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Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P1

NOVEMBER 2024

MARKS: 150

TIME: 2½ hours

This question paper consists of 18 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. Read the questions carefully.
4. Answer ONLY what has been asked.
5. Start EACH question on a NEW page.
6. Number the answers correctly according to the numbering system used in this question paper.
7. You may use a non-programmable calculator.
8. Show ALL calculations, including formulae, where applicable.
9. 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 ONE of the following does NOT form part of the large intestine:

- A Rectum
- B Colon
- C Caecum
- D Ileum

1.1.2 A feed with total digestible nutrients (TDN) of 72% and digestible protein (DP) of 8% will have digestible non-nitrogen substances (DNNS) of ...

- A 1 : 9
- B 8%
- C 64%
- D 1 : 8

1.1.3 ONE of the following feeds has the highest biological value:

- A Linseed meal
- B Fish meal
- C Peanut oilcake meal
- D Lucerne

1.1.4 In farm animals the oesophagus is an extension of the pharynx at the back of the oral cavity and:

- (i) It connects the mouth with the stomach
- (ii) It is a passage for bolus from the mouth to the stomach
- (iii) It is where the absorption process starts
- (iv) It regulates the swallowing process

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 A permanent intensive poultry housing system in which the floor is covered with straw or wood shavings:

- A Deep-litter
- B Free-range
- C Battery cage
- D Close-range

1.1.6 The following method of handling farm animals applies specifically to sheep:

- A Work with animals using a neck clamp
- B Use random dogs to manage them
- C Catch animals as high as possible on their hind legs
- D Use a prodder or a whip

1.1.7 A carrier organism that is responsible for the transmission of the disease-causing agent:

- A Vector
- B Pathogen
- C Toxin
- D Virus

1.1.8 The following are measures to prevent the absorption of poison already ingested:

- (i) Animals should be kept away from drinking water
- (ii) Administering strong tea or activated charcoal
- (iii) Providing feed loaded with additives
- (iv) Dosing animals with sugar or glucose

Choose the CORRECT combination:

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

1.1.9 The following is a milk pathway from the point of production in the udder until it is released:

- A Teat canal → gland cistern → teat cistern → alveolus
- B Alveolus → teat canal → gland cistern → teat cistern
- C Alveolus → gland cistern → teat cistern → teat canal
- D Gland cistern → teat cistern → alveolus → teat canal

1.1.10 ONE of the following about meiotic cell division during spermatogenesis is NOT correct:

- A Halves the chromosome number to form reproductive cells
- B Produces two identical diploid (2n) daughter cells from a parent cell
- C Also known as reduction cell division
- D Forms four haploid (n) daughter cells from a parent cell (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:	Maltase	Secreted by the islets of Langerhans
	B:	Insulin	
1.2.2	A:	Cud	Regurgitated bolus inside the mouth
	B:	Chyme	
1.2.3	A:	Poor meat quality	Consequence of the correct and frequent handling of animals
	B:	Aggressive temperament	
1.2.4	A:	Export ban	Animals and their products are not allowed to enter or leave the country to control the spread of diseases
	B:	Import ban	
1.2.5	A:	Copulation	Involuntary contractions of the pelvic floor in male animals resulting in the discharge of semen
	B:	Courtship	

(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 collective name for the finger-like protrusions in the rumen of farm animals
- 1.3.2 The farming system where the farmer raises pigs with the aim of feeding the family
- 1.3.3 The type of cloning performed to produce embryonic stem cells that develop into new tissues and organs
- 1.3.4 A sixteen-celled solid ball that forms after fertilisation
- 1.3.5 The tube that transports sperm cells from the epididymis to the urethra

(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 Mastication involves transportation of water and nutrient molecules from the small intestine into the blood stream.

