education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P1

SEPTEMBER 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, for e.g. 1.1.11 A.

1.1.1 The process in animal nutrition that describes the intake of food through the mouth:

A Assimilation
B Digestion
C Egestion
D Ingestion

1.1.2 The compartment in ruminant farm animals regarded as the true stomach:

A Rumen
B Reticulum
C Abomasum
D Omasum

1.1.3 The mineral required for the formation of haemoglobin in red blood cells:

A Calcium
B Phosphorus
C Sodium
D Iron

1.1.4 Regurgitation in ruminant farm animals entails the following:

(i) The walls of the reticulum contracts and bolus enters the oesophagus
(ii) Through peristalsis fine particles pass back into the mouth
(iii) Bolus of partly digested coarse particles move back to the mouth
(iv) Re-mastication to increase the surface area

Choose the CORRECT combination:

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

1.1.5 ONE of the following is NOT a basic guideline for transporting farm animals:

A The floor of the truck should not be slippery
B Load cattle, sheep and goats together on the same truck
C Do not feed animals less than 12 hours before loading
D Do not load animals too long before departure

1.1.6 The most effective way of preventing the infestation of liver fluke on a farm.

A Regular dipping
B Destroy slugs and snails
C Shear animals before the rainy season
D Quarantine all infected animals

1.1.7 Commercial farming enterprises are characterised by:

A Low productivity with simple systems
B Focus output on the farmer
C Generating maximum profit
D Using traditional farming methods

1.1.8 The safest way to approach larger ruminant farm animals during handling.

(i) Announce presence through a touch on the side or front
(ii) Never use a prodder if there is no space for animals to go
(iii) Move animals through a chute with minimal obstructions
(iv) Make movement from the blind spot

Choose the CORRECT combination:

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

1.1.9 Monozygotic twins develop from:

A A single ovum and a single sperm cell
B Two ova and a single sperm cell
C Two ova and two sperm cells
D A single ovum and two sperm cells

1.1.10 The following occurs during the process of spermatogenesis:

A Secondary spermatocytes divide mitotically to form spermatids
B Spermatogonium divides by meiosis to form primary spermatocytes
C Primary spermatocyte is transformed into two secondary spermatocytes during meiosis
D Spermatids undergo morphological changes to form oocytes

(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:	Rumen	Contractions help with the flow of finer food particles into the omasum
	B:	Reticulum	
1.2.2	A:	Cardiac region	Secretes mucus and mixes it with food
	B:	Fundic region	
1.2.3	A:	Soil sods	Used in pens to absorb moisture and insulate cold cement floors
	B:	Hay and straw	
1.2.4	A:	Infra-red light	Reduces the impact of cold weather conditions in extensive beef production
	B:	Insulator	
1.2.5	A:	Sterility	Abnormalities of the acrosome and tail resulting in an immobile sperm cell
	B:	Infertility	

(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 vitamin required for the normal absorption of calcium and phosphorus from the digestive tract

1.3.2 The confined area where sheep are kept and fed intensively for a short period of time

1.3.3 Cells responsible for the nutrition of sperm cells in bulls

1.3.4 The solution controlling the pH of diluted semen

1.3.5 A long thin tube used to deposit semen into the reproductive canal of female farm animals during artificial insemination (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 Fishmeal is a concentrate and a source of carotene and energy.

