GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

JUNE EXAMINATION
GRADE 12

2024

AGRICULTURAL SCIENCES

AGRICULTURAL SCIENCES P1

C2641E

TIME: 2½ hours

MARKS: 150

17 pages

X05

INSTRUCTIONS AND INFORMATION

1. This paper consists of TWO sections: 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 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 example 1.1.11 D.

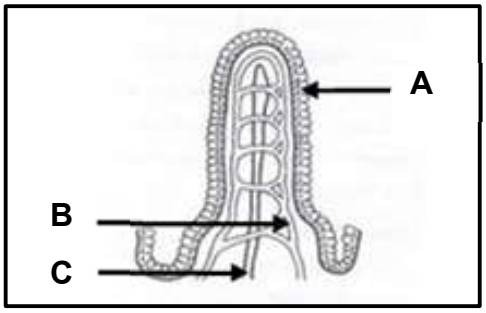
1.1.1 The chemical symbol for the mineral element responsible for the formation of haemoglobin in the red blood cells:

A Ca
B P
C Fe
D Na

1.1.2 Chemical digestion in chickens occurs in the …

A crop.
B proventriculus.
C gizzard.
D ventriculus.

1.1.3 The following statements refer to the adaptation features of the structure below:



(i) Part **B** represents blood capillaries where amino acids are absorbed.
(ii) Digested fat is absorbed in part **C**.
(iii) Part **A** decreases the surface area for absorption.
(iv) Absorption of glucose occurs in part **B**.

Choose the CORRECT combination.

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

1.1.4 The fat-soluble vitamins that are needed for the important functions in an animal's body are …

A Cobalamin and vitamin K.
B Thiamine and vitamin E.
C Retinol and vitamin D.
D Riboflavin and pyridoxine.

1.1.5 A farmer producing crops or livestock to generate profit using highly advanced technologies:

A Commercial farmer
B Nomadic farmer
C Subsistence farmer
D Communal farmer

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 The main reason for drying off a cow before the next lactation is to …

A ensure early conception.
B reduce pregnancy problems.
C shorten the gestation period.
D allow the recovery of glandular tissues.

(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, for example 1.2.6 B only.

COLUMN A		COLUMN B
1.2.1	A: Fish protein B: Egg protein	The type of protein with the highest biological value
1.2.2	A: Pepsin B: Renin	The enzyme in the small intestine responsible for fat digestion
1.2.3	A: Intensive B: Extensive	A production system that is capital orientated
1.2.4	A: Rabies B: Rift valley fever	An example of a viral disease
1.2.5	A: Leydig cells B: Cells of Sertoli	Produce(s) testosterone

(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 strategic plan for livestock farmers to ensure that there is enough fodder on the farm to meet the requirements of all animals throughout the year

1.3.2 Equipment fitted with a water valve and a nozzle used to supply water to the sow and piglets

1.3.3 A two-lobed sac that encloses and protects the testes

1.3.4 A secondary sex organ that protects the uterus against bacterial infection during pregnancy

1.3.5 The funnel-shaped organ that collects the ovum released during ovulation (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 Molasses is the compound commonly used as a non-protein nitrogen source in ruminant feeds.

1.4.2 The hormone insulin controls the secretion of the pancreatic juice.

1.4.3 Acute diseases are long lasting and occur repeatedly in the same animal.

1.4.4 The umbilical cord is a vascular, membranous organ that brings the blood vessels of the mother and the foetus into closer contact.