1.4.2 The blue tick is a three-host tick that transmits heartwater in farm animals.

1.4.3 The allantois brings blood of the mother and foetus in close contact.

1.4.4 Ovum transfer occurs when the nucleus of a body cell is transferred to an enucleated unfertilised egg cell.

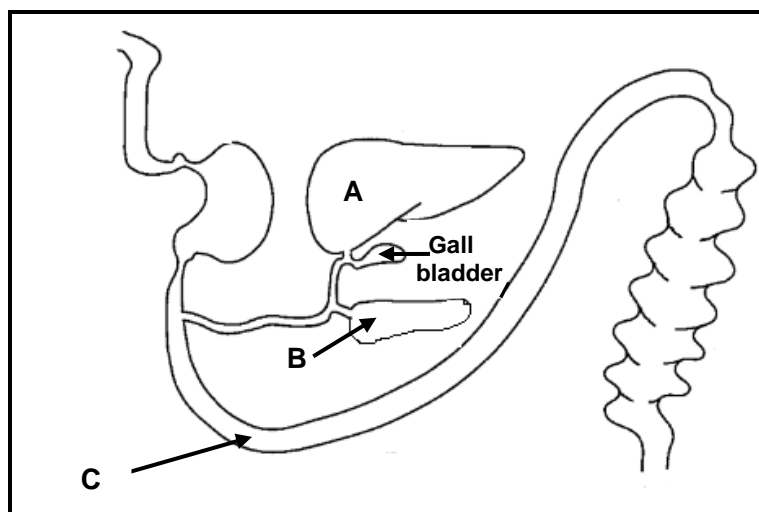
1.4.5 A Graafian follicle develops in the ovary after ovulation in the place of the burst follicle. (5 x 1) (5)

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 Identify, in the diagram above, the parts labelled **A** and **B**. (2)

2.1.2 State TWO functions of an alkaline substance secreted in **A**. (2)

2.1.3 Name ONE intestinal gland located in part **C**. (1)

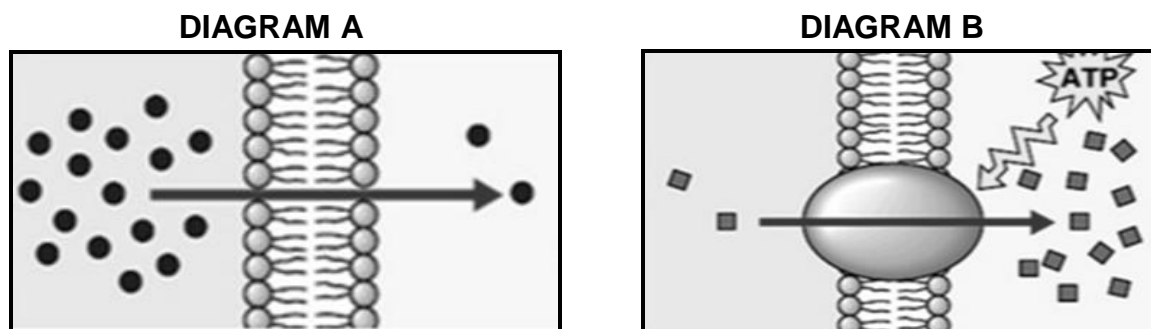
2.2 There is a relationship between the micro-organisms and the digestion of roughages.

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

2.2.2 State ONE function of the micro-organisms in the rumen of cattle. (1)

2.2.3 Name the type of micro-organism that forms the least in terms of population in the rumen of cattle. (1)

- 2.3 The diagrams below illustrate the processes of food absorption into the bloodstream of farm animals.