1.4.2 The distance animals like to keep between themselves and danger refers to the blind spot.

1.4.3 Mastitis is a viral disease affecting the udder of cows.

1.4.4 The inner layer, from which the respiratory and digestive system develops, is known as the amnion.

1.4.5 Dystocia is the failure of a cow to expel the afterbirth within 12 to 24 hours after parturition. (5 x 1) (5)

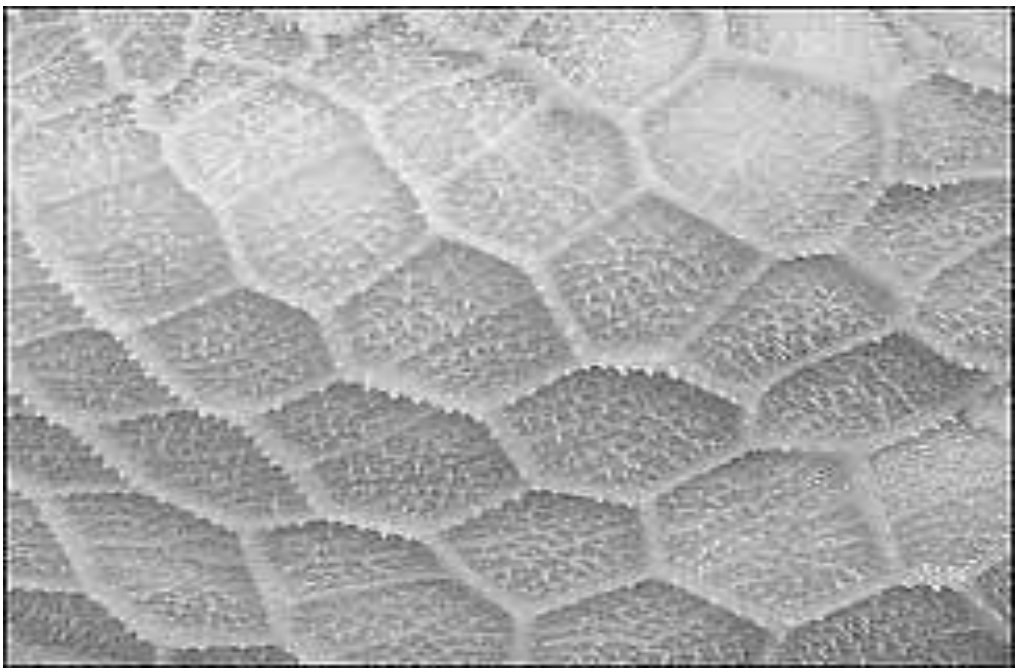
TOTAL SECTION A: 45

SECTION B

QUESTION 2: ANIMAL NUTRITION

Start this question on a NEW page.

2.1 The structure below represents a part of the compound stomach of a ruminant farm animal.



2.1.1 Identify the part of the compound stomach represented above. (1)

2.1.2 Give TWO functions of the part identified in QUESTION 2.1.1 above. (2)

2.1.3 Explain the term *reticulo-rumen*. (2)

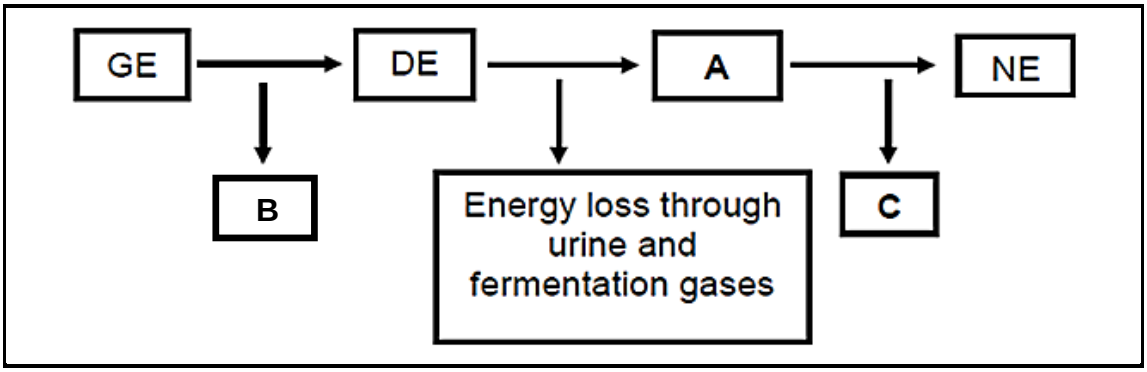
2.2 The diet of ruminant farm animals mainly consists of roughages which are digested by various micro-organisms through a process of fermentation, resulting in a number of gases produced by these farm animals.

