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Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2022

AGRICULTURAL SCIENCES P1

MARKS: **150**

TIME: **2½ hours**

This question paper consists of 17 pages.

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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 legible.

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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, for example 1.1.11 A.

1.1.1 The process of regurgitation occurs only in …

A fowls.
B cattle.
C chickens.
D pigs.

1.1.2 The presence of … is an adaptation feature of the ventriculus to perform its digestive function.

A papillae
B enzymes
C villi
D small stones

1.1.3 The following are the requirements of micro-organisms in the reticulo-rumen:

(i) Sufficient mineral nutrients for growth and reproduction.
(ii) Adequate supply of easily digestible carbohydrates.
(iii) Warm, dry and aerobic environment with a temperature of 38 ˚C.
(iv) Continuous elimination of waste products.

Choose the CORRECT combination:

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

1.1.4 A method of improving digestibility of grain by dry heating causing it to expand is …

A popping.
B pelleting.
C soaking.
D dry rolling.

1.1.5 Correct handling of animals may lead to …

A increased body mass.
B higher grading of carcasses.
C delayed rigor mortis.
D bruises in animals.

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1.1.6 When environmental temperature drops, the following applies to farm animals:

(i) Eat less feed, drink more water and produce more.
(ii) Eat more feed and produce less.
(iii) Eat a lot of feed to keep the body temperature constant.
(iv) Eat more feed, drink less water and produce less.

Choose the CORRECT combination:

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

1.1.7 The following diseases are caused by bacteria.

A Mastitis and tuberculosis
B Anthrax and Rift Valley Fever
C Red water and mastitis
D Swine flu and rabies

1.1.8 … is the measure the farmer can apply to prevent plant poisoning.

A Allowing poisonous plants in the pasture for a short period
B Giving animals insufficient feed before allowing them to graze
C Allowing more cattle and few sheep on a camp
D Regular inspection of hay kept in stables

1.1.9 The following statement is INCORRECT about milk production.

A The higher the milk yield, the lower the butterfat content.
B The lower the crude fibre in a feed, the higher the butterfat content.
C A high crude fibre content produces high butterfat content.
D There is an inverse relationship between milky yield and butterfat content.

1.1.10 The removal of the nucleus from the ovum during nuclear transfer.

A Enucleation
B Nucleus expulsion
C Nucleation
D Transplantation (10 x 2) (20)

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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:	Keratomalacias	Deficiency disease caused by lack of vitamin D and calcium
	B:	Osteomalacia	
1.2.2	A:	Glands of Lieberkühn	Glands between the villi that secrete succus entericus
	B:	Glands of Langerhans	
1.2.3	A:	Aggressiveness	Consequence of the correct handling of animals
	B:	Agitated behaviour	
1.2.4	A:	Dosing	Chemical method used to control parasites in farm animals
	B:	Dipping	
1.2.5	A:	Congenital	Inborn characteristics that are present at birth
	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 An alkaline liquid that is released into the duodenum to assist in the digestion of fat

1.3.2 The tendency of sheep to stand closer together on a hot day to reduce exposure to the sun

1.3.3 A condition in cows where the follicle does not rupture to release an ovum during a normal cycle

1.3.4 The part of the male reproductive organ responsible for regulating the temperature of the testicles

1.3.5 The accumulation of fluid in the tissues or between the foetal membrane (5 x 2) (10)

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1.4 Change the UNDERLINED WORD(S) in EACH of the following statements to make them TRUE. Write only the correct answer next to the question numbers (1.4.1 to 1.4.5) in the attached ANSWER BOOK.