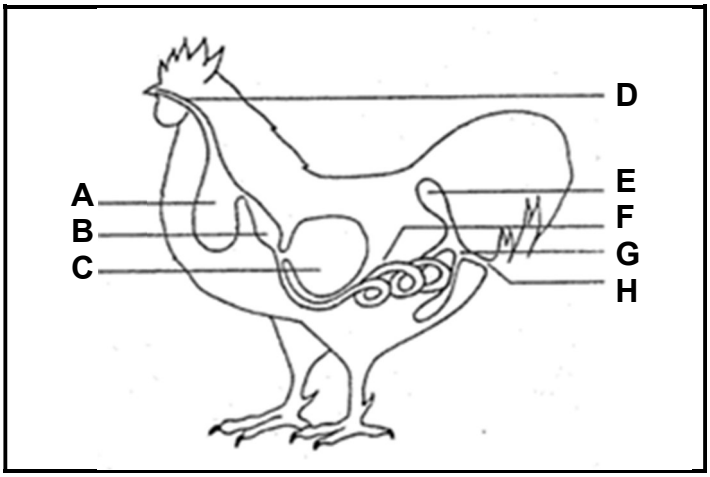
1.4.5 Hypoplasia refers to the situation where the one testicle is attached to the abdominal cavity of the bull. (5 x 1) (5)

TOTAL SECTION A: 45

SECTION B

QUESTION 2: ANIMAL NUTRITION (Start on a new page.)

2.1 The picture below shows the digestive system of a fowl.



2.1.1 Identify only the LETTER of the part where EACH of the following occurs:

(a) Grinding of ingested feed (1)

(b) Soaking and storage of food (1)

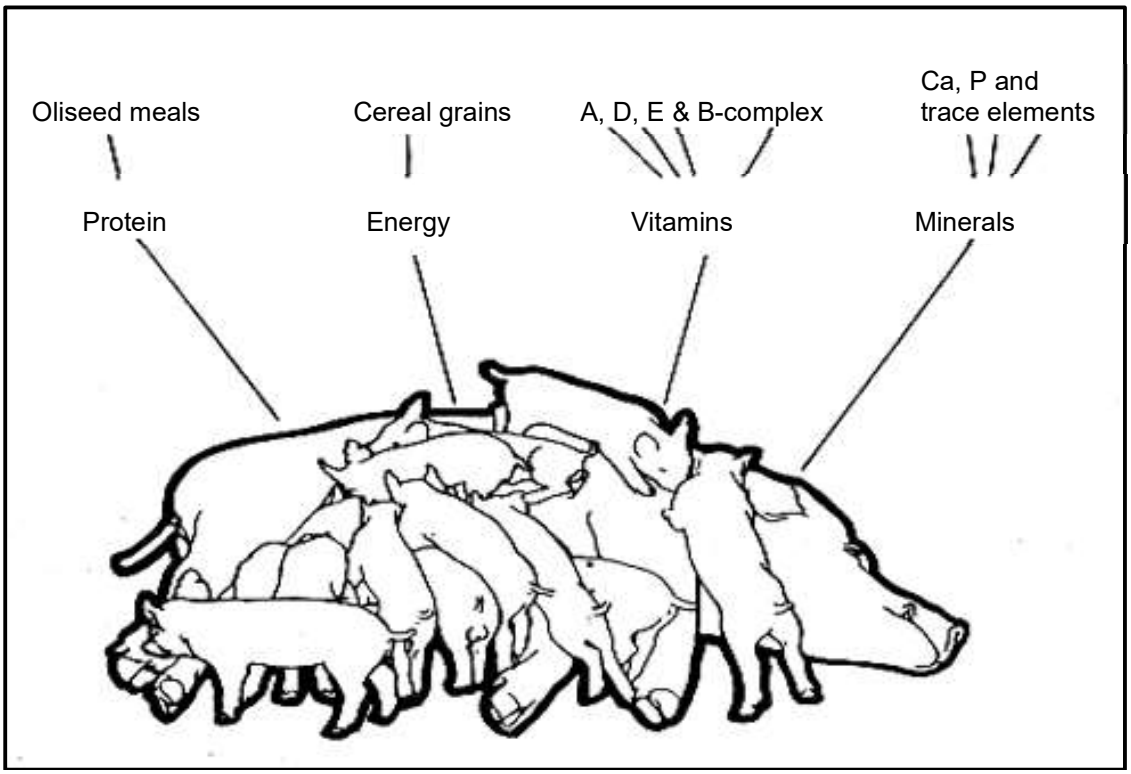
(c) Digestion of fats (1)

