education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT

GRADE 12

AGRICULTURAL SCIENCES
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 your calculations, including formulae, where applicable.
7. Write neatly and legibly.

SECTION A

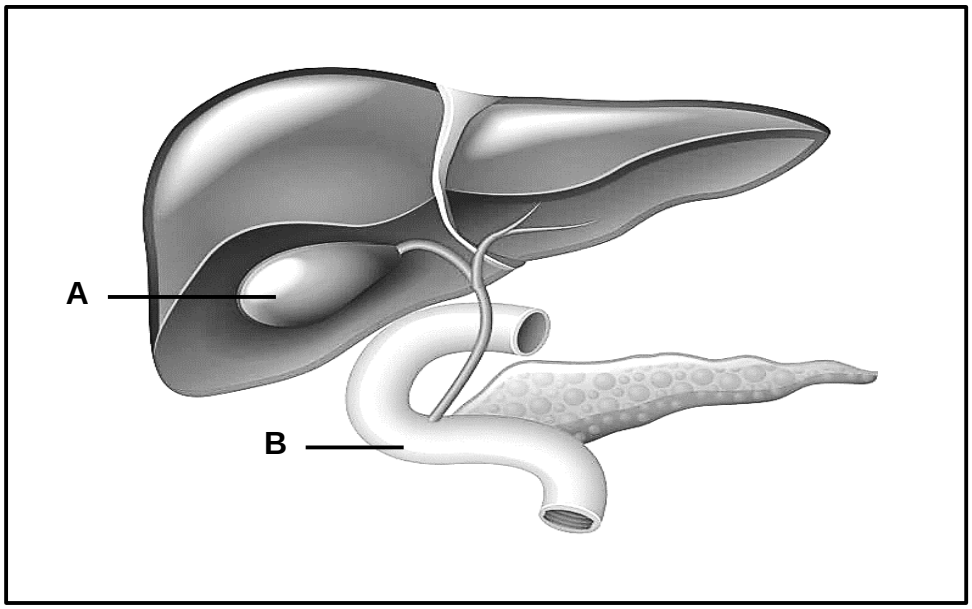
QUESTION 1

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 Papillae in the wall of the rumen serve as …

A heating rods for fermentation of crude fibre.
B cooling rods for the synthesis of vitamins.
C rods which secrete cellulase to hydrolyse crude fibre
D grinding rods for the drying of feed.

1.1.2 The fluid secreted from the part labelled **A** assists in digestion by …



(i) changing the pH from acidic to alkaline.
(ii) promoting the absorption of fatty acids to glycerol.
(iii) stimulating the conversion of glucose to glycogen.
(iv) creating an alkaline medium for the functioning of enzymes.

Choose the CORRECT combination:

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

1.1.3 The dry material intake of a farm animal was 25 kg and the dry mass in the manure was 5 kg. The coefficient of digestibility of the feed is:

A 55%
B 60%
C 80%
D 67%

1.1.4 The protein with the highest biological value.

A Fish protein
B Egg protein
C Milk protein
D Soya bean protein

1.1.5 The statements below relate to an extensive animal production system:

(i) large area with a low production output
(ii) low capital input with a low production output
(iii) little management and control of the environment
(iv) high production output with a high input

Choose the CORRECT combination:

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

1.1.6 As the environmental temperature increases above the normal comfort levels, ruminant farm animals tend to:

A Eat less and drink more water
B Eat more and drink less water
C Eat more and drink more water
D Eat less and drink less water

