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GRADE 12

AGRICULTURAL SCIENCES P1

NOVEMBER 2019

MARKS: 150

TIME: 2½ hours

This question paper consists of 15 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 A.

1.1.1 The amount of feed absorbed (in kg) when an animal was fed 15 kg of hay as dry matter and it excreted 6 kg of dry manure:

- A 9 kg
- B 7 kg
- C 21 kg
- D 13 kg

1.1.2 The insoluble components of crude fibre:

- A Hemicellulose, galactose and lactose
- B Cellulose, hemicellulose and lignin
- C Lignin, sugars and starch
- D Cellulose, hemicellulose and nitrogen-free extract

1.1.3 ... are digestive juices that are secreted into the duodenum.

- A Bile and hydrochloric acid
- B Pancreatic juice and gastric juice
- C Succus entericus and pancreatic juice
- D Duodenal juice and pepsin juice

1.1.4 The following occurs in the villi during absorption:

- (i) Blood capillaries absorb amino acids.
- (ii) Lacteal absorbs fatty acids and glycerol.
- (iii) Lacteal absorbs carbohydrates and proteins.
- (iv) Micro-villi increase the surface area for absorption.

Choose the CORRECT combination:

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

1.1.5 ONE of the following is NOT a factor that increases production in an intensive production system:

- A Balanced nutrition
- B Proper environment
- C Inadequate shelter
- D Breeding resistant animals

1.1.6 The following are basic guidelines to be considered when transporting animals:

- (i) Do not load animals too long before departure.
- (ii) Do not feed animals 12 hours before they are loaded.
- (iii) Transport cattle, sheep and goats on the same truck.
- (iv) Group animals to establish social groupings before loading.

Choose the CORRECT combination:

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

1.1.7 A preventative measure to control the spread of liver fluke in a large herd of cattle:

- A Use medicinal treatment at regular intervals.
- B Fence off swampy and wet areas from the rest of the pastures.
- C Removal of infected dung from the pastures on a regular basis.
- D Division of the pasture into camps.

1.1.8 Zoonotic diseases ...

- A can be transmitted from animals to humans.
- B are caused by nutritional deficiencies.
- C are non-infectious .
- D cannot be treated once diagnosed.

1.1.9 The scrotum encloses the primary male reproductive organ that ...

- A produces the carrier fluid for spermatozoa.
- B acts as a copulatory organ.
- C produces spermatozoa and testosterone.
- D secretes testosterone and seminal fluids.

1.1.10 An example of congenital defects in cows:

- A Cryptorchidism
- B Cystic ovaries
- C Impotence
- D Double cervix

(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, e.g. 1.2.6 B only.

COLUMN A			COLUMN B
1.2.1	A:	Keratomalacia	Animals chew dry bones
	B:	Pica	
1.2.2	A:	Active transport	The movement of glucose molecules and amino acids across the membrane against the concentration gradient
	B:	Passive transport	
1.2.3	A:	Swine fever	Classified as a notifiable disease
	B:	Foot and mouth disease	
1.2.4	A:	Subsistence farming	Farming system using advanced agricultural technology
	B:	Indigenous farming	
1.2.5	A:	Vesicular	Gland secreting a sticky, yellowish fluid containing a high concentration of proteins
	B:	Bulbo-urethral	

(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 plan where a farmer makes sure that the animal feed requirements are met throughout the production cycle
- 1.3.2 Poultry equipment in a broiler house that ensures maximum consumption of feed even at night
- 1.3.3 Parasites that usually live within the digestive tract of an animal
- 1.3.4 A pregnancy problem caused by excessive collection of fluids in the tissues or between foetal membranes
- 1.3.5 The process of forming ova in cows

(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 Mineral lick is the method of supplementing minerals where an animal takes in as much minerals as required.