(d) Secretion of digestive enzymes (1)

2.1.2 Give the function of the part labelled **H.** (1)

2.1.3 Compare the structure of the oesophagus of a fowl with that of a sheep. (2)

2.2 The diagram below depicts a sow with a litter of piglets that require balanced nutrition for proper growth. The sow is housed in a furrowing pen with a cement floor. To meet the nutritional requirements of the piglets, the farmer provided various types of feeds and supplements, including oilseed meals, cereal grains, vitamins A, B-complex, D and E as well as calcium (Ca), phosphorus (P) and trace elements or micro-elements.



2.2.1 Recommend ONE important trace or micro-element for the piglets that may be deficient in the pen that has a cement floor. (1)

2.2.2 Name the metabolic disease that is associated with deficient levels of the element mentioned in QUESTION 2.2.1. (1)

2.2.3 State the cheapest and easiest method of supplementing the element mentioned in QUESTION 2.2.1. (1)

2.2.4 Name TWO functions of the element mentioned in QUESTION 2.2.1 in the animal body. (2)

2.2.5 Feeds for farm animals can be grouped as sources of nutritional components.

Indicate ONE nutritional component that is not indicated in the schematic representation above. (1)

2.3 Maize meal and sunflower oilcake meal are mixed at a ratio of 8 : 20 to create a feed with a 17% digestible protein content.

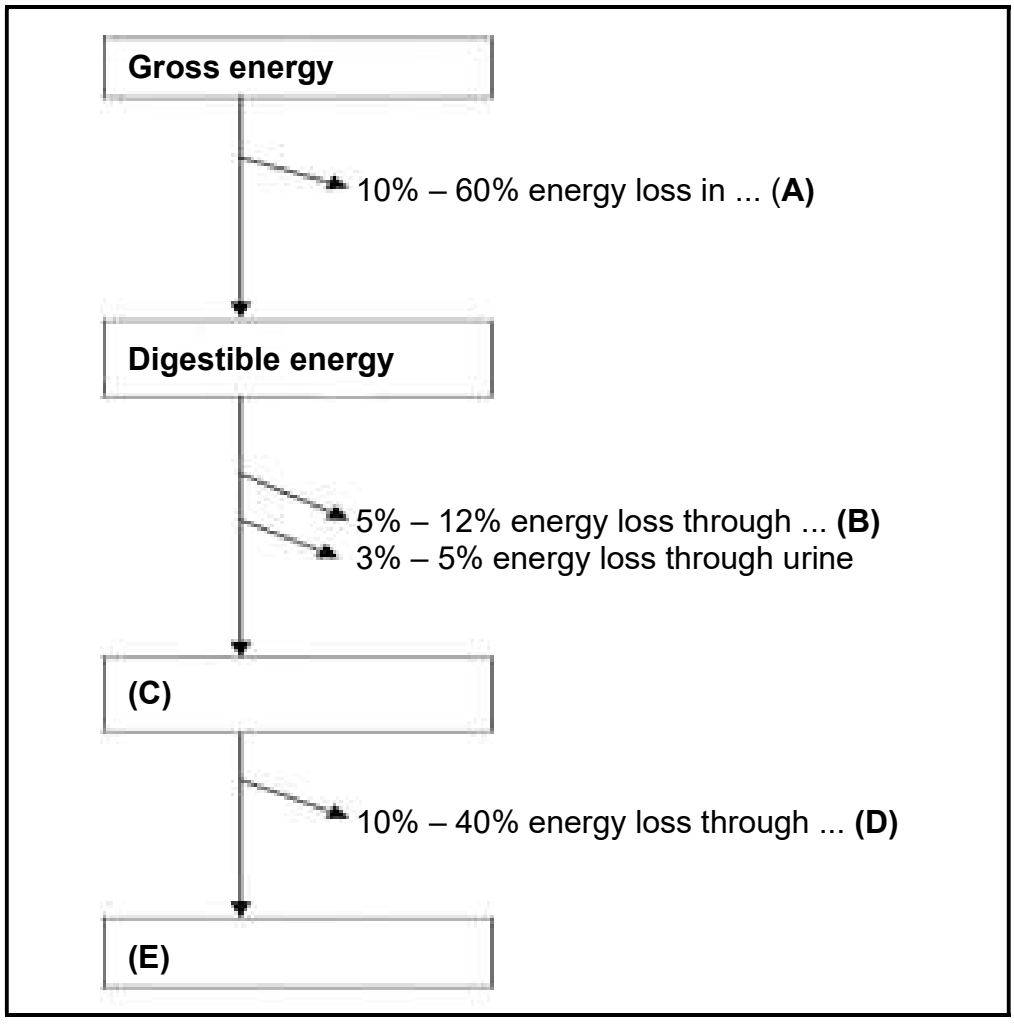
2.3.1 Indicate the part of the ratio that represents the sunflower oilcake meal. (1)