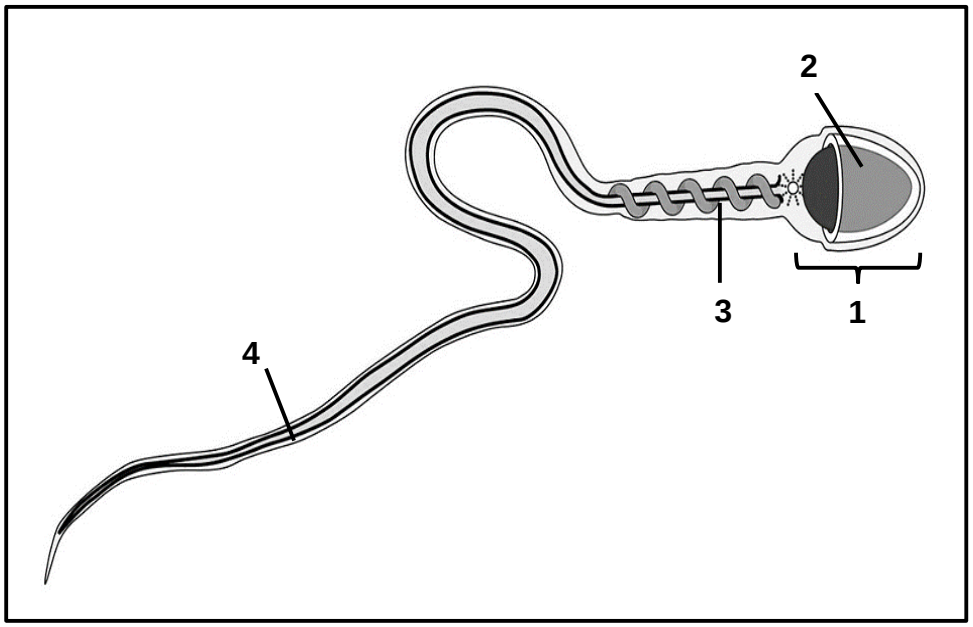
1.1.7 The incorrect handling of farm animals may lead to pale, poor quality meat due to bruising as well as … after slaughtering.

A yellow-coloured fat
B softening of the meat
C softer bones
D delayed rigor mortis

1.1.8 Tool used in the bloodless method to castrate only young animals:

A burdizzo
B tail docker
C electric knife
D elastrator

1.1.9 In the diagram below part … provide the energy for the sperm cell.



A 4
B 3
C 1
D 2

1.1.10 One of the statements regarding the normal lactation of dairy cows is INCORRECT.

A When the milk yield is at its highest, butterfat is at its lowest
B The higher the crude fibre content in a feed, the lower the butterfat content in the milk
C Milk production drops before drying up
D Feed with lower fibre content produces milk with a low butterfat content (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:	Unsaturated	A condition where animals lose more fluids than they take in
	B:	Dehydration	
1.2.2	A:	Metabolic energy	The quantity of energy available to farm animals after the energy lost in the faeces
	B:	Gross energy	
1.2.3	A:	Deep-litter	A system that produces organic eggs
	B:	Battery cage	
1.2.4	A:	Strong with high sides	Guidelines for a vehicle transporting farm animals
	B:	Clean, non-slip floor	
1.2.5	A:	Corpus luteum	A structure that develops in the ovary and produces progesterone during early pregnancy
	B:	Follicle	

(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 ball of food mixed with saliva formed in the mouth to facilitate swallowing

1.3.2 Poultry reared for meat production

1.3.3 A tube that transports sperm cells from the epididymis to the urethra

1.3.4 A powerful contraction of the urethra that deposits semen into the vagina of a cow

1.3.5 A device placed around the lower leg of a cow, to detect and record movement when in 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 Trypsin is the enzyme responsible for digesting starch into maltose, dextrose, and glucose.

1.4.2 A feedlot is the place where dairy cows are milked.

1.4.3 Allantois surrounds the embryo during pregnancy.

1.4.4 The condition whereby a cow has difficulty giving birth is called parturition.

1.4.5 The purpose of reproductive cloning is to develop a cure for diseases.

(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 represent the alimentary canals of farm animals.