1.4.2 Bedding in an intensive production system reduces the effect of solar radiation and also heat loss from the house.

1.4.3 Oestrogen leads to increased blood supply to the uterus and prepares it for implantation.

1.4.4 Parturition is the early termination of pregnancy with a visible expulsion of a non-viable foetus.

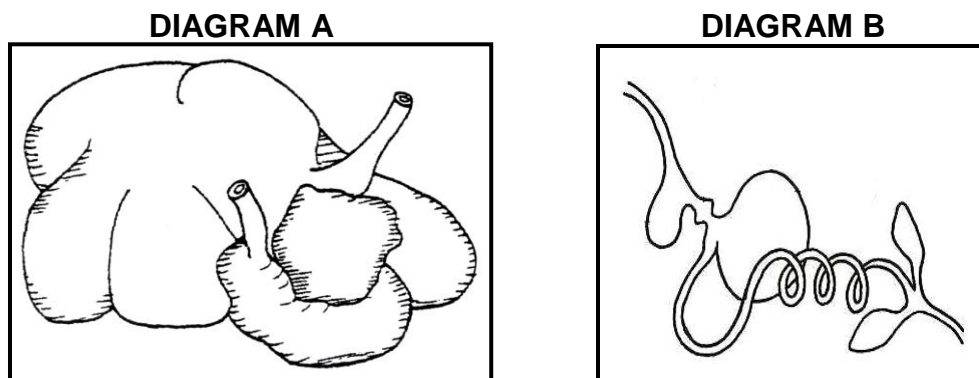
1.4.5 The mid-piece of a sperm cell facilitates penetration into the ovarian wall. (5 x 1) (5)

TOTAL SECTION A: 45

SECTION B**QUESTION 2: ANIMAL NUTRITION**

Start this question on a NEW page.

2.1 The diagrams below show the alimentary canals of farm animals.



2.1.1 Classify the TWO animals represented by DIAGRAM A and DIAGRAM B respectively. (2)

2.1.2 Name TWO adaptation features of the animal in DIAGRAM A that enables it to survive by feeding primarily on hay. (2)

2.1.3 Give a reason why the animal in DIAGRAM B cannot be fed a ration that is high in crude fibre content. (1)

2.1.4 Explain how the animal in DIAGRAM A benefits from the consumption of a non-protein nitrogenous substance such as urea. (2)

2.2 The information below shows the composition of the ration for farm animals:

Maize meal = 12%
Sunflower oilcake meal = 18%
Lucerne hay = 60%
Oats hay = 10%

2.2.1 From the information above, identify the feed that is an example of EACH of the following:

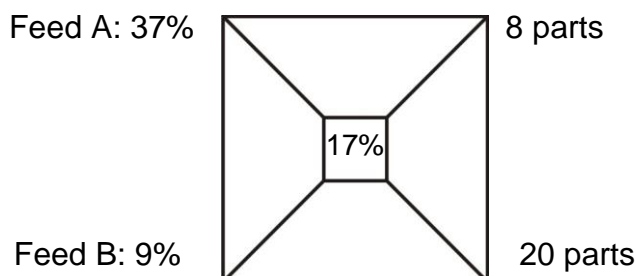
(a) Carbohydrate-rich roughage (1)

(b) Protein-rich concentrate (1)

2.2.2 Why is the ration in QUESTION 2.2 NOT recommended as the only source of food for lambs less than two weeks old? (2)

2.2.3 State ONE important point about grass hay in rations for mature ewes. (1)

- 2.3 Two feeds (maize meal and sunflower oilcake meal) are mixed to obtain a ration with the desired protein content.



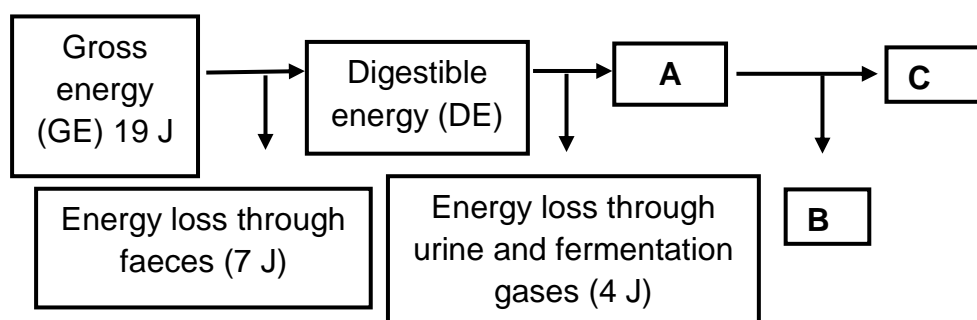
- 2.3.1 Indicate the parts of the ration that represent maize meal and sunflower oilcake meal. (2)
- 2.3.2 Calculate the percentage of feed **B** in the mixture. Show ALL calculations. (3)
- 2.3.3 Calculate the quantity of maize meal (in kg) in 250 kg of mixture. Show ALL calculations. (2)

- 2.4 The table below shows the laboratory results of two feeds.