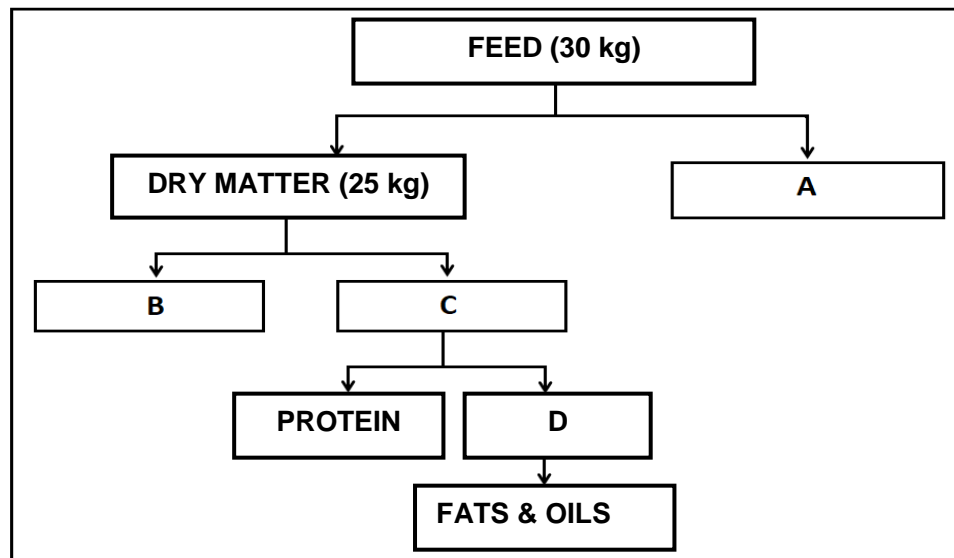


- 2.3.1 Identify the type of food absorption illustrated in:
- (a) DIAGRAM A (1)
- (b) DIAGRAM B (1)
- 2.3.2 Identify the diagram (A or B) that represents the process responsible for the absorption of glucose and certain amino acids. (1)
- 2.3.3 Explain the absorption process in DIAGRAM B. (2)
- 2.4 The nutrient components of two different feeds are shown below.

FEED A	FEED B
Digestible protein (7%)	Digestible protein (16%)
Total digestible nutrients (58%)	Total digestible nutrients (82%)
Crude fibre content (21%)	Crude fibre content (8%)

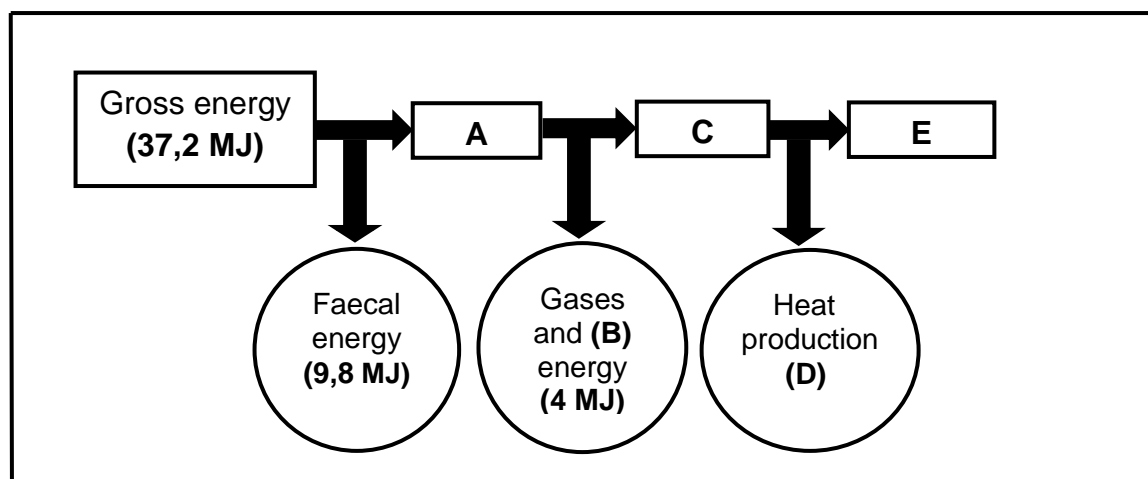
- 2.4.1 Classify the following:
- (a) FEED A (1)
- (b) FEED B (1)
- 2.4.2 Justify the classification of FEED B in QUESTION 2.4.1, based on the data provided above. (1)
- 2.4.3 Name the farm animal that is unable to digest FEED A. (1)
- 2.4.4 Identify the feed that is suitable for EACH of the following:
- (a) Improves the functioning of the digestive system in ruminant farm animals (1)
- (b) Stimulates production of more butterfat in milk (1)

- 2.5 The schematic representation below illustrates the nutrient composition of a feed for farm animals.