DIAGRAM A

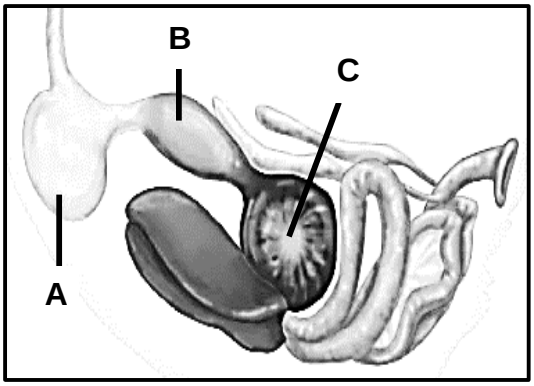


DIAGRAM B

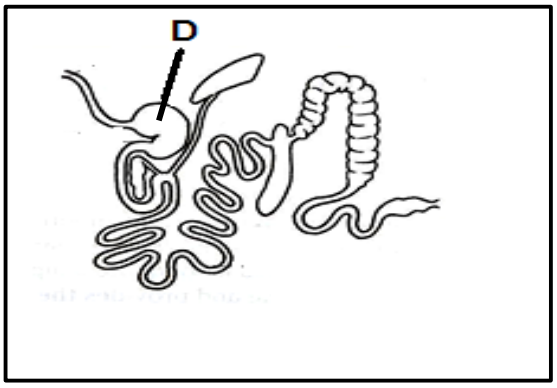
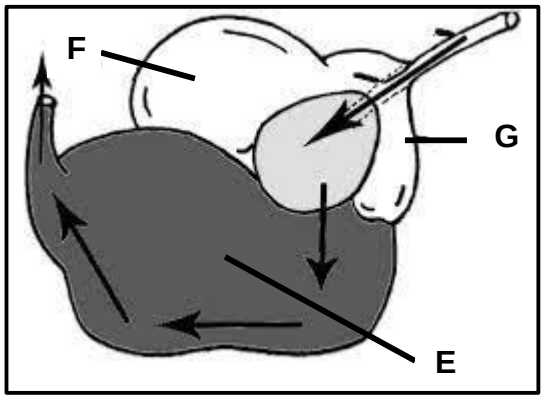


DIAGRAM C



2.1.1 Classify the farm animals with an alimentary canal represented by DIAGRAM **A** and DIAGRAM **C**. (2)

2.1.2 Provide a reason for each of the answers in QUESTION 2.1.1. (2)

2.1.3 Determine the age group of the animal in DIAGRAM **C**. (1)

2.1.4 Give ONE reason, visible from the diagram above, to support the answer in QUESTION 2.1.3. (1)

2.1.5 Identify the letter in DIAGRAM **A** and DIAGRAM **C** representing the part where pepsin is secreted. (2)

2.2 In the block below are different feeds used in animal nutrition.

oil cake meal; green lucerne; dried hay; maize meal; urea

Indicate the feed from the block above that is applicable to each of the following statements:

(a) Source of protein for young lambs (1)

(b) Recommended for fattening animals (1)

(c) Feed rich in vitamin D (1)

(d) A roughage which is a source of vitamin A (1)

2.3 The table below shows the composition of TWO animal feeds.

FEED COMPONENT	FEED A (%)	FEED B (%)
Digestible protein	12,5	6,25
Crude fibre	6,0	14,2
Nitrogen-free extract	60	40
Fat	1,5	2,0

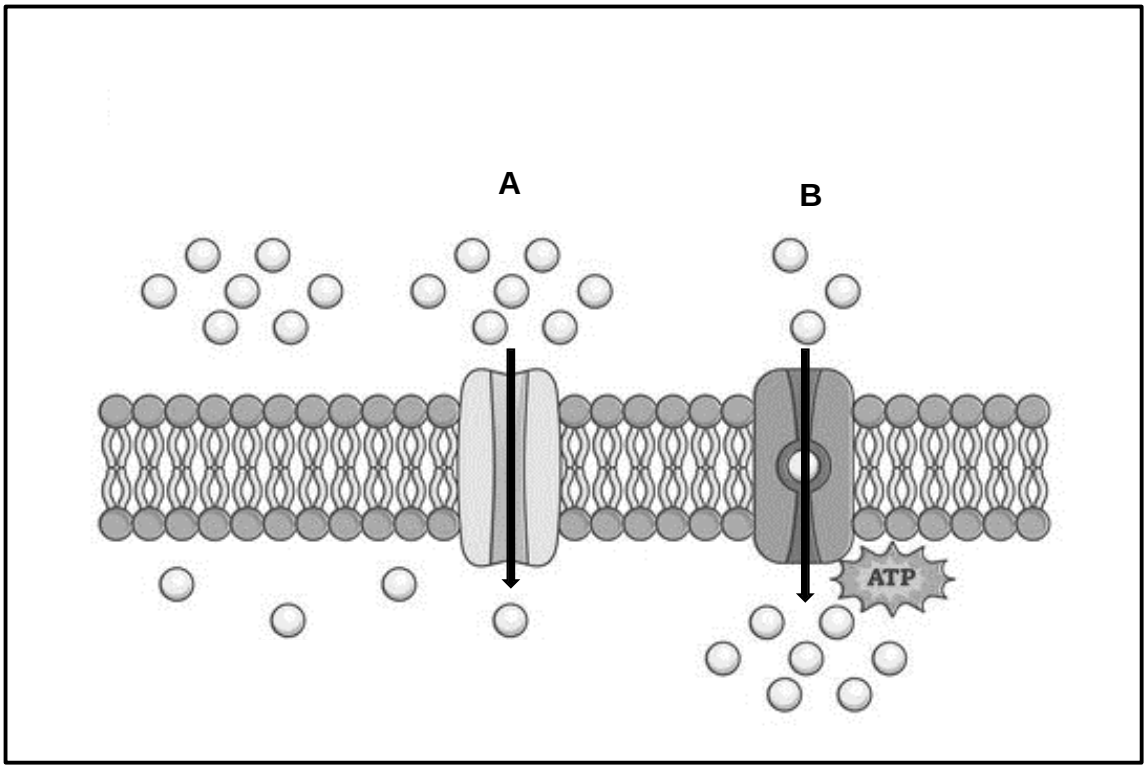
2.3.1 Classify FEED **A** and FEED **B** in the table above. (2)

