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basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P1

NOVEMBER 2022

MARKS: 150

TIME: 2½ hours

This question paper consists of 15 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 calculations, including formulae, where applicable.
7. Write neatly and legibly.

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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, e.g. 1.1.11 B.

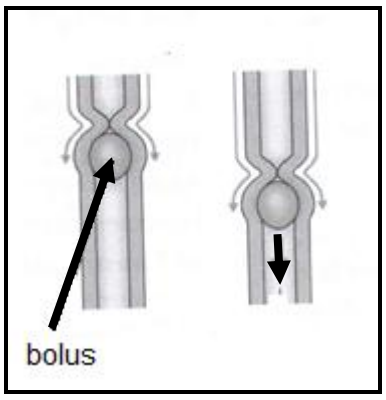
1.1.1 The compartment of the fowl's stomach that corresponds with the true stomach of a ruminant farm animal:

A Ventriculus
B Caecum
C Proventriculus
D Crop

1.1.2 ONE of the following statements applies to a ration that has 10 parts of maize meal and three parts of fishmeal:

A Has a higher percentage of fish meal than maize meal
B Has a higher percentage of maize meal than fish meal
C Has equal percentages of maize meal and fish meal
D Has 10% maize meal and 70% fish meal

1.1.3 The diagram below shows the process where each of the following occurs:



(i) The muscles above the bolus contract to push the food downwards.
(ii) The muscles below the bolus relax to move the food upwards.
(iii) The muscles constantly contract and relax to move the food down the oesophagus.
(iv) The muscles below the bolus relax to move the food downwards.

Choose the CORRECT combination:

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

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1.1.4 The following is the CORRECT sequence of the process of rumination:

A Re-swallowing → chewing → regurgitation → swallowing
B Regurgitation → ingestion → swallowing → chewing
C Ingestion → regurgitation → swallowing → re-swallowing
D Regurgitation → reinsalivation → re-chewing → re-swallowing

1.1.5 A facility used to restrain cattle during dehorning:

A Handling pen
B Holding shed
C Crush
D Weighbridge

1.1.6 The following is a sign of stress in cattle:

A Snout rubbing
B Pawing
C Belly nibbling
D Cannibalism

1.1.7 Diseases that are caused by mineral deficiencies:

A Infectious
B Contagious
C Notifiable
D Non-infectious

1.1.8 Parasites, especially in sheep, that are responsible for the irritation of the sinuses, causing sneezing and a discharge of a yellowish mucus:

A Nasal worms
B Blowflies
C Ticks
D Roundworms

1.1.9 The primary sex organ of a bull:

A Scrotum
B Testis
C Penis
D Urethra

1.1.10 … are female sex hormones responsible for the contraction of the uterine muscles.

A FSH and LH
B Oxytocin and FSH
C Oxytocin and oestrogen
D Oestrogen and progesterone (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, e.g. 1.2.6 B only.

COLUMN A			COLUMN B
1.2.1	A:	Rectum	The enlarged first part of the large intestine in pigs where absorption of water occurs
	B:	Caecum	
1.2.2	A:	Pearson square	Method of balancing the rations to determine the required protein value in a feed mixture
	B:	Feed square	
1.2.3	A:	Large-scale production system	A farming system that produces food, mainly to feed the family
	B:	Modern farming system	
1.2.4	A:	Ointments	Chemicals that kill ticks and mites
	B:	Anthelmintics	
1.2.5	A:	Artificial vagina	Apparatus used in the process of collecting semen from a bull
	B:	Electro-ejaculator	

(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 absorption of volatile fatty acids along the concentration gradient through the rumen wall

1.3.2 A preventative measure whereby farm animals with a contagious disease are kept away from healthy animals

1.3.3 The hormone which inhibits milk ejection when a cow is in a scary and unusual situation

1.3.4 A milky, sticky, creamy and opaque liquid released through the penis during ejaculation

1.3.5 A thin-walled elastic tube that extends from the urethral opening to the vulva (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 answer next to the question numbers (1.4.1 to 1.4.5) in the ANSWER BOOK.