1.4.1 Nitrogen-free extract is the amount of fat and fat-soluble components in a feed.

1.4.2 Injection is a method of administering medication in pigs with parakeratosis.

1.4.3 Tail-chalking is a device placed underneath the chin of an animal to mount cows on heat.

1.4.4 Electro-ejaculator is a long, narrow instrument that is used to inject semen into the uterus.

1.4.5 Embryo splitting is the removal of viable embryos from a superior cow (5 x 1) (5)

TOTAL SECTION A: 45

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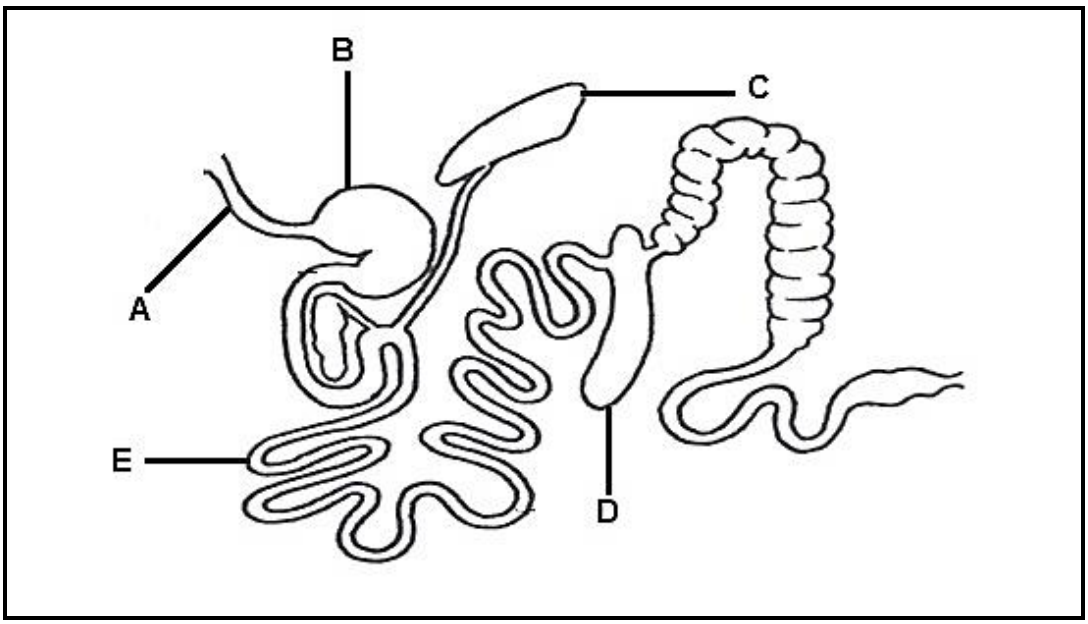
SECTION B

QUESTION 2: ANIMAL NUTRITION

Start this question on a NEW page.

2.1 The diagram below shows the digestive system of a farm animal.



2.1.1 Name the farm animal whose alimentary canal is represented in the diagram above. (1)

2.1.2 Give a reason for the answer in QUESTION 2.1.1 by referring to the diagram above. (1)

2.1.3 Indicate how the part labelled **A** differs from that of a fowl. (2)

2.1.4 Identify the letter representing the part where each of the following occurs:

(a) Secretion of rennin (1)

(b) Storage of fat-soluble vitamins **A**, **D**, **E** and **K** (1)

2.1.5 Refer to the part labelled **B** to explain a reason why the animal in the diagram above cannot digest maize stalk. (2)