2.3.2 Calculate the nutritive ratio of FEED **A**. (4)

2.3.3 Recommend a purpose for which FEED **A** can be used based on its nutritive ratio. (1)

2.3.4 Justify the answer in QUESTION 2.3.3. (1)

2.4 The diagram below indicates the process occurring in the alimentary canal of farm animals after digestion.



2.4.1 Identify the process illustrated above. (1)

2.4.2 Indicate the part in the alimentary canal where the process above, occurs. (1)

2.4.3 Identify the type of nutrient movement shown by arrows **A** and **B**. (2)

2.4.4 Provide a reason for the answer in QUESTION 2.4.3. (2)

2.4.5 Name a nutrient that is absorbed through each of the following:

(a) Blood capillaries (1)

(b) Lacteal (1)

2.5 The table below gives the feed available and supplementary feed requirement in a sheep production unit over a period of six months.

MONTHS	Jan	Feb	March	April	May	June
Feed available (kg/ha)	1 200	800	200	100	80	50
Supplementary requirement (kg/animal/day)	0	0	2	3	4	6

2.5.1 Identify the month in which it will be advisable for the farmer to reduce the number of sheep. (1)

2.5.2 Give a reason, from the data above, to support the answer in QUESTION 2.5.1. (1)

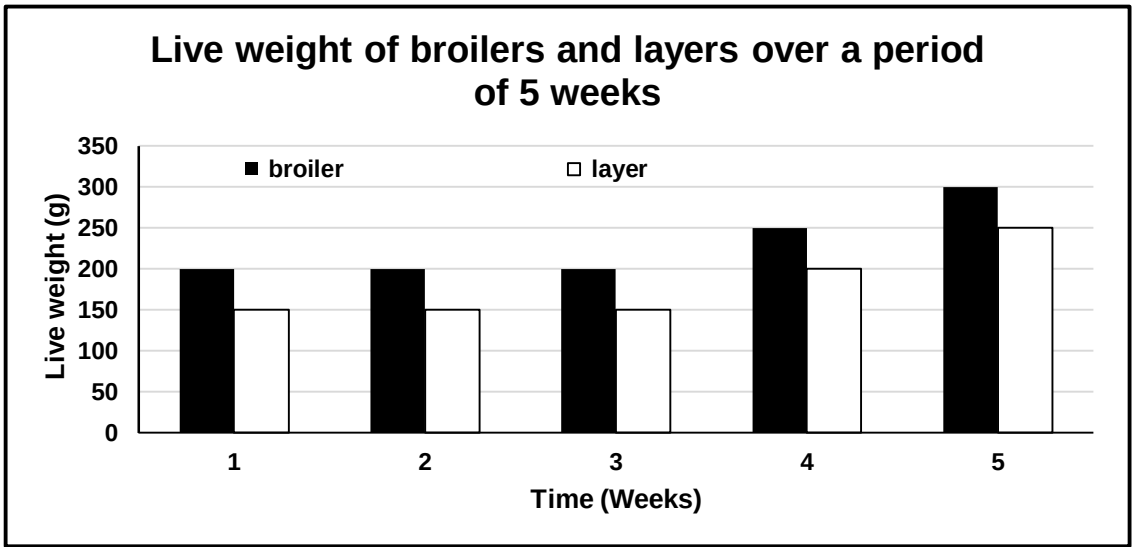
2.5.3 Suggest TWO sustainable actions the farmer can take to reduce the impact of the problem in QUESTION 2.5.1. (2)

2.5.4 Calculate the quantity of feed available (in tons) during February if the farm has 14 hectares available for grazing. (3)
[35]

QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

Start this question on a NEW page.