1.4.1 Proper protein supplies the required amount and proportion of all amino acids.

1.4.2 An elastrator is a castration tool used in farm animals and causes bleeding.

1.4.3 The allantois is the outer germ layer from which the external organs, mainly the skin, hooves and hair, develop.

1.4.4 Artificial insemination takes place when the bull is allowed to mount and service a cow.

1.4.5 Meiosis is the division of diploid spermatogonium to become larger.

(5 x 1) (5)

TOTAL SECTION A: 45

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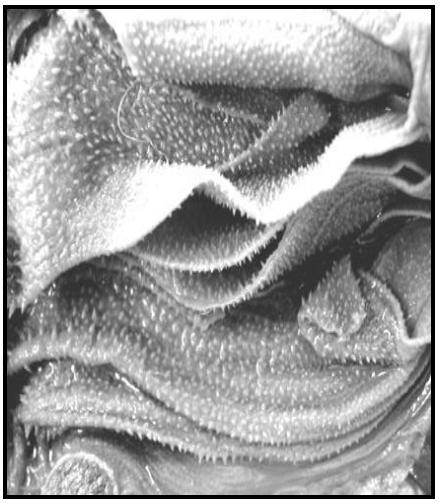
SECTION B

QUESTION 2: ANIMAL NUTRITION

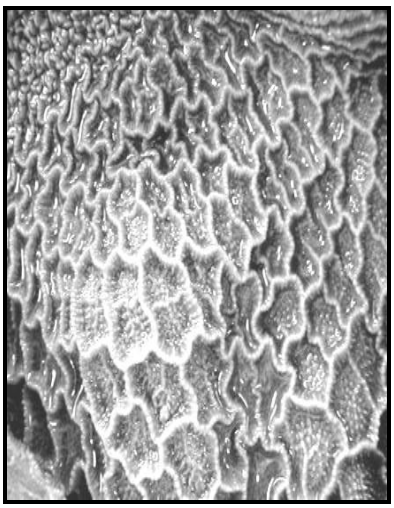
Start this question on a NEW page.

2.1 The pictures below show the parts of the stomach in a farm animal.



A

B



C

2.1.1 Name the farm animal with the stomach parts represented in the pictures above. (1)

2.1.2 Identify the letter of the stomach part where EACH of the following occurs:

(a) Foreign objects accumulate (1)

(b) Heat is produced (1)

2.1.3 The farm animal with stomach parts **A**, **B** and **C** above can survive on feed low in fat soluble vitamins. Justify this statement by indicating the adaptation feature and its role. (2)

2.1.4 Use the letters of the stomach parts to indicate the sequence with which the feed will flow after regurgitation. (3)

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2.2 The following are the symptoms of nutrient deficiencies in farm animals:

A Deformation and ulceration of the cornea in the eye
B Porous bones, especially in older animals
C Bad sores on the skin
D Paleness of the mucous membrane
E Enlarged thyroid gland

2.2.1 Identify the mineral that is deficient in **C** and **D**. (2)

2.2.2 Name the deficiency symptoms shown by the farm animals in **B** and **E**. (2)

2.2.3 Classify the vitamin that causes the deficiency in **A** according to its grouping. (1)

2.2.4 State TWO methods of supplementing the vitamin that is deficient in **A**. (2)

2.3 The table below shows the results of a digestibility coefficiency trial conducted with two different farm animals that consumed wheat straw.

ANIMAL	DRY MATTER INTAKE (kg)	DRY MATTER EXCRETED (kg)	DIGESTIBILITY COEFFICIENCY (%)
A	15	13	13
B	15	5	67

2.3.1 Identify the type of farm animal used as **A**. (1)

2.3.2 Give a reason for the answer to QUESTION 2.3.1. (1)

2.3.3 Suggest TWO factors that might have influenced the digestibility of the feed used in the trial. (2)

2.3.4 State TWO methods of improving the digestibility of this feed. (2)

2.4 The information below shows the composition of a feed.

COMPOSITION OF A FEED	PERCENTAGE
Carbohydrates	55
Digestible protein (DP)	15
Fats	5
Total digestible nutrients (TDN)	–