- 2.5.1 Label nutrient component **C**. (1)
- 2.5.2 Indicate the value for component **A**. (1)
- 2.5.3 Calculate the digestibility coefficient of the feed using the data in the schematic representation above, assuming that the animal excreted 6 kg dry material. Show ALL calculations. (4)

- 2.6 The schematic representation below indicates the energy flow of maize meal that was fed to a pregnant farm animal.



- 2.6.1 Define the energy represented by **A**. (2)
- 2.6.2 Label **B**. (1)
- 2.6.3 State ONE function of the energy represented by **E**. (1)
- 2.6.4 Calculate the value of the energy represented by **C**. Show ALL calculations. (2)

- 2.7 A farmer mixed 15 parts of FEED A with 5 parts of FEED B to get a ration with 16% digestible protein.

Calculate (in kg) the quantity of FEED B required in a 750 kg ration.
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 a production system.

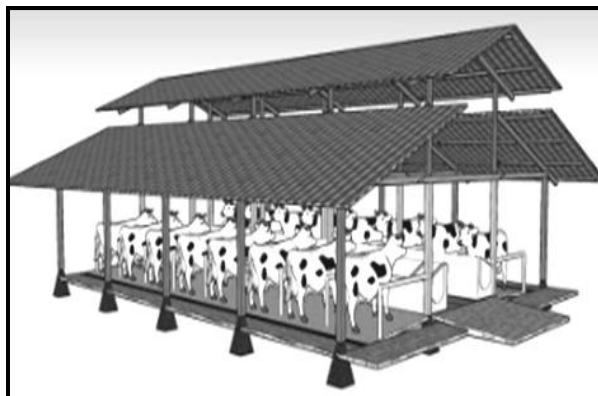


3.1.1 Identify the production system shown in the picture above. (1)

3.1.2 Give TWO reasons for the answer to QUESTION 3.1.1 by referring to the picture above. (2)

3.2 The pictures below show two facilities that are used under different environmental conditions.

PICTURE A



PICTURE B



3.2.1 Identify the picture of the facility that is used under EACH of the following environmental conditions:

(a) Very cold and windy conditions (1)

(b) Hot summer conditions (1)

3.2.2 Give the term for the material that covers the floor in PICTURE B, which will act as an insulator. (1)

3.3 Below is a list of structures, tools and apparatus used to handle and manage farm animals.

- A Barbed wire fence to demarcate an area of farmland
- B A separate crush
- C Red flags and warning signs
- D Kraal made of branches
- E Shelter made of poles and canvas

Choose, from the list above, the structure, tool or apparatus applicable to EACH of the statements below. Write down only the letter (A–E) next to the question numbers (3.3.1 to 3.3.3).

- 3.3.1 For implementation of a rotational grazing system (1)
- 3.3.2 Used by subsistence farmers to house farm animals overnight (1)
- 3.3.3 Alerting road users about farm animals crossing a public road (1)

3.4 The table below shows the body temperature, number of breaths and number of heartbeats per minute of different farm animals.

FARM ANIMAL	BODY TEMPERATURE (°C)	NUMBER OF BREATHS (PER MINUTE)	NUMBER OF HEARTBEATS (PER MINUTE)
Horse	38	12	40
Cattle	39	25	65
Sheep	40	16	75
Goat	41	16	75
Pig	40	14	70

Draw a combined bar graph showing the body temperatures and the number of heartbeats of the different farm animals. (6)

3.5 Name a method that is used to administer the types of medication listed below:

- 3.5.1 Liquid medicine given orally to a farm animal (1)
- 3.5.2 Inserting medication into the muscle of a farm animal (1)

- 3.6 Complete the table below by writing down **ONLY** the missing information for **A, B, C, D** and **E** in the ANSWER BOOK.