3.1 The bar graph below illustrates the live weight of broilers and layers over a period of five weeks.



3.1.1 Deduce, from the graph above, the trend in live weight for broilers from week 1 to week 3. (2)

3.1.2 Use the information above to draw a line graph. (6)

3.2 Farmer **A** manages an intensive dairy with 200 cows, 2 milking parlours and 4 milking machines each. The cows produce 8 000 ℓ of milk per day which are sent to a large processing factory in the city. The cows also produce 1 220 tons of manure per year.

Farmer **B** owns 2 cows which produce 10 ℓ of milk per day combined. The farmer has a family of 12 members and 5 dogs. The 2 cows graze alongside the road during the day. The manure collected in the kraal where the cows sleep at night is used to fertilise the garden.

3.2.1 Identify, from the scenario above, the farming system practised by:

(a) Farmer **A** (1)

(b) Farmer **B** (1)

3.2.2 Justify the answer to QUESTION 3.2.1. (2)

3.2.3 Indicate the farming system with a negative impact on the environment. (1)

3.2.4 Support the answer to QUESTION 3.2.3 by stating ONE environmental effect. (1)

3.3 The photograph below shows an apparatus used for a management practice in sheep production.

3.3.1 Identify the apparatus in the photograph above. (1)

3.3.2 Name the function of this apparatus in sheep production. (1)

3.3.3 Give ONE reason why sheep farmers prefer this apparatus to others. (1)

3.3.4 State the age group where this process is performed on lambs under intensive production conditions. (1)

3.3.5 Justify the answer in QUESTION 3.3.4. (1)

3.3.6 Name ONE other apparatus that can be used for the same purpose as the one identified in QUESTION 3.3.1. (1)

3.4

DISEASE	PATHOGENS: Bacterium, Virus, Protozoan or Fungus	KEY SYMPTOMS	TYPE OF ANIMAL INFECTED
Mastitis	**A**	Inflammation in the udder	Farm animals
Rift Valley fever	Virus	High abortion rate	**B**
Redwater	**C**	Fever, anaemia and death	Cattle
D	Fungus	Forms a crust on the skin	Wool sheep

3.4.1 Complete the table above by writing down the missing information for **A**, **B**, **C** and **D**. (4)

3.4.2 Identify a disease from the table that affects only dairy cows. (1)

3.4.3 Suggest TWO management practices that may be used to prevent Redwater. (2)

3.4.4 Name the farm animal that is most susceptible to mastitis. (1)

3.5 *Lantana camara* and *Dichepetalum cymosum* or poison leaf ('gifblaar') are two of the most common and important hepatotoxic plants for farm animals.

3.5.1 State a common name used to describe the plants in the scenario above. (1)

3.5.2 Name the farm animal which is mainly affected by poison leaf ('gifblaar'). (1)

3.5.3 Give TWO examples of other plants in this category. (2)

3.5.4 Give an example of TWO types of sheep that are most susceptible to these types of plants. (2)

3.5.5 Name the inorganic white granular substance fed to ruminant farm animals as a protein substitute, which has the same effect as the plants mentioned above if it is fed in excess. (1)

[35]