FEED	TDN (%)	DP (%)	NR
A	75	15	1 : 4
B	80	7	_____

- 2.4.1 Calculate the nutritive ratio (NR) of feed **B**. Show ALL calculations, including the formula. (3)
- 2.4.2 Justify the suitability of feed **A** and feed **B** for growing animals based on their nutritive ratios (NR). (2)

- 2.5 The diagram below shows the energy values of a feed.



- 2.5.1 Calculate the energy value represented by **A**. Show ALL calculations. (2)
- 2.5.2 Identify the energy loss in **B**. (1)
- 2.5.3 Give TWO reasons why energy in **C** is important to farm animals. (2)

- 2.6 The table below shows the quantities of minerals in three different rations prepared for animals.

RATION	Ca (mg/kg)	P (mg/kg)	Mg (mg/kg)
A	7,0	4,5	6,5
B	0,5	1,5	3,0
C	3,5	5,0	2,0

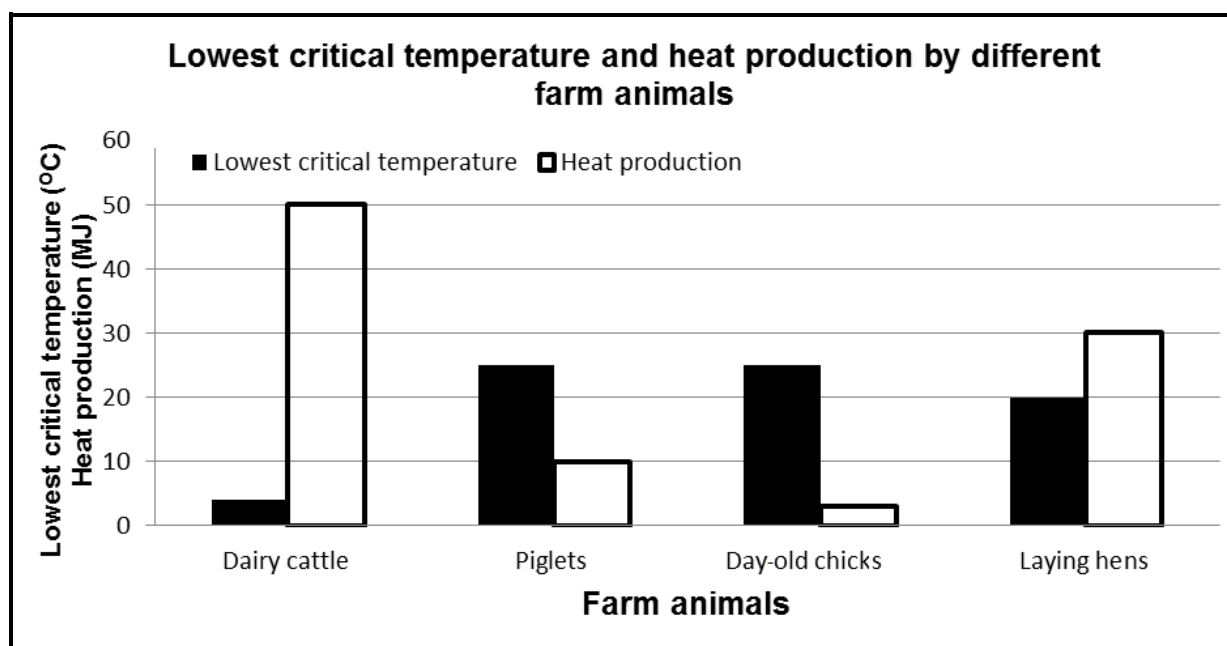
Draw a combined bar graph of the different quantities of minerals in the three different rations.