DISEASE	PATHOGEN INVOLVED	MAIN SYMPTOMS
Ringworm	A	Round, scaly patches of hairless skin
B	Virus	High fever, blotchy lesions, diarrhoea, abortion, nasal discharge, coughing, difficulty breathing
Mastitis	Bacteria	C
Redwater	D	Acute abdominal pain, anaemia and dark to brown urine
E	Bacteria	High fever, swelling of the body, bloody discharge from mouth, nose and rectum

(5)

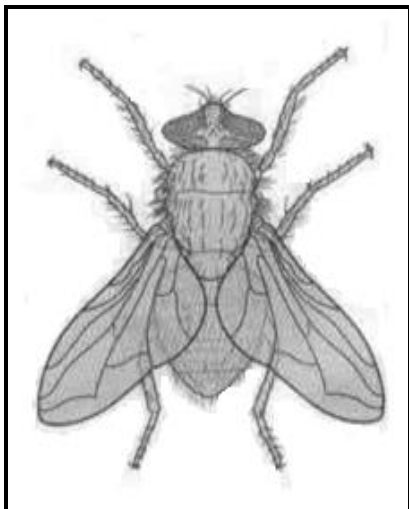
- 3.7 The table below illustrates the life stages of parasites.

PARASITE A	PARASITE B
Eggs in faeces ↓ Embryo in intestines ↓ Scolex in intestines ↓ Adult parasite	Eggs hatch in water ↓ Larvae in snail ↓ Parasite attach to grass ↓ Cattle eat grass ↓ Parasite in the livers of cattle

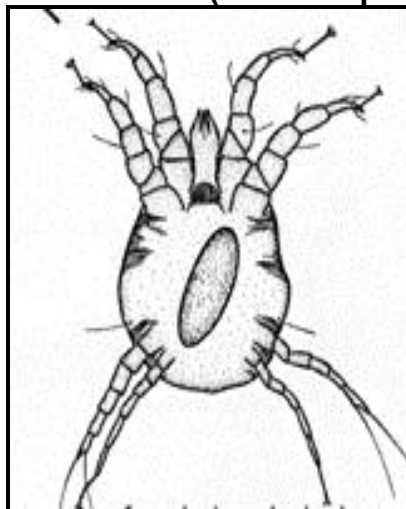
- 3.7.1 Classify the parasites illustrated by the life stages above. (1)
- 3.7.2 Name parasite **A**. (1)
- 3.7.3 Classify parasite **B** based on the number of hosts to complete the life cycle. (1)
- 3.7.4 Name TWO costs associated with the control of the parasites illustrated in the table above. (2)

3.8 The pictures below show parasites that are harmful to farm animals.

PARASITE A



PARASITE B (Microscopic)



3.8.1 Identify the parasite (**A** or **B**) above that matches the descriptions below:

(a) Causes scab and mange in animals (1)

(b) Lays eggs in an area soaked in urine and faeces, and infests open wounds in wool sheep (1)