2.3.2 Justify your answer to QUESTION 2.3.1. (2)

2.3.3 Calculate the percentage of carbohydrate-rich feed in the mixture.

Show ALL calculations. (3)

2.4 The flow chart below illustrates the energy value of a feed.



2.4.1 Complete the above diagram by identifying the missing words labelled **A** to **E**. (5)

2.4.2 The energy identified in **E** is used for certain functions in the body of an animal. State the TWO such functions. (2)

2.5 Read the extract below and answer the question that follows.

> The digestibility coefficient of a feed is that portion of the feed that is taken in by the animal, digested, absorbed and used for body functions. It is not excreted in the manure and is expressed as a percentage of dry matter. A cow eats 30 kg of concentrates with a moisture content of 10% and 16 kg of material is excreted in the manure with a moisture content of 35%.

Use an appropriate formula to calculate the digestibility coefficient of this feed. Show ALL calculations. (5)

2.6 The table below shows the biological values of some feeds.

TYPE OF FEED	BIOLOGICAL VALUE (BV) (%)
Milk protein	90
Fish meal	90
Wheat	75
Maize	60
Barley	50

2.6.1 Identify the feed that has a low biological value in the table above. (1)

2.6.2 Indicate the feed from the table above that is suitable for the following conditions:

(a) For young growing animals (1)

(b) For fattening (1)

(c) Necessary for maintenance (1)

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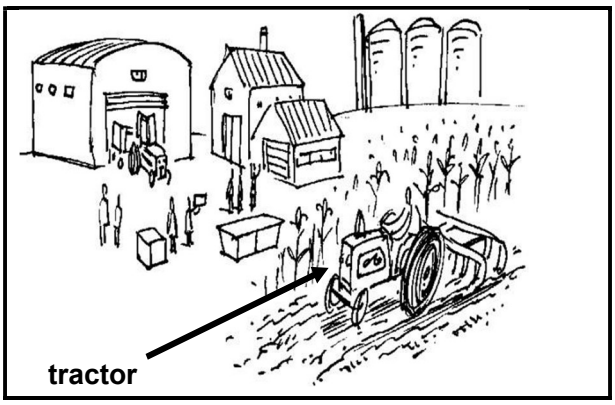
QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL
(Start on a new page.)

3.1 The pictures below shows TWO farming systems.

SYSTEM A



SYSTEM B



3.1.1 Identify both farming systems, **A** and **B**. (2)

3.1.2 Compare farming system **A** with farming system **B** with regard to the following:

(a) Purpose (2)

(b) Management (2)

3.2 Animals are handled physically for different reasons such as administering medication, breeding programmes and other management practices. Below are pictures of equipment that is used.