(6)
[35]

QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

Start this question on a NEW page.

- 3.1 The graph below shows the lowest critical temperature and heat production by different farm animals.



- 3.1.1 Based on the graph above, identify TWO farm animals that need to be kept under an intensive production system. (2)
- 3.1.2 Give a reason for the answer to QUESTION 3.1.1. (1)
- 3.1.3 Identify a farm animal that would be most economical to keep without sheltering facilities. (1)
- 3.1.4 Based on the graph above, give TWO reasons for the answer to QUESTION 3.1.3. (2)
- 3.1.5 Indicate the impact of a decrease in temperature to below 25 °C on the feed intake of piglets. (1)

3.2 The pictures below show the different facilities used in production systems.

PICTURE A



PICTURE B



PICTURE C

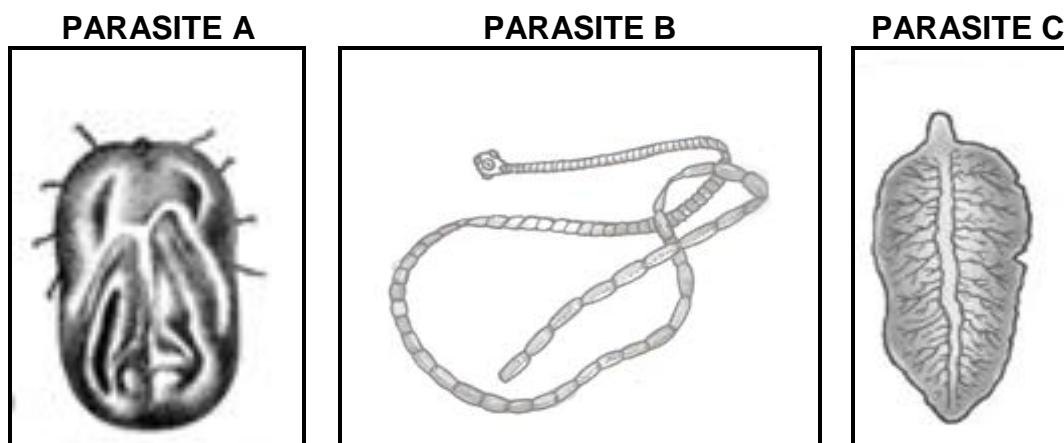


PICTURE D



- 3.2.1 Identify the production system in picture **C**. (1)
- 3.2.2 Give a reason for the answer to QUESTION 3.2.1. (2)
- 3.2.3 Write down the letter of the picture that represents EACH of the following:
- (a) Feed shed (1)
 - (b) Holding pen (1)
- 3.2.4 Differentiate between the facilities in picture **A** and picture **D** in terms of their purpose. (2)
- 3.2.5 Identify the role of equipment **E** in picture **D**. (1)
- 3.3 Name TWO basic guidelines for handling large farm animals. (2)

3.4 The pictures below show parasites affecting farm animals.



3.4.1 Classify parasite **A** according to its life cycle. (1)

3.4.2 Name the protozoan disease that is transmitted by the parasite in QUESTION 3.4.1 (1)

3.4.3 Write down the letter of the parasite to which EACH of the statements below applies:

(a) Its infestation can be controlled by destroying the snail. (1)

(b) It can cause bloated bellies in young animals. (1)

3.4.4 Name TWO requirements of the use of medication in farm animals. (2)

3.5 The table below shows symptoms of different diseases in farm animals.

	ANIMAL 1	ANIMAL 2	ANIMAL 3
SYMPTOMS	Bloody discharge from the mouth and rectum	Skin surface and fleece contains scabs or a crust	Aggression coupled with excessive salivation