3.8.2 Indicate TWO symptoms of a PARASITE B infestation in farm animals. (2)

3.8.3 State TWO precautionary measures to take to prevent the infestation of PARASITE A. (2)

3.9 Indicate the type of parasite that is treated using EACH of the following methods:

3.9.1 Administering anthelmintics to farm animals (1)

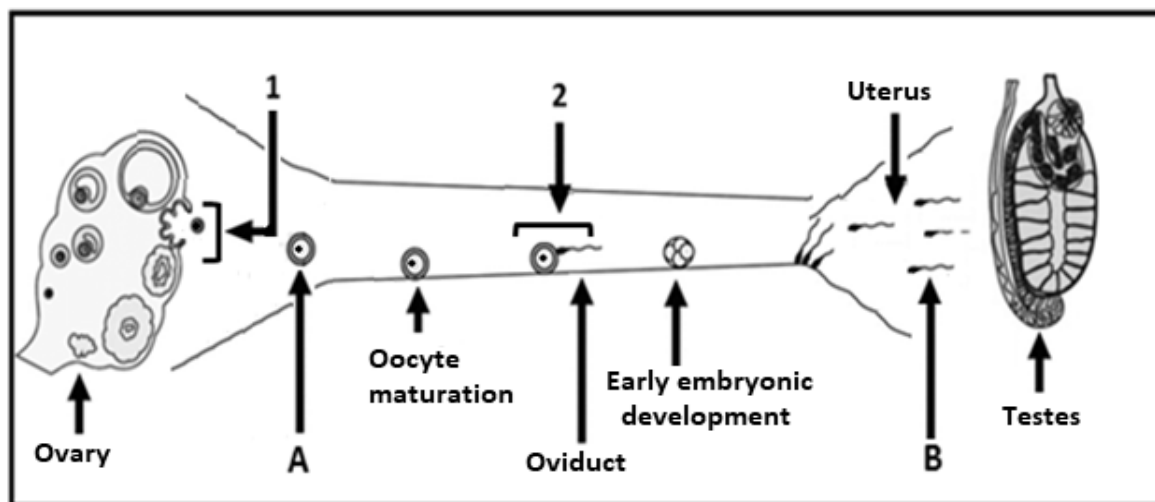
3.9.2 Applying a toxic solution to the body of the animal (1)

[35]

QUESTION 4: ANIMAL REPRODUCTION

Start this question on a NEW page.

4.1 The diagram below shows the reproductive process in farm animals.



4.1.1 Identify **A** and **B** in the diagram above. (2)

4.1.2 Name the process through which **B** is produced. (1)

4.1.3 Give ONE example of a secondary female reproductive organ visible in the diagram above. (1)

4.1.4 Identify the reproductive processes taking place in **1** and **2**. (2)

4.1.5 Give ONE function of EACH of the following organs:

(a) Fallopian tube (1)

(b) Uterus (1)

4.2 Farmers usually manipulate the reproductive process in female farm animals so that they can come on heat at the same time.

4.2.1 Name the reproductive process described above. (1)

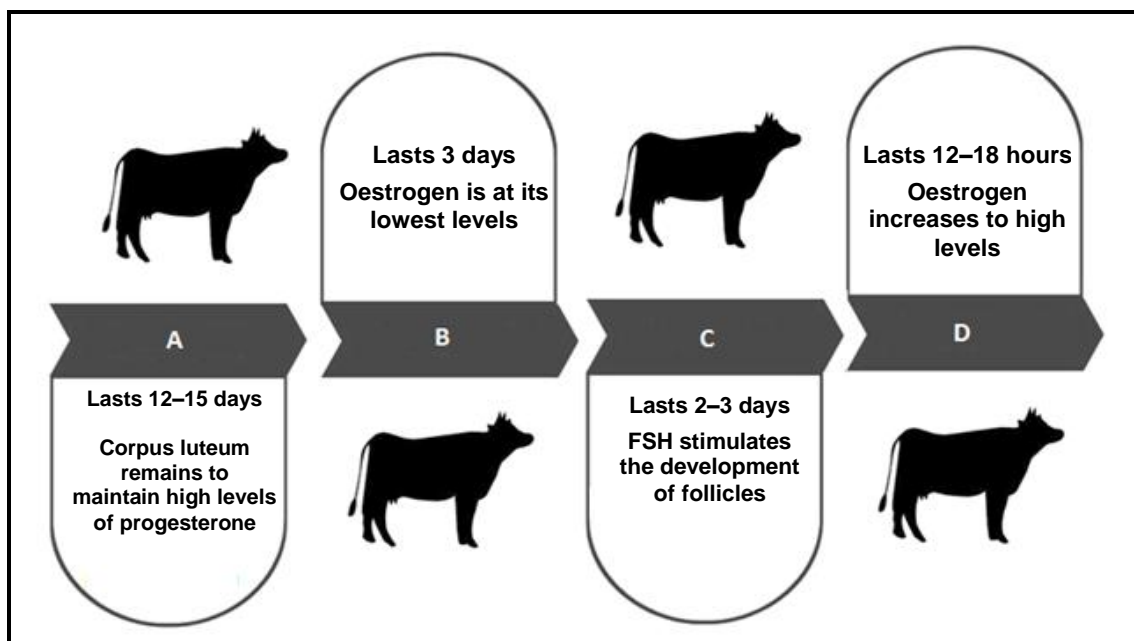
4.2.2 Indicate ONE method that farmers can use to ensure that the process named in QUESTION 4.2.1 is a success. (1)