2.4.1 Calculate the nutritive ratio (NR) of the feed. Show ALL calculations, including the formula. (4)

2.4.2 Indicate the suitability of the feed based on the nutritive ratio in QUESTION 2.4.1. (1)

2.4.3 Give a reason for the answer to QUESTION 2.4.2. (1)

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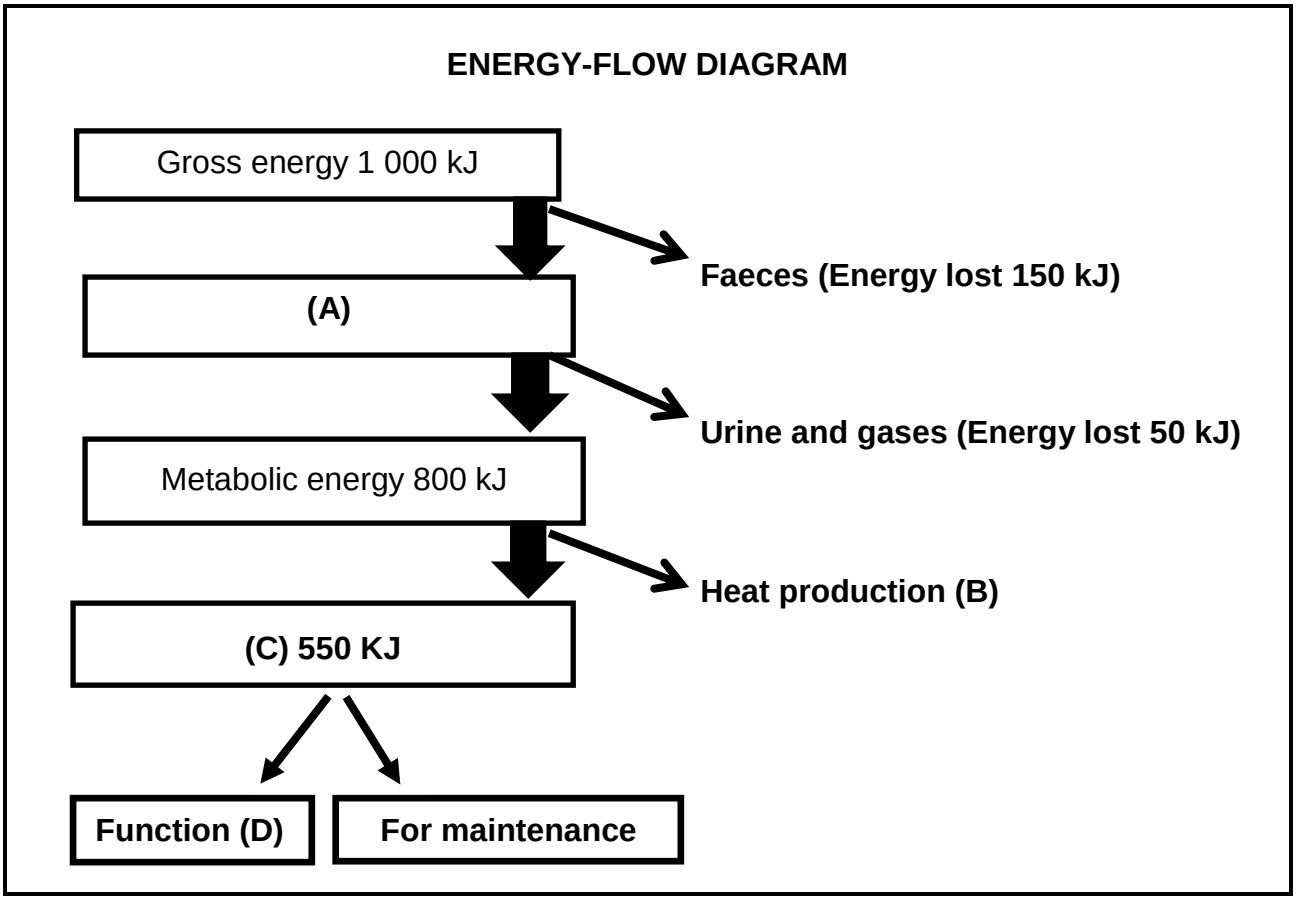
2.5 The illustration below is a schematic representation of energy flow.



2.5.1 Name the energy in **C**. (1)

2.5.2 Give the function represented by **D**. (1)

2.5.3 Calculate the following based on the schematic representation above:

(a) Energy in **A** (2)

(b) The amount of energy lost in **B** (2)

2.5.4 State TWO aims of calculating the energy value of a feed. (2)
[35]

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QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

Start this question on a NEW page.

3.1 The table below shows expected growth rates of farm animals as the temperature changes.

GROWTH RATE (kg)		TEMPERATURE (°C)
COWS	PIGS	
110	130	35
100	90	25
90	50	15
80	25	5
70	5	0

3.1.1 Identify, in the table above, the farm animals that need to be kept in an environment with housing facilities. (1)

3.1.2 Give a reason, using data from the table above, to support the answer to QUESTION 3.1.1. (2)

3.1.3 Draw a line graph to compare the growth rate of cows and pigs under different temperatures. (6)

3.2 The following is a list of equipment used in a broiler production unit:

- Foldable curtains
- Electric heaters
- Fans on the roof and walls
- Insulation material on the roof

3.2.1 Indicate the equipment in the list above that is used for EACH of the following situations:

(a) Keeping the temperature inside the broiler unit constant day and night (1)

(b) Increasing the temperature inside during a sudden drop in environmental temperature (1)

(c) Reducing the temperature on a very hot day (1)

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3.3 The pictures below show different intensive chicken production systems.