2.2.1 List TWO gasses produced during the rumination process. (2)

2.2.2 Indicate the condition posed by the excessive accumulation of gasses during the rumination process. (1)

2.2.3 Explain the process whereby the end-products of roughage digestion, are absorbed. (2)

2.3 The schematic representation below shows the energy flow in the body of a farm animal.



2.3.1 Identify, from the representation above, **B** and **C**. (2)

2.3.2 Write the abbreviation of ***DE*** in full. (1)

2.3.3 Indicate TWO purposes for calculating the energy value of a feed or ration. (2)

2.4 The table below provides information on several feeds.

NO.	FEED	DIGESTIBLE PROTEIN (DP) (%)	CRUDE FIBRE (CF) (%)	ME (MJ/kg)
1	Lucerne hay	14	30	08
2	Soyabean meal	38	08	17
3	Maize meal	09	02	12
4	Oats meal	11	03	13
5	Sorghum stalks	04	40	06

2.4.1 Classify feeds 1, 3 and 5 into different types of roughages and concentrates. (Write ONLY the number and the type of feed.) (3)

2.4.2 Identify, from the table above, only the number of the feed applicable to EACH of the following statements:

(a) The feed with the highest nutritional value (1)

(b) The energy-rich concentrate with the highest energy content (1)

2.5 Use the information from the table in QUESTION 2.4 above to answer the questions that follow.

2.5.1 Compile, by means of the Pearson square method, a ration by using FEED **2** and FEED **4** for sheep requiring 17% DP. (3)

2.5.2 Calculate the percentage of FEED **4** for the ration in QUESTION 2.5.1. (3)

2.6 A small stock farmer keeps 120 sheep on 40 ha of natural veld. Each sheep consumes on average 2,5 kg DM per day.

2.6.1 Calculate the total quantity DM required in tons for the month of January. (3)

2.6.2 Give TWO measures the farmer can take to overcome the problem of a food shortage. (2)

2.7 This vitamin is needed for blood clotting and strength for bones and muscles.

2.7.1 Name a farm animal where this vitamin is of critical importance. (1)

2.7.2 Indicate if the vitamin is a water- or fat-soluble vitamin. (1)

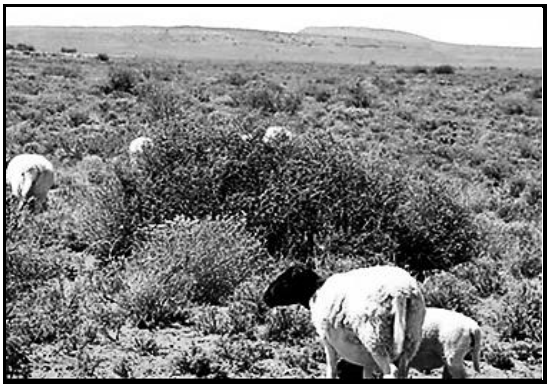
2.7.3 List TWO feeds or sources, of plant origin, rich in the vitamin. (2)
[35]

QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

Start this question on a NEW page.

3.1 The illustrations below show two animal production systems practiced in different parts of South Africa.

PRODUCTION SYSTEM A



PRODUCTION SYSTEM B

3.1.1 Identify EACH of the following:

(a) PRODUCTION SYSTEM **A** (1)

(b) PRODUCTION SYSTEM **B** (1)

3.1.2 Give a reason to motivate the answer based on the illustration of PRODUCTION SYSTEM **B** in QUESTION 3.1.1 (b). (1)

3.1.3 Compare PRODUCTION SYSTEM **A** and **B** with regard to *the production output per unit area.* (2)

3.2 The table below indicates the lowest critical temperatures of different farm animals.

FARM ANIMAL	LOWEST CRITICAL TEMPERATURE (^{O}C)
Dairy cattle	5
Piglets	30
Sows	10
Day-old chicks	20
Layers	10
Baconers	15

3.2.1 Refer to the information in the table above to identify the animal:

(a) That will not utilise feed effectively at a temperature of 24 ºC (1)

(b) That will utilise feed effectively at a temperature of 8 ºC (1)

3.2.2 Justify the answer in QUESTION 3.2.1(a). (1)

3.2.3 Distinguish between the heat loss in farm animals through:

(a) Conduction (1)

(b) Radiation (1)

3.3 Different equipment and structures are used by farmers in handling farm animals.

Identify the equipment and structures used by farmers in each of the following statements:

3.3.1 To mark stud rams with a permanent and specific code inside the ear (1)

3.3.2 Equips dairy cattle with an advanced electronic device to locate them and record the distance they walk per day (1)

3.3.3 Remove the testes of bull calves (1)

3.3.4 A permanent structure where sows and piglets are kept before and after parturition (1)

3.3.5 A permanent structure where poultry are kept on cement floors for their entire productive lives (1)

3.3.6 A mobile or fixed structure used to load animals on and off vehicles to transport them to the market (1)

3.4 The table below shows the distances cattle walked and the energy used at different temperatures.

TEMPERATURES (ºC)	DISTANCE WALKED (km per day)	ENERGY USED (MJ per day)
5	1	10
10	3	8
15	4	7
20	5	6
25	7	4
30	6	6
35	2	7
40	0	8

3.4.1 Draw a combined bar graph showing the distances cattle walked and the energy used at temperatures between 10 ºC and 30 ºC. (6)

3.4.2 Give a reason why cattle use more energy at temperatures of 35 ºC and higher. (1)

3.5 The sustainable use of medication is very important. Correct medication for the specific disease at the precise dosage is of the utmost importance. Medication can therefore be used either for the prevention or the treatment of diseases.

3.5.1 Explain the process of the *prevention* of diseases. (2)

3.5.2 Name the apparatus used to administer medication for the treatment of diseases. (1)

3.5.3 Give ONE factor that determines the dosage of medication administered to farm animals. (1)

3.6 The table below provides information on diseases in farm animals.

DISEASE	PATHOGENS	KEY SYMPTOMS	TYPE OF ANIMAL INFECTED
A	Virus	Respiratory distress, diarrhoea, paralysis	Poultry of all ages
Mastitis	**B**	Udder is hot, swollen and painful, fever with rapid pulse	Female farm animals
Ringworm	Fungus	Hair loss, red thick, scaly and itchy ring-like lesions	**C**
Heartwater	Protozoa	**D**	Cattle

Refer to the table above and write down the missing information for the letters **A, B, C,** and **D**. (4)

3.7 Name the parasite applicable to each of the following statements:

3.7.1 Causes irritation of the sinuses and sneezing in sheep (1)

3.7.2 Needs a snail within a day to stay alive (1)

3.7.3 Proglottids appear in faeces of the infected animals (1)

3.7.4 Crutching can minimize this infestation (1)
[35]

QUESTION 4: ANIMAL REPRODUCTION

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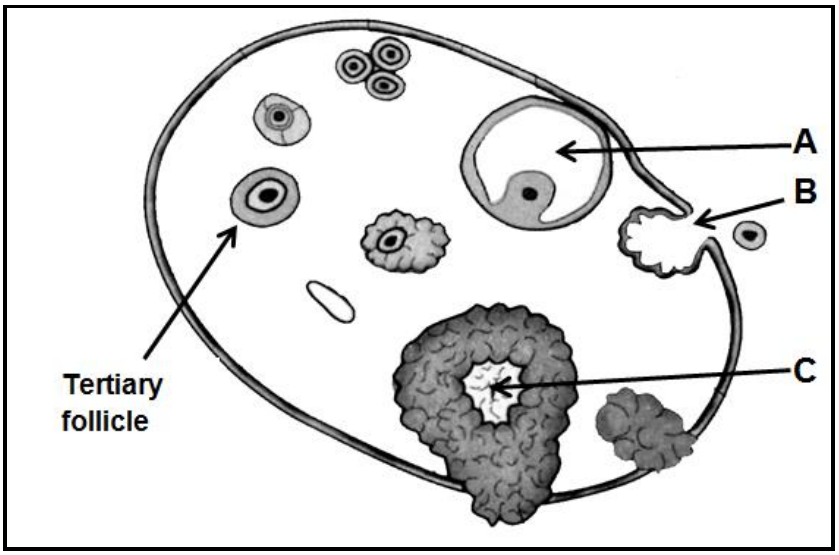
4.1 The diagram below illustrates a female reproductive organ in a farm animal.