PICTURE A



PICTURE B



PICTURE C



3.2.1 Choose the picture above that matches the following descriptions. Write **A**, **B** or **C**.

(a) An electric stick that shocks an animal to control movement (1)

(b) A tool that is used to strike animals to control their movement across the road (1)

(c) To clip ear tags into the ears of animals (1)

3.3 The picture below illustrates the facilities that are used when handling farm animals.



3.3.1 Identify the facility labelled **B**. (1)

3.3.2 Indicate the purpose of using the facility labelled **A**. (1)

3.3.3 The facility labelled **A** meets the safety criteria for handling large animals. Refer to the design features of this facility to justify this statement by stating TWO design features. (2)

3.3.4 State TWO reasons for the handling of farm animals using the facility labelled **A**. (2)

3.4 State THREE basic requirements for transporting farm animals. (3)

3.5 The table below indicates the feed consumption and average weight-gain for beef cattle.

AVERAGE FEED CONSUMPTION (KILOGRAMS PER DAY)	AVERAGE WEIGHT-GAIN (GRAMS PER DAY)
1	80
2	160
3	240
4	320
5	400
6	475

3.5.1 Use the data in the table above to draw a line graph to indicate the average feed consumption and average weight-gain for beef cattle. (6)

3.5.2 Deduce from the graph the relationship between feed consumption and weight-gain. (2)

3.6 Read the scenario on avian flu below and answer the questions that follow.

The avian influenza outbreak in South Africa in 2023 led to the culling of millions of birds in the country, resulting in a 30% reduction in the production of hatching eggs. Poultry farmers are already battling with loadshedding and high costs, and as a result, local consumers are paying the price. Farmers are expected to alert authorities should they suspect that their animals are infected with such diseases.

3.6.1 Name the pathogen that causes the disease mentioned above. (1)

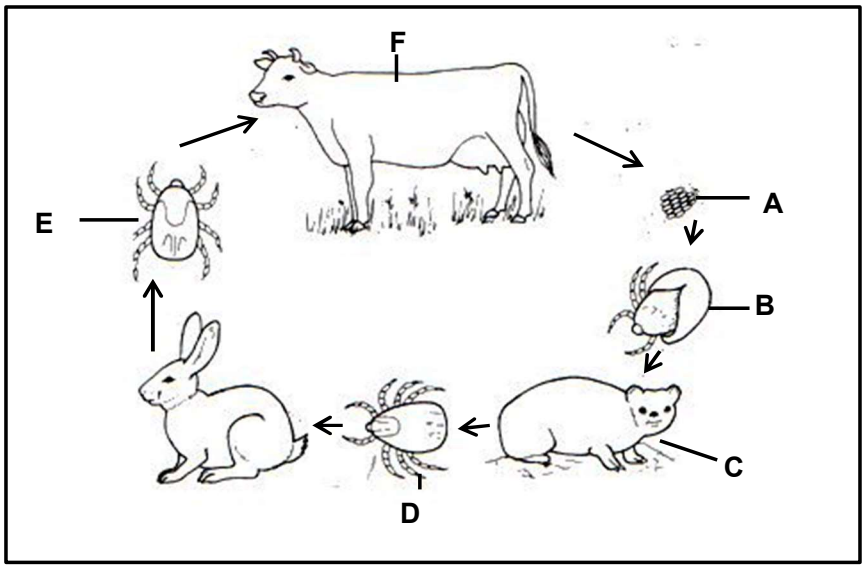
3.6.2 The disease in the scenario above is deemed notifiable.

