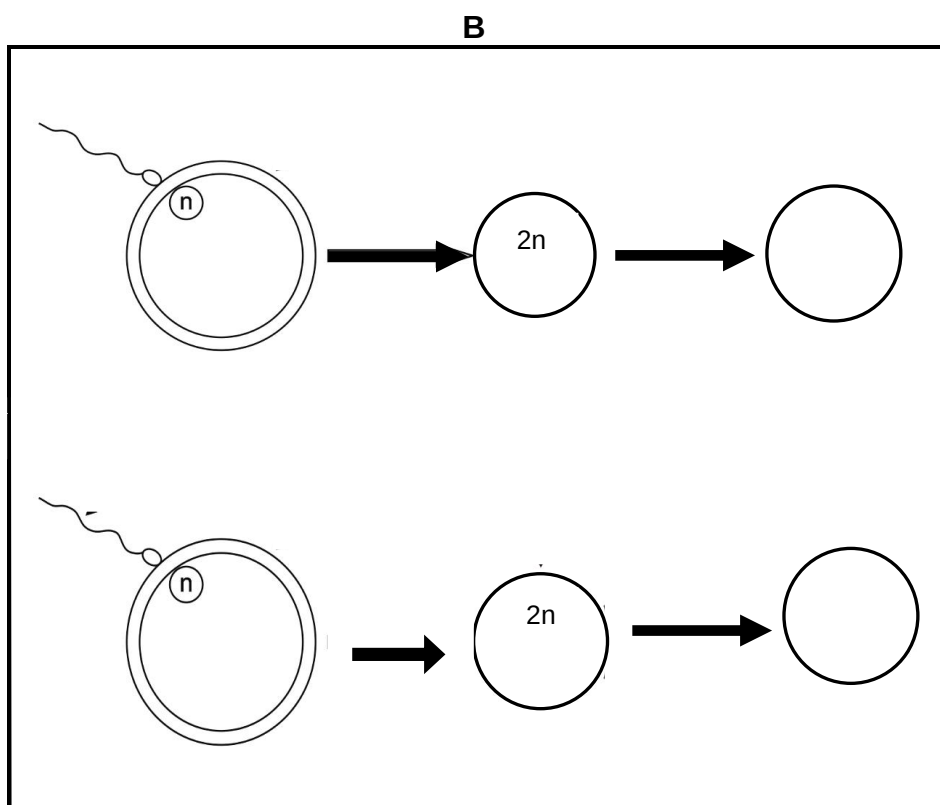
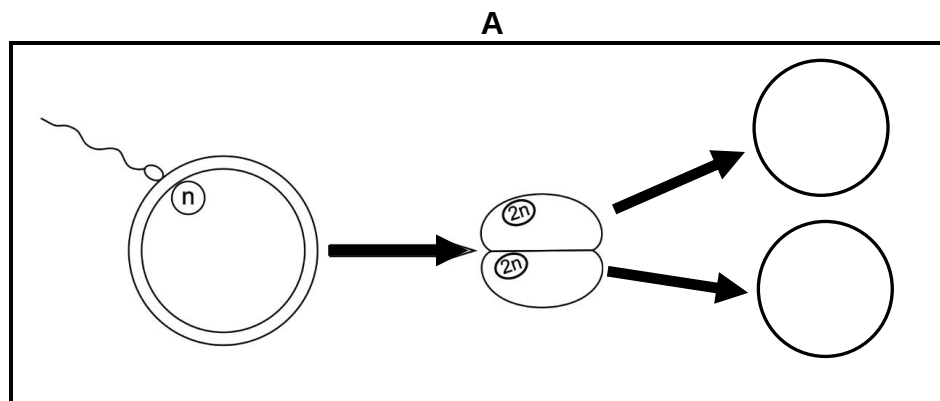


4.6.1 Name the stage of parturition illustrated in the picture above. (1)

4.6.2 Give the term for a situation when a cow is unable to calve on her own. (1)

4.6.3 Indicate TWO calf-related problems that can negatively affect parturition. (2)

- 4.7 Diagrams A and B below show the fusions of male and female gametes and the development of the zygotes.



- 4.7.1 Identify the type of multiple births that resulted from the fusion represented in:

- (a) Diagram A (1)
- (b) Diagram B (1)

- 4.7.2 Differentiate between the two multiple births identified in QUESTION 4.7.1. (2)

[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150