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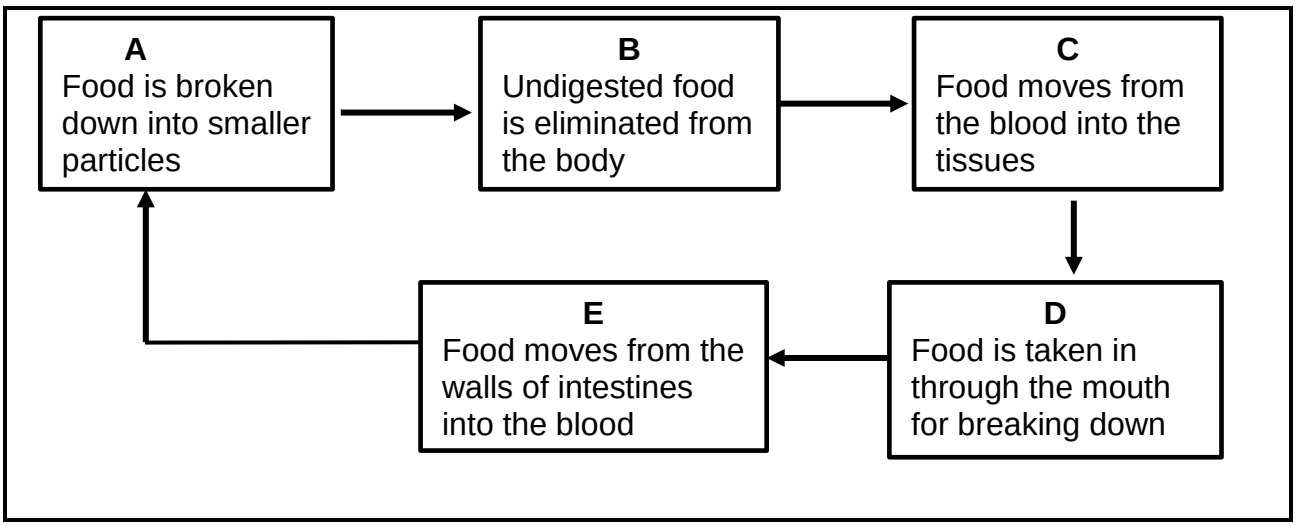
2.2 The flow chart below illustrates the processes involved in the digestion in the alimentary canal.



2.2.1 Re-arrange the processes (**A–E**) in the flow chart above in a sequential order. (Write ONLY the letter of the process.) (5)

2.2.2 Name the structure that enables the process labelled **E** to take place. (1)

2.3 The table below shows the types of feeds that are used to supply the daily requirements of farm animals.

	FEED A	**FEED B**
Digestible protein	6%	12%
Total Digestible Nutrients	56%	75%

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

2.3.2 Identify the feed that is suitable for each of the descriptions below:

(a) Main source of food for non-ruminants (1)

(b) Improves the functioning of digestive system (1)

(c) Can be used for the production of milk (1)

2.3.3 Calculate the nutritive ratio of **FEED A**. (3)

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2.4 During a digestibility trial, the farmer gave an animal 12 kg of hay and the animal excreted 5 kg dry manure.