Justify this statement. (1)

3.6.3 Name ONE of the common symptoms of avian flu. (1)

3.6.4 State TWO economic implications of avian flu to a farmer. (2)

3.7 The diagram below indicates the various stages in the life cycle of a parasite.



3.7.1 Write down the letter (A – F) that represents each of the following stages in the life cycle of the parasite in the diagram above:

(a) The larvae hatches from the eggs (1)

(b) The nymph will feed on the second host (1)

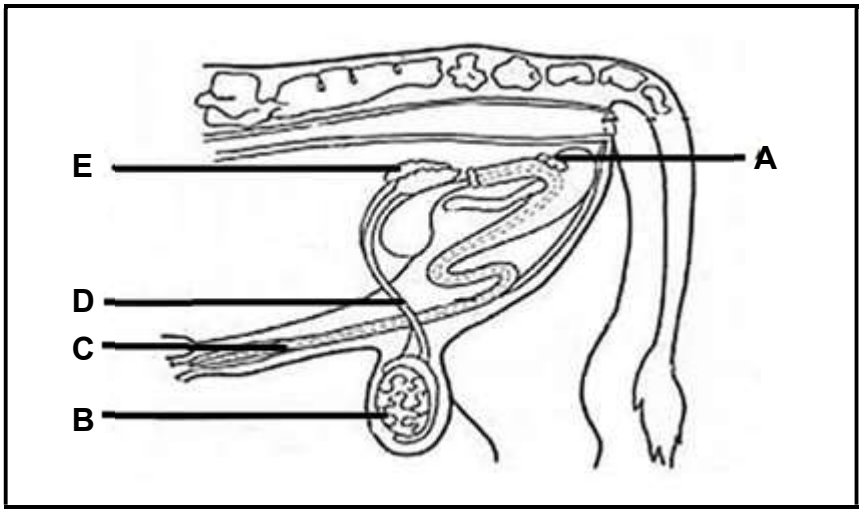
(c) The tick will feed on the third host (1)

(d) The first host (1)

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QUESTION 4: ANIMAL REPRODUCTION
(Start on a new page.)

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



4.1.1 Identify the LETTER representing the part where EACH of the following occurs:

(a) Feeding of sperm cells by SERTOLI cells during spermatogenesis (1)

(b) Transportation of sperm cells to the urethra (1)

(c) Secretion of a sticky liquid that provides energy for the sperm cells (1)

4.1.2 State TWO congenital defects of part **B** that may cause a complete loss of fertility in bulls. (2)

4.1.3 Indicate the role played by part **C** in reproduction. (1)

4.2 The illustration below outlines the distinctive characteristics of each phase of the oestrus cycle.

A
The cow is calm, restful and displays no sexual behaviour.

B
Growth of the follicle

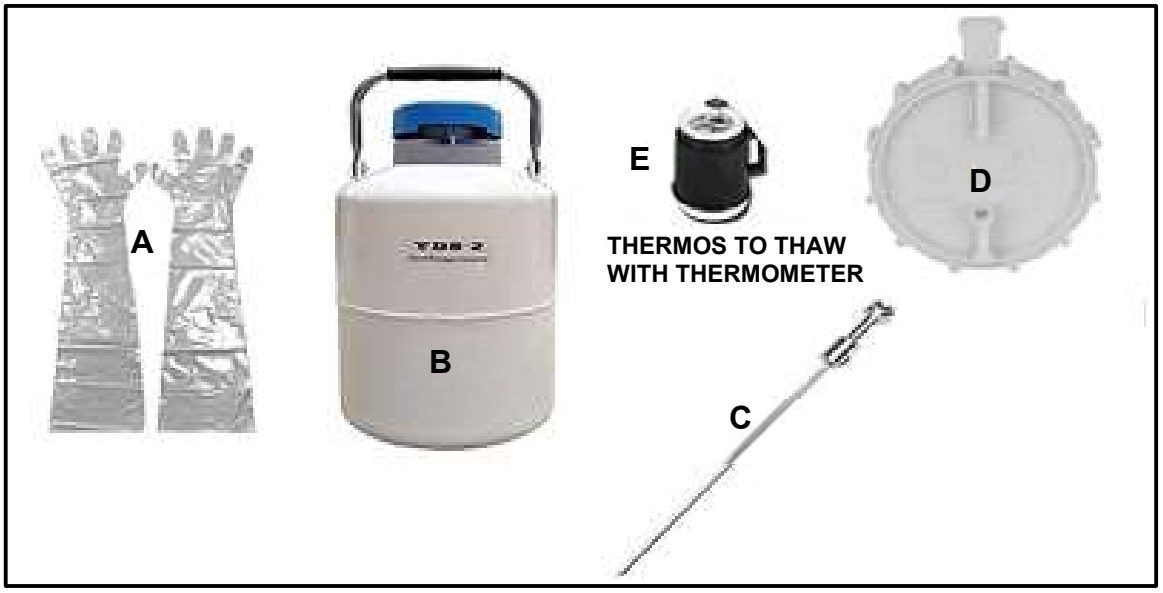
C
Oestrogen delays the secretion of FSH by the pituitary gland and stimulates the gland to secrete LH.