3.5.1 Identify the diseases affecting animal **1**, animal **2** and animal **3**. (3)

3.5.2 Identify the animal suffering from a deadly bacterial disease. (1)

3.5.3 Name a pathogen that causes the disease in animal **2**. (1)

3.5.4 State ONE precautionary measure a farmer can take to prevent the spread of the disease in animal **3**. (1)

3.5.5 Name TWO roles of the state in controlling the spread of the disease in animal **1**. (2)

3.6 Salts can be toxic to farm animals. Precautions should be taken to minimise the risk of salt poisoning.

3.6.1 Give TWO symptoms of salt poisoning in farm animals. (2)

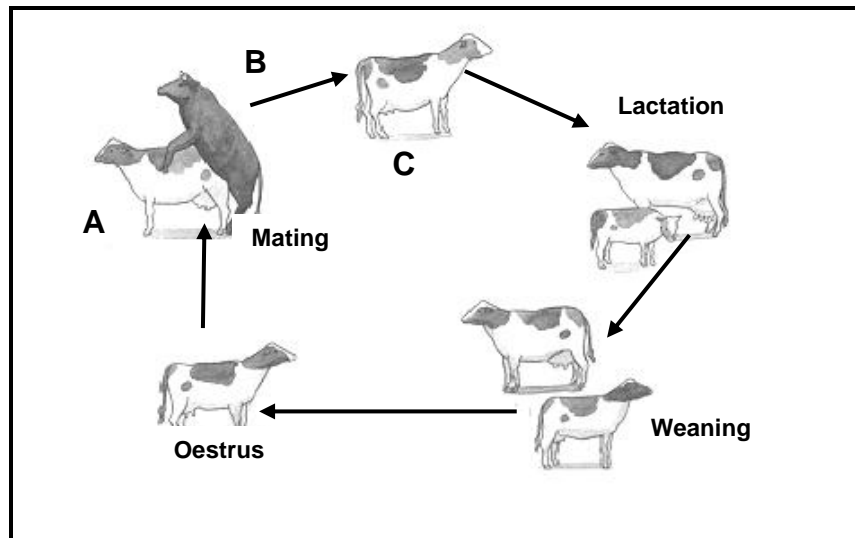
3.6.2 State TWO ways in which a farmer can treat an animal with salt poisoning. (2)

[35]

QUESTION 4: ANIMAL REPRODUCTION

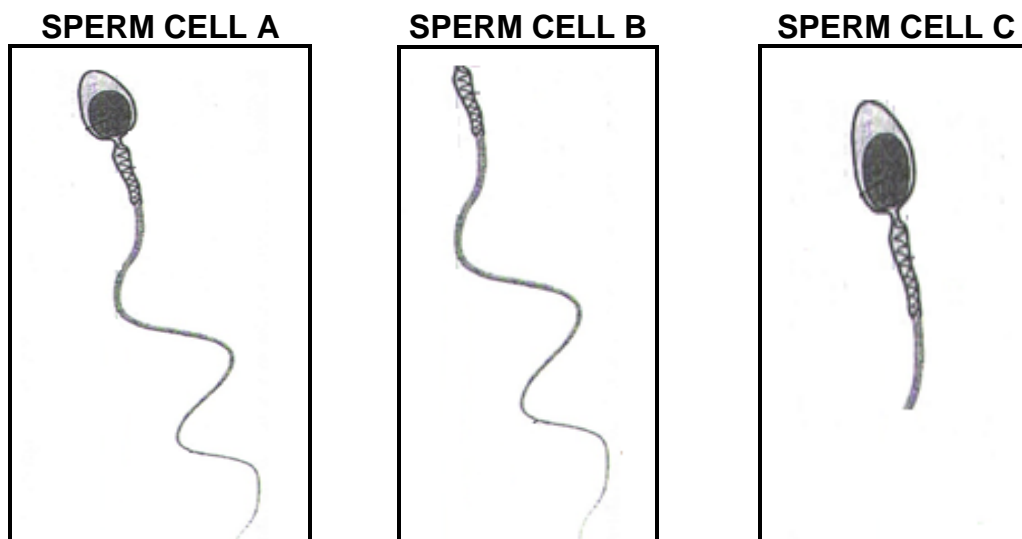
Start this question on a NEW page.