QUESTION 4: ANIMAL REPRODUCTION

Start this question on a NEW page

4.1 The diagram below shows the organs in the reproduction systems of farm animals.

DIAGRAM 1

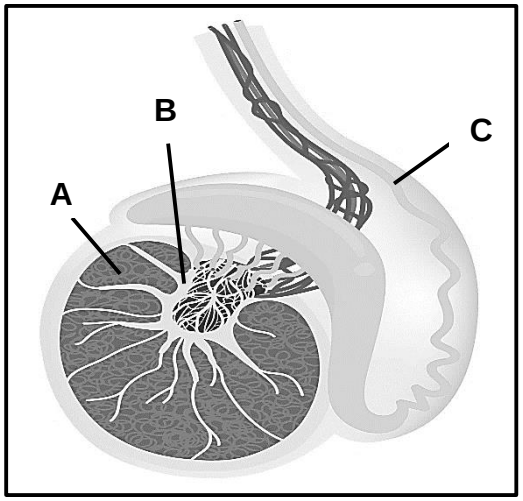
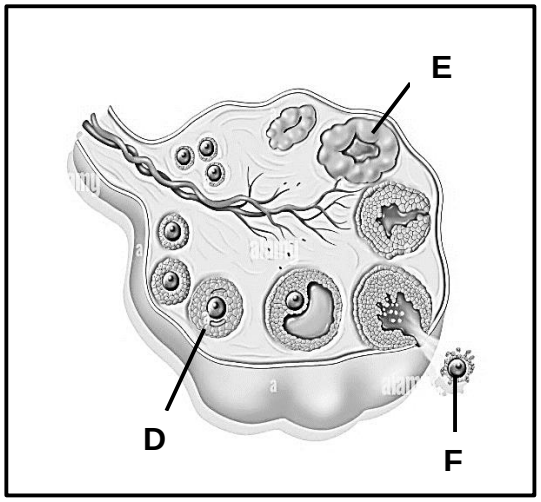


DIAGRAM 2



4.1.1 Identify the LETTER in DIAGRAM **1** and DIAGRAM **2** representing the part where each of the following occurs:

(a) Gametes are formed in DIAGRAM **2** (1)

(b) Acts as a temperature regulating mechanism in DIAGRAM **1** (1)

(c) Secretion of progesterone in DIAGRAM **2** (1)

(d) Production of testosterone in DIAGRAM **1** (1)

4.1.2 Name the congenital defect common in both male and female farm animals that may lead to sterility. (1)

4.1.3 Give TWO hormones responsible for the process in **F**. (2)

4.2 Refer to TWO senses that will regulate mating behaviour in bulls. (2)

4.3 Artificial Insemination is an important technique performed in female farm animals to increase the herd economically and rapidly.

Below are the steps that are involved before and during artificial insemination to ensure successful conception:

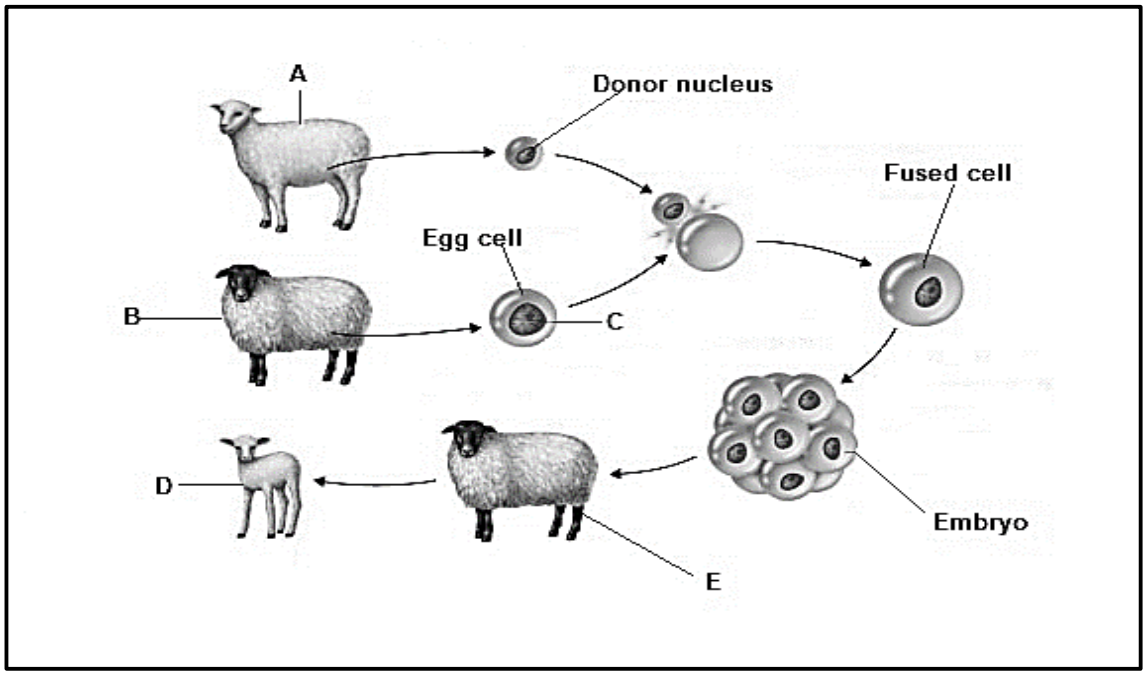
- Semen dilution
- Placing semen into the reproductive tract of a cow
- Semen examination
- Heat detection
- Semen harvesting