2.4.1 Calculate the digestibility co-efficiency of the hay used in this trial. (Show ALL calculations.) (4)

2.4.2 Suggest ONE supplement that the farmer can use to increase the palatability and digestibility of this hay. (1)

2.5 The pictures below show animals with deficiency symptoms of nutrients.

ANIMAL A	ANIMAL B

2.5.1 Identify the deficiency symptom shown in **ANIMAL A** and **ANIMAL B**. (2)

2.5.2 Indicate the nutrient deficient in **ANIMAL A** and **ANIMAL B**. (2)

2.5.3 Give the feed source that could be used to correct the deficiency in **ANIMAL A**. (1)

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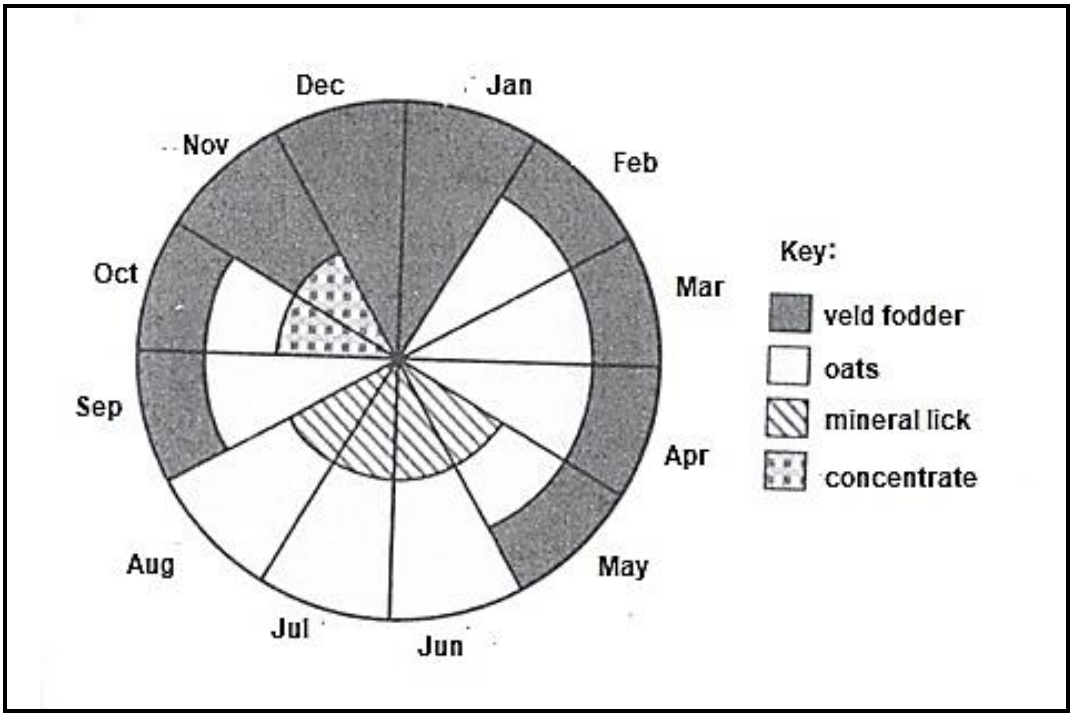
2.6 The pie chart below indicates the feed available and the supplementary requirements for lactating cows.



2.6.1 Identify the number of months in which the veld had no fodder available. (1)

2.6.2 Assume that the demand on the veld in May was 5 kg per day for each lactating cow, then, calculate the total feed required by 100 lactating cows in May. (2)

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QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

Start this question on a NEW page.

3.1 The table below shows different ways to increase production in two production units.

	PRODUCTION UNIT A	PRODUCTION UNIT B
FEEDING	Animals fed on good quality grazing only	Animals fed the highest level of concentrates
BREEDING	Breeding takes place in the animal's natural environment during the appropriate season	Animals are bred from high quality bulls to maximise production and increase profit
ENVIRONMENT	Animals rely on trees for protection against extreme temperature conditions	Housing/shelters and equipment are used to keep environmental conditions optimal for animals

3.1.1 Identify the production unit that will sell the animals for profit. (1)

3.1.2 Give TWO reasons from the table above to justify the answer in QUESTION 3.1.1. (2)

3.1.3 State TWO basic housing structures that are likely to be found in **PRODUCTION UNIT B**. (2)

3.1.4 The **PRODUCTION UNIT A** has a low input cost. Justify this statement with TWO reasons from the table above. (2)

3.2. Animals react differently to stress and fear. Name the animal that displays each of the following behaviour when under stress:

(a) Pawing (1)

(b) Snout rubbing (1)

(c) Feigned charging movements (1)

3.3 State ONE requirement when moving farm animals along/across a road. (1)

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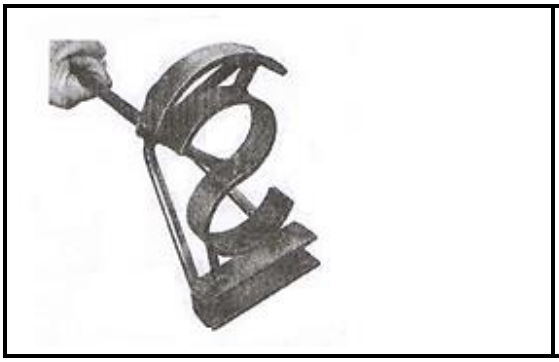
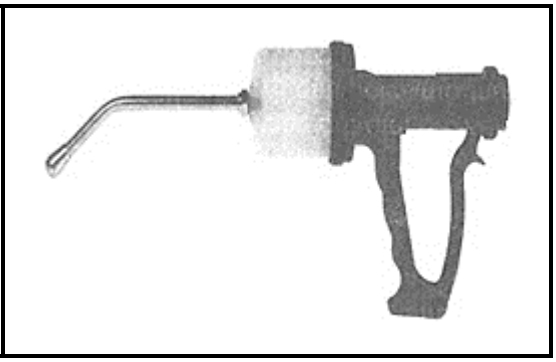
3.4 The equipment below are used by farmers during handling of farm animals.