4.1 The picture below shows the reproductive cycle in cattle.



- 4.1.1 Identify the hormones that initiated mating by animal **A** and animal **B**. (2)
- 4.1.2 Give a function for EACH hormone in QUESTION 4.1.1 secreted by animal **A** and animal **B**. (2)
- 4.1.3 Identify the following reproductive processes:
- (a) **C** after successful action by animal **A** and animal **B** (1)
 - (b) Between **C** and lactation (1)
- 4.1.4 Name the hormone that initiates milk let-down. (1)
- 4.1.5 Indicate how the hormone in QUESTION 4.1.4 functions in milk let-down. (1)

4.2 The pictures below show the morphology of sperm cells.



4.2.1 Name the process during which the sperm cells above are formed. (1)

4.2.2 Identify a high quality sperm cell. (1)

4.2.3 Name the instrument used to evaluate the sperm cells above during semen examination. (1)

4.2.4 Explain how sperm cell **B** and sperm cell **C** can affect the ability of a bull to fertilize a cow. (2)

4.3 The correct technique must be used during artificial insemination (AI) to minimise the risk of injuring an animal.

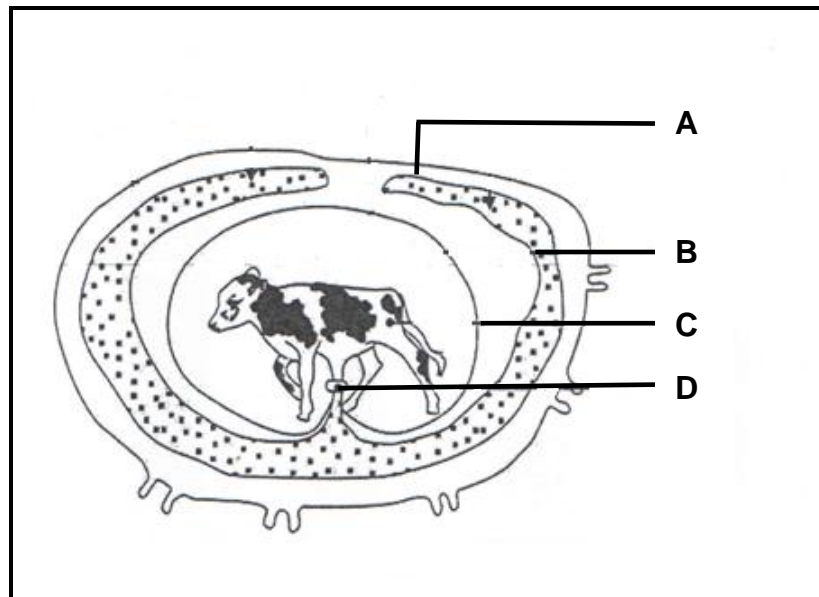
Below are the steps that should be followed when artificial insemination is done:

- The inseminator feels for abnormalities and whether the cow is not already pregnant by inserting the hand into the rectum.
- The pistolette is guided through the vulva, vagina to the cervix.
- A cow is sheltered and kept calm.
- Excess faecal matter is removed.

4.3.1 Re-arrange the steps above in the correct order to ensure that the process is carried out with success. (4)

4.3.2 State TWO disadvantages of artificial insemination for the farmer. (2)

4.4 The diagram below shows the layers covering the foetus during pregnancy.



4.4.1 Name the stage of pregnancy in the diagram above. (1)

4.4.2 Write down the letter of the membrane responsible for EACH of the following:

(a) Attaches the foetus to the uterus (1)

(b) Collects the urine of the unborn calf (1)

(c) Protects the unborn calf from injuries (1)

4.5 Problems are usually experienced by heifers that are giving birth for the first time.

4.5.1 State TWO behavioural signs of an animal that is about to give birth. (2)

4.5.2 Name TWO causes of problems during birth in heifers. (2)

4.6 State the importance of EACH of the aspects below in embryo transfer:

4.6.1 Superovulation (1)

4.6.2 Embryo flushing (1)

4.6.3 Donor cow (1)

4.6.4 Recipient cow (1)

4.7 In nuclear transfer (cloning), the nucleus of a somatic cell from a superior animal is transferred to an enucleated egg cell.

4.7.1 State the importance of nuclear transfer for the following:

(a) Farmer (1)

(b) Veterinarian services (1)

4.7.2 Name TWO disadvantages of nuclear transfer. (2)
[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150