4.1.1 Name the primary reproductive organ illustrated above. (1)

4.1.2 Identify **A** and **C**. (2)

4.1.3 Explain the process that takes place in **B**. (2)

4.2 Hormones play an important role in the reproductive cycle of farm animals.

4.2.1 Give the primary function of EACH of the following hormones:

(a) Testosterone (1)

(b) Luteinising hormone (LH) (1)

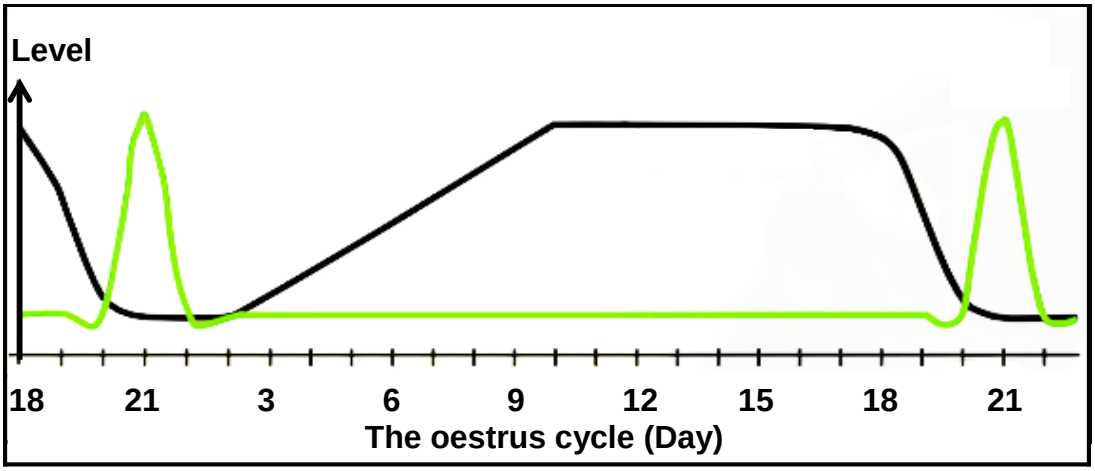
4.2.2 Name the hormone responsible for EACH of the following:

(a) Maintaning the corpus luteum (1)

(b) Inducing milk synthesis (1)

4.2.3 Indicate the structure that secrets the *Gonadotrophic releasing hormone* (GnRH). (1)

4.3 The graph below shows the phases of the oestrus cycle in cattle.



4.3.1 Name the phases of the oestrus cycle:

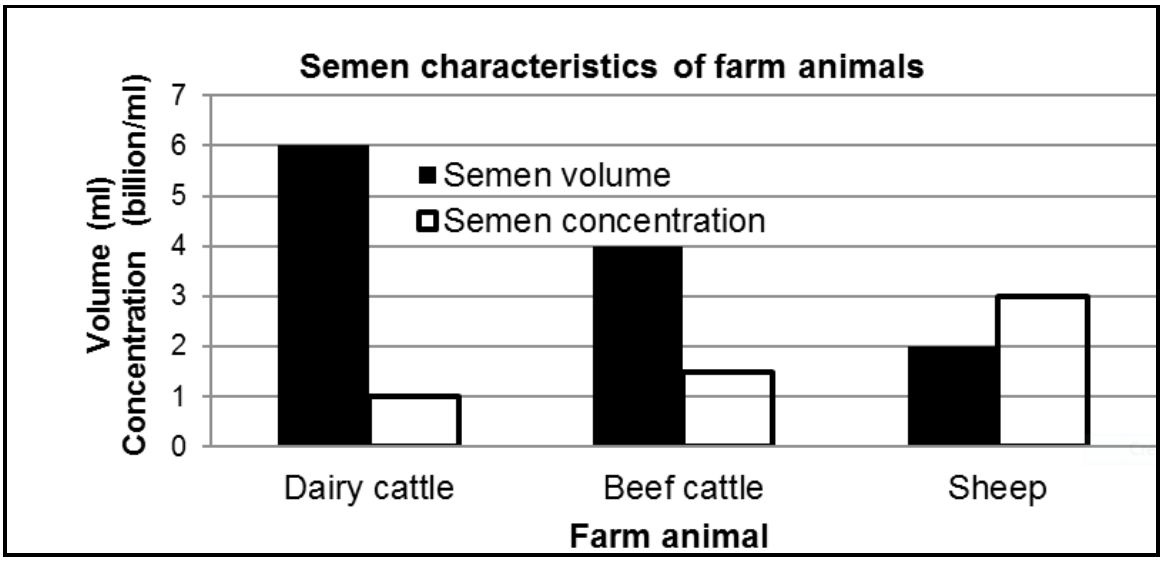
(a) Between day 18 and 21 (1)