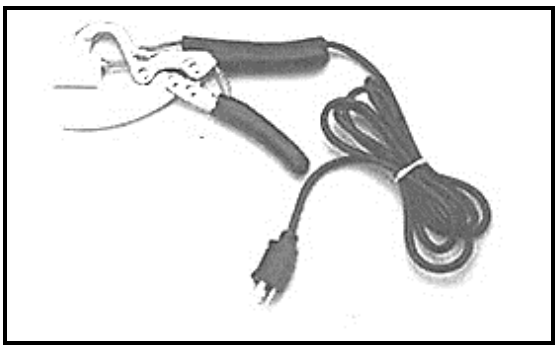
A



B



C



3.4.1 Indicate the purpose for which equipment labelled **A** and **C** are used in a farming enterprise. (2)

3.4.2 Sheep farmers prefer using the equipment labelled **C** to castrate/dock animals. Provide TWO reasons for this choice. (2)

3.4.3 Name the equipment labelled **B**. (1)

3.4.4 List TWO guidelines that are important when handling cattle. (2)

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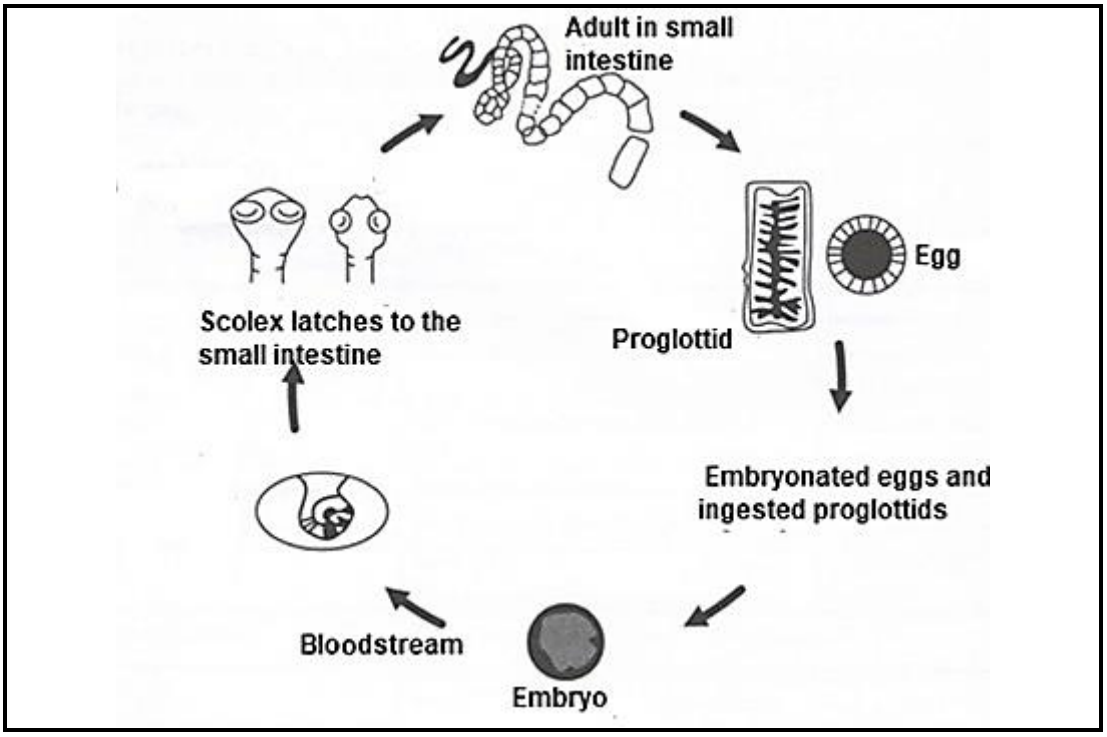
3.5 The table below shows the average pulse and respiratory rates of different farm animals.