4.2.3 Name the factor causing sterility and infertility in bulls associated with each of the following:

(a) Bull has an unbalanced ration (1)

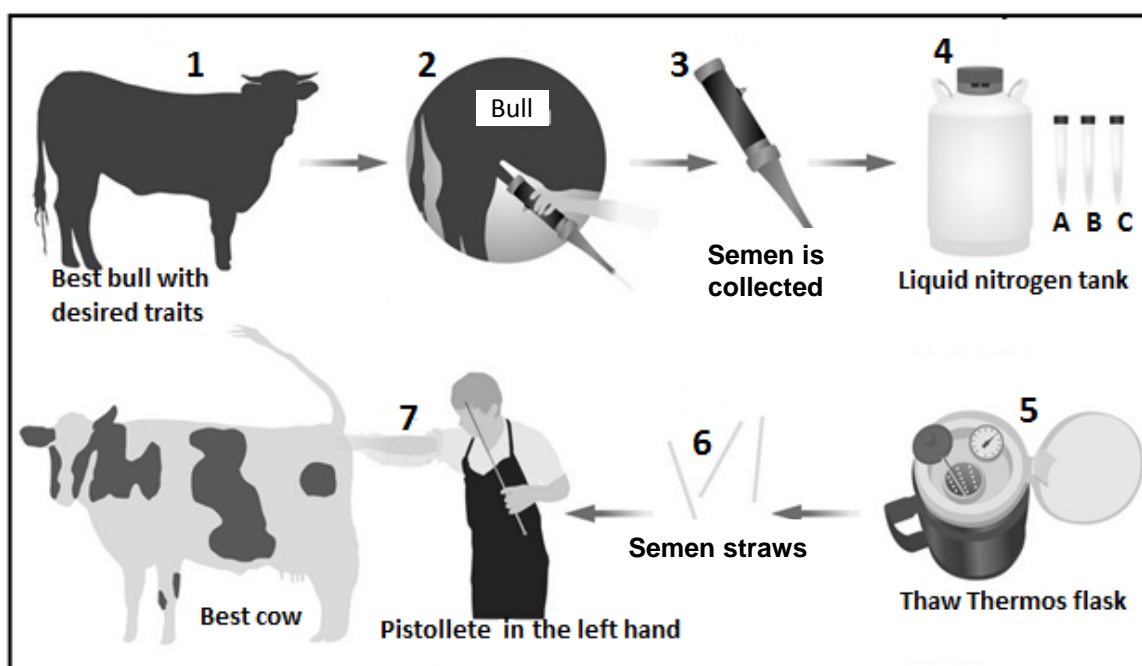
(b) Young bull is raised in isolation (1)

- 4.3 The illustration below represents a reproductive process that takes place in a female farm animal.



- 4.3.1 Identify the process illustrated above. (1)
- 4.3.2 Identify stages **C** and **D** of the process in QUESTION 4.3.1. (2)
- 4.3.3 Name ONE practical method that dairy farmers can use to identify cows on heat. (1)

- 4.4 The demonstration below shows a reproductive technique used by farmers to increase animal production.