D
The corpus luteum secretes progesterone to maintain pregnancy by causing the lining of the uterus to thicken.

4.2.1 Identify the phases of oestrus represented by **A, B, C** and **D**. (4)

4.2.2 Indicate TWO signs of the phase represented by **C**. (2)

4.3 The equipment below is used during artificial insemination.



4.3.1 Indicate the purpose of using the equipment labelled **C**. (1)

4.3.2 State TWO basic requirements when using the equipment labelled **B**. (2)

4.3.3 Identify the LETTER of the equipment that ensures the following:

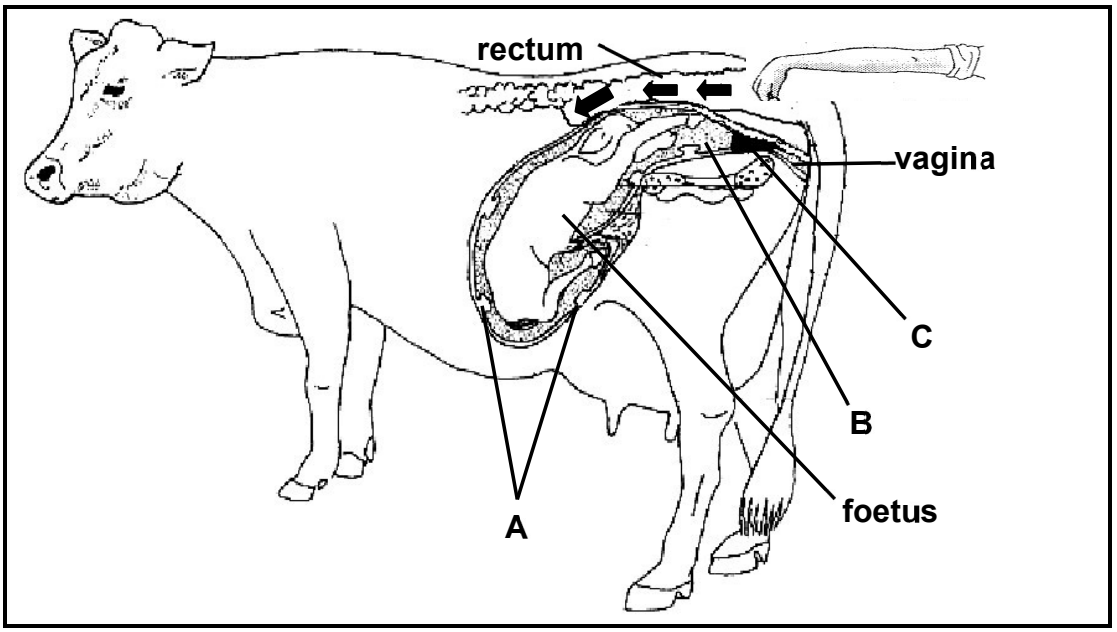
(a) Semen is not contaminated with pathogens by the inseminator (1)

(b) Semen is ready for use after being kept frozen (1)