FARM ANIMALS	TEMPERATURE (˚C)	PULSE RATE (HEART BEATS PER MINUTE)	RESPIRATORY RATE (BREATHS PER MINUTE)
Cattle	38,5	65	20
Sheep	39,5	80	15
Goats	39,5	75	15
Pigs	39,0	60	10
Fowls	41,5	312	25

3.5.1 Draw a bar graph showing the average pulse rate and respiratory rate of farm animals in the table except fowls. (6)

3.5.2 Explain the trend of the pulse rate and respiratory rate in different farm animals. (2)

3.6 The illustration below shows the life cycle of a parasite.



3.6.1 Classify the parasite in the above illustration and provide its name. (2)

3.6.2 Identify the symptom of this parasite infestation that is visible from the illustration above. (1)

3.6.3 Indicate the treatment measure the farmer can apply when animals are infested with the parasite in the illustration. (1)

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3.7 Below is the list of key symptoms of the diseases commonly affecting farm animals:

A Urine becomes dark red or brown
B Milk from the udder becomes thick, flaky with clots
C Fleece contains lumps, scabs or crust
D Blood-stained nasal discharge

3.7.1 Name the pathogen responsible for the disease in **B** and **C**. (2)

3.7.2 Give the name of the disease in **A** and **D**. (2)

3.7.3 Identify the letter of the symptoms of the disease that is transmitted by a blue tick. (1)

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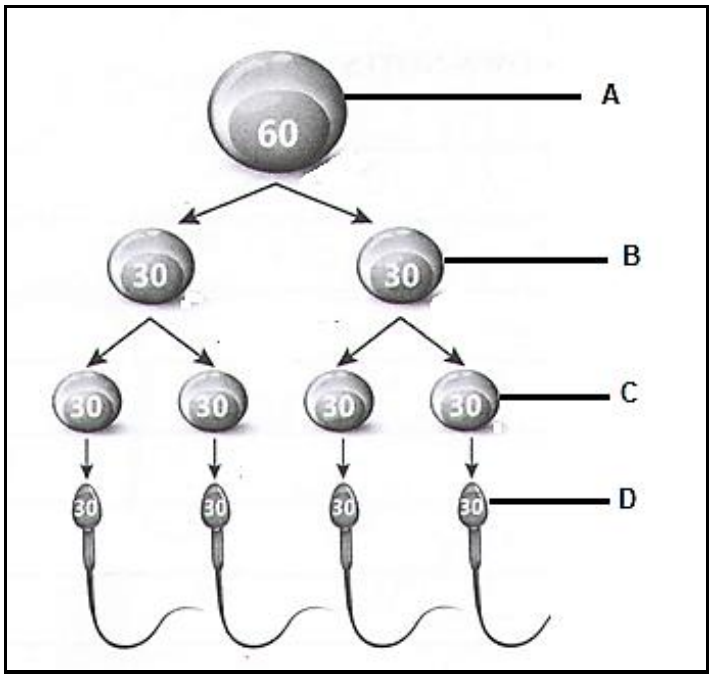
QUESTION 4: ANIMAL REPRODUCTION

Start this question on a NEW page.

4.1 The diagram below shows the process that occurs in the reproductive system of a farm animal.



4.1.1 Indicate the reproductive organ where the process illustrated above occurs. (1)

4.1.2 Identify the cells labelled **A** and **C**. (2)

4.1.3 Name the type of cell division that occurs between **B** and **C**. (1)

4.1.4 Give the name of the part in the cell labelled **D** that enables it to do the following:

(a) Penetrate zona pellucida (1)

(b) Provide energy for mobility (1)

4.1.5 Indicate TWO similarities between the process illustrated above and the one occurring in female animals. (2)

4.2 Different factors regulate the mating behaviour among bulls.

4.2.1 State the hormone that regulates mating behaviour in bulls. (1)

4.2.2 Name TWO senses that stimulate the mating response of bulls. (2)

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4.3 The stages below represent the reproductive process taking place in animals.