4.3.1 Re-arrange the steps above in chronological order to ensure the success of artificial insemination. (5)

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

4.3.3 Give another scientific technique other than the one mentioned above, that will improve the production rate. (1)

4.4 The diagram below illustrates a reproductive process that occurs in animals.



4.4.1 Identify the process illustrated above. (1)

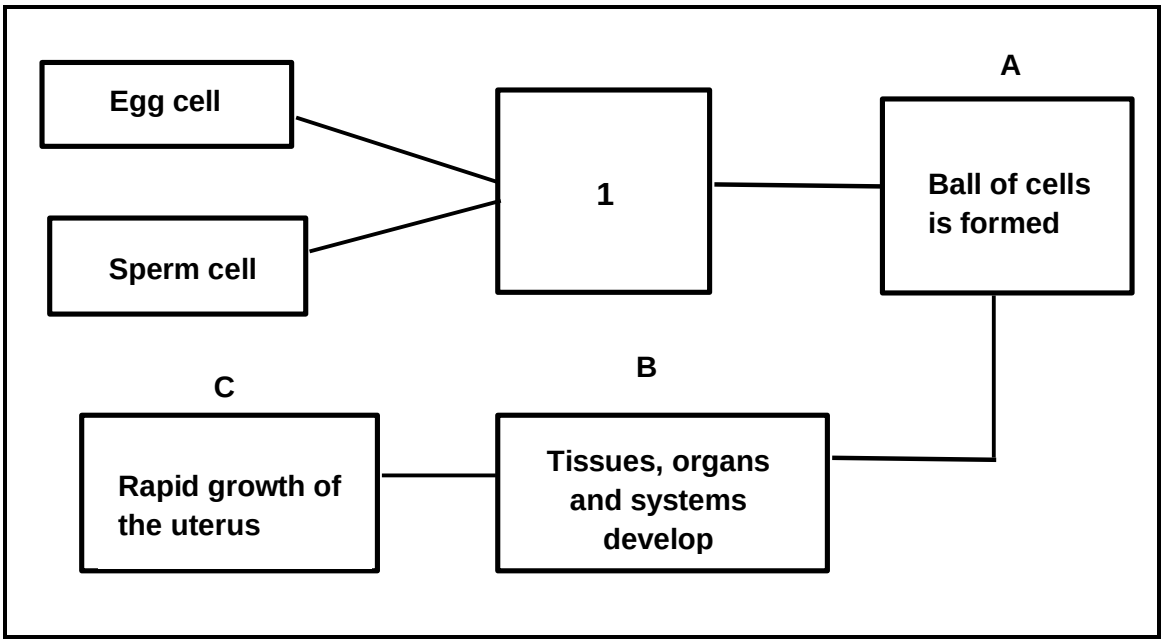
4.4.2 Indicate the LETTER representing the sheep that will be genetically identical to the sheep in **D**. (1)

4.4.3 Write down the LETTER of the sheep that will serve as a surrogate. (1)

4.4.4 Give the name of the process in **C**. (1)

4.4.5 Name TWO aims of the process illustrated above. (2)

4.5 The flow chart below describes the stages of gestation.



4.5.1 Identify the process taking place at **1**. (1)

4.5.2 Indicate the stage of gestation represented by LETTER **A**. (1)

4.5.3 Name the structure that will develop to feed the calf, as a result of the process taking place at LETTER **C**. (1)

4.5.4 Name TWO systems that develop from the endoderm in LETTER **B**. (2)

4.5.5 Give TWO reasons why a cow may abort the foetus. (2)

4.6 Parturition is a complicated process that can be problematic especially if presentation of the calf is incorrect.

4.6.1 Indicate the type of presentation represented by each of the statements below:

(a) The foetus lies on its abdomen with forefeet stretching towards the pelvis and the head resting on it (1)

(b) Rear part of the foetus lies towards the cervix resulting in the hind legs appearing first (1)

4.6.2 Indicate the presentation that will need the assistance of a veterinarian. (1)

4.6.3 Name TWO problems other than presentation that may cause difficult births. (2)

[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150