(b) On day 21 (1)

4.3.2 Define the term *anoestrus*. (2)

4.3.3 Refer to the graph above to determine if this cow is pregnant or not on day 20. (1)

4.4 The graph below shows the semen characteristics of different farm animals.



4.4.1 Determine, from the graph above, the farm animal with the highest semen concentration and indicate the concentration. (2)

4.4.2 Indicate the reason for EACH of the following colours of semen:

(a) Red (1)

(b) Grey (1)

4.4.3 Explain the effect of fever on the quality of semen. (2)

4.5 The following is a list of different reproductive techniques used to increase the number and quality of the offspring:

- Artificial insemination
- Embryo transplantation
- Cloning
- Synchronization of oestrus

4.5.1 Choose a technique from the list above that matches EACH of the statements below:

(a) The nucleus containing DNA is removed from the egg cell and this egg is therefore enucleated (1)

(b) A viable embryo is harvested from the donor using a *Foley catheter* (1)

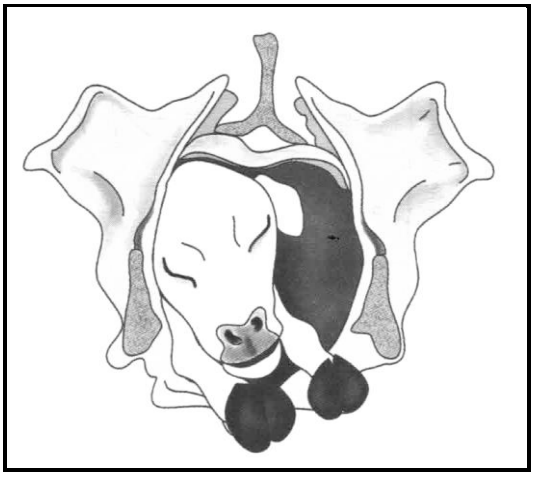
(c) Viable semen is collected through electro-ejaculation (1)

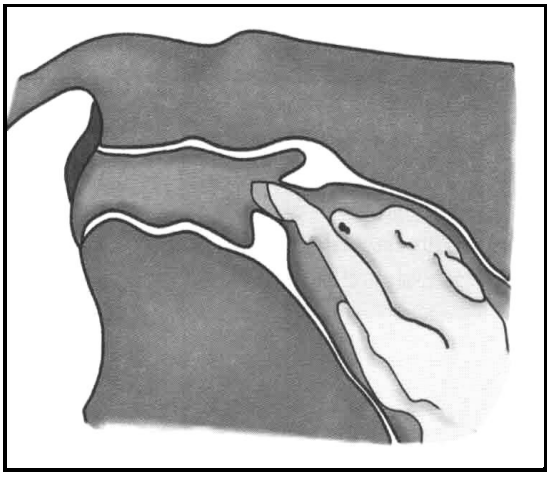
(d) Somatic cells are used to produce a genetically identical organism (1)

(e) A group of cows are brought into oestrus at approximately the same time (1)

4.6 Parturition is a complex process especially when the presentation, positioning and posture of the calf is incorrect, as shown in one of the pictures below.

PICTURE A **PICTURE B**





4.6.1 Name the stages of parturition shown by PICTURE **A** and PICTURE **B** above. (2)

4.6.2 Give the correct term for the problem shown in PICTURE **B.** (1)

4.6.3 Distinguish between *position* and *posture*. (2)

4.7 In an ideal milk production system, dairy cows are producing milk for 305 days. In the remaining 60 days of the year, no milk is produced.

4.7.1 Give a term for each of the following:

(c) The 305 days in which cows are producing milk (1)

(d) The 60 days within which no milk is produced (1)

4.7.2 Describe the term *colostrum*. (2)
[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150