STAGE A	STAGE B	STAGE C
Foetal membrane separates from the uterine caruncle and eventually expelled	Cervix, vagina, vulva dilate. Hormones initiate contractions which occur at intervals of about 15 minutes	Foetus enters the cervix with front legs and nose protruding first

4.3.1 Identify the process represented by the stages above. (1)

4.3.2 Provide the name of the stages labelled **A**, **B** and **C**. (3)

4.3.3 Name the hormone that causes the corpus luteum to regress at the stage labelled **B**. (1)

4.3.4 Indicate TWO signs visible when the animal approaches the process in QUESTION 4.3.1. (2)

4.4 The following are steps involved to ensure successful artificial insemination:

- Semen dilution
- Semen collection
- Semen storage
- Semen evaluation

4.4.1 Rearrange the steps above in a sequential order. (4)

4.4.2 Indicate the component of a dilutant that is responsible for each of the following functions:

(a) Provides nutrients for semen (1)

(b) Prevents bacterial growth (1)

(c) Provides protection against pH changes (1)

4.4.3 Indicate the recommended temperature for storing semen over years in liquid nitrogen. (1)

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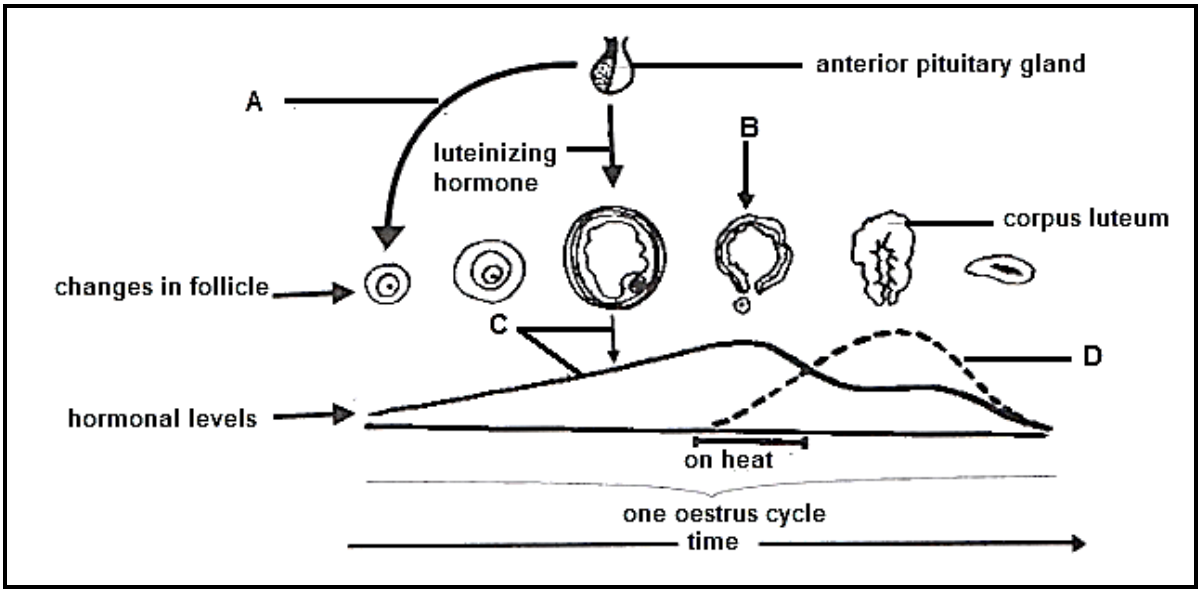
4.5 The schematic representation below indicates the hormonal changes that occur during the oestrus cycle.



4.5.1 Identify the hormones labelled **A**, **C** and **D**. (3)

4.5.2 Explain TWO important functions of the hormone labelled **A** during the oestrus cycle. (2)

4.5.3 Name the process in **B**. (1)

4.5.4 Luteinizing hormones plays an important role in the process labelled **B**. Justify this statement. (2)

4.5.5 Indicate the stage of oestrus when the hormone labelled **C** is at its peak. (1)

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TOTAL SECTION B: 105
GRAND TOTAL: 150

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