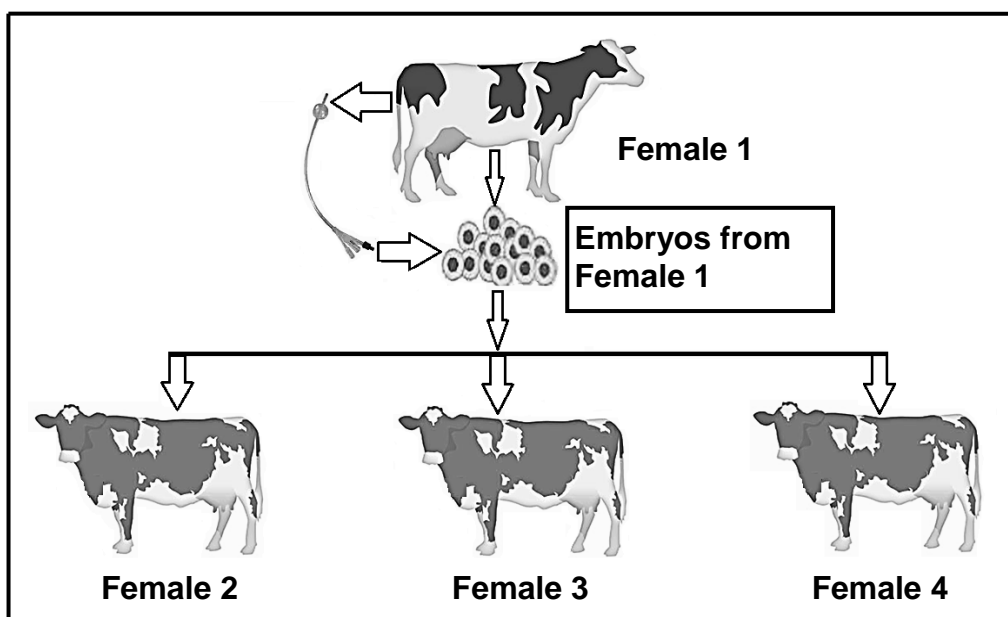
- 4.4.1 Identify the reproductive technique in stage **7** above. (1)
- 4.4.2 Name the method of collection in stage **2** of the technique demonstrated above. (1)

- 4.4.3 Collected semen is mixed with a dilutant made up of egg yolk, milk, glycerol, buffers and antibiotics.

Give the role of EACH of the following substances in a dilutant:

- (a) Antibiotics (1)
- (b) Buffers (1)
- (c) Egg yolk (1)

- 4.5 The diagram below illustrates a reproductive technique in female farm animals.



- 4.5.1 Define the technique illustrated above. (2)
- 4.5.2 Give the term referring to EACH of the following farm animals:
- (a) Female 1 (1)
 - (b) Females 2, 3 and 4 (1)
- 4.5.3 Indicate the importance of **Female 1** in the technique above. (1)
- 4.5.4 State ONE disadvantage of the technique defined in QUESTION 4.5.1 for the farmer. (1)

4.6 Statements that apply during parturition are given below.

- A The uterus contracts to expel the placenta.
- B Vagina, cervix and uterus enlarged to form a common canal.
- C Cow lies down, head and front legs of the foetus emerge from the vulva.
- D Foetus lies with front feet pointing towards the cervix with chin resting on the front legs.

Rearrange the statements above in the correct sequence. Write only the letter (A–D) of the statement next to the question number (4.6).

(4)

4.7

Milk synthesis and milk ejection in a cow are controlled by the hormones prolactin and oxytocin respectively. Milk ejection is initiated by stimulation of the central nervous system. Milk synthesis takes 305 days after which a cow dries off before the next parturition.

4.7.1 State ONE method in which the milker can stimulate the milk let-down process.

(1)

4.7.2 Indicate how oxytocin stimulates the milk let-down process.

(1)

4.7.3 State the importance of a dry period for a lactating cow.

(1)

4.7.4 Name the substance in the colostrum that provides the calf with immunity against diseases.

(1)

[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150