4.3.4 State ONE disadvantage of using the equipment shown in QUESTION 4.3 for the farmer. (1)

4.3.5 Indicate TWO advantages of artificial insemination. (2)

4.4 The diagram below illustrates pregnancy testing in a cow. The hand is inserted through the rectum.



4.4.1 Identify parts **A**, **B** and **C**. (3)

4.4.2 State TWO advantages of detecting pregnancy early. (2)

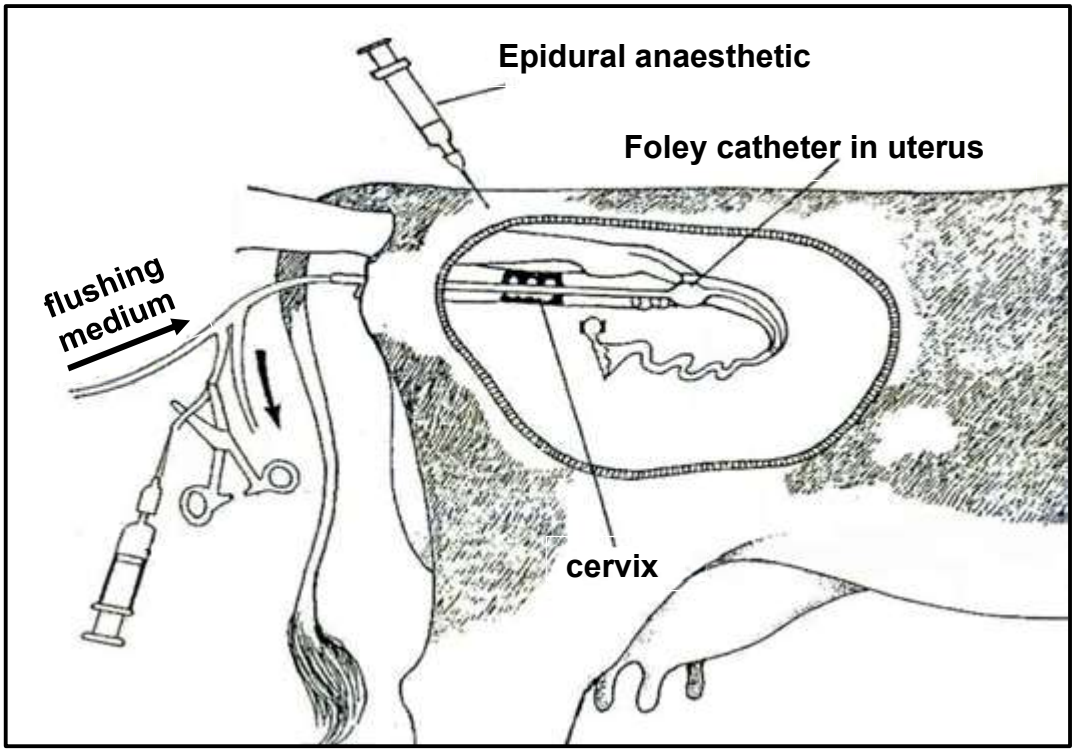
4.4.3 Explain the role of the mucus plug found in part **C**. (2)

4.4.4 Name the condition that would occur in each of the following situations:

(a) The foetus dies, decays and remains inside the cow (1)

(b) The fluid around the foetus is reabsorbed and a hard skeleton remains (1)

4.5 The diagram below illustrates a technique used in animal reproduction.



4.5.1 Name the process that is illustrated in the diagram above. (1)

4.5.2 State the main benefit of using this technique on female animals in a herd. (2)

4.6 The first milk produced by the cow, within the first three days of lactation, differs from the normal milk produced by the cow thereafter.

4.6.1 Identify the first milk released as indicated in the scenario above. (1)

4.6.2 Describe TWO ways in which it differs from the normal milk. (2)

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TOTAL SECTION B: 105

TOTAL: 150