A

B

3.3.1 Identify the type of intensive chicken production system in **A** and **B**. (2)

3.3.2 State TWO factors leading to increased production in the production systems above, other than nutrition. (2)

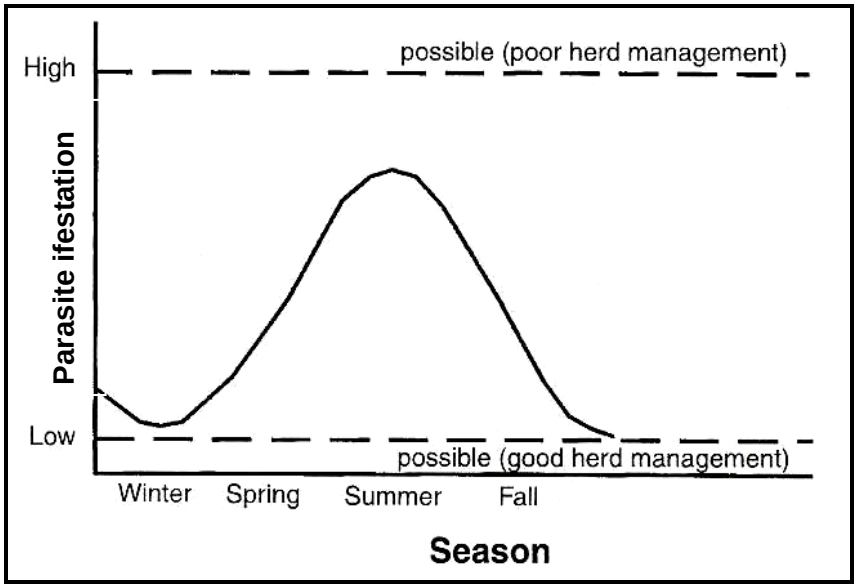
3.4 Name the farm animals to which the following basic guidelines apply when they are handled:

3.4.1 Carry them by both legs (1)

3.4.2 Catch them above the joint of the hind legs (1)

3.4.3 Use a plywood board when moving them (1)

3.5 The graph below indicates the seasonal trends in the occurrence of parasites that vary with regard to season and management.



3.5.1 Identify the season with the highest parasite infestation. (1)

3.5.2 Give ONE possible reason for the increase in the parasite infestation during the season identified in QUESTION 3.5.1. (1)

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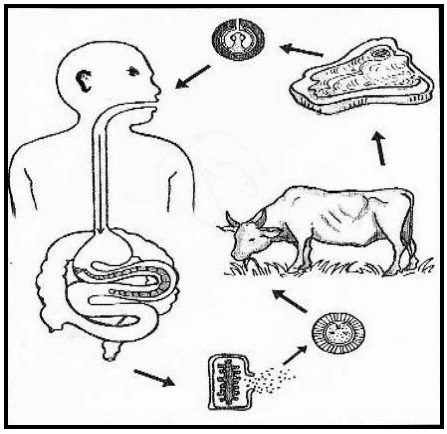
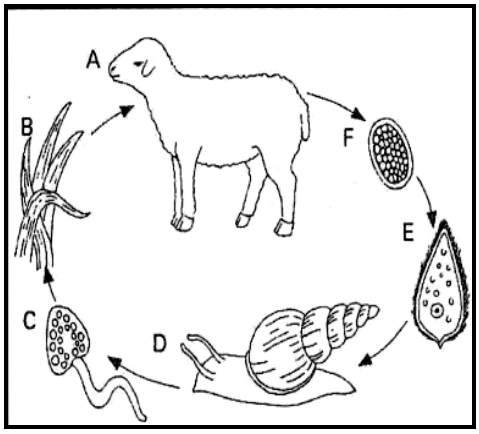
3.5.3 State TWO economic impacts of parasites. (2)

3.5.4 State TWO good herd management practices that could have led to a lower parasite infestation during the autumn months. (2)

3.6 The diagrams below illustrate the life cycle of two different parasites.



A



B

3.6.1 Classify the parasite in **B**. (1)

3.6.2 Name the parasites that are represented in **A** and **B**. (2)

3.6.3 State TWO biological measures that can be used to control the parasite in **B**. (2)

3.7 The table below shows different symptoms of diseases affecting farm animals.

ANIMAL 1	ANIMAL 2
Bleeds from the mouth, nose and anus	Urinates dark red urine, has pale to yellow eyes and later diagnosed with anaemia

3.7.1 Name the diseases affecting animal **1** and animal **2** respectively. (2)

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

3.7.3 Indicate the animal with a non-infectious disease. (1)

3.7.4 Name the specific vector responsible for the transmission of the disease in animal **2**. (1)

[35]

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QUESTION 4: ANIMAL REPRODUCTION

Start this question on a NEW page.

4.1 Match the following accessory sex glands with the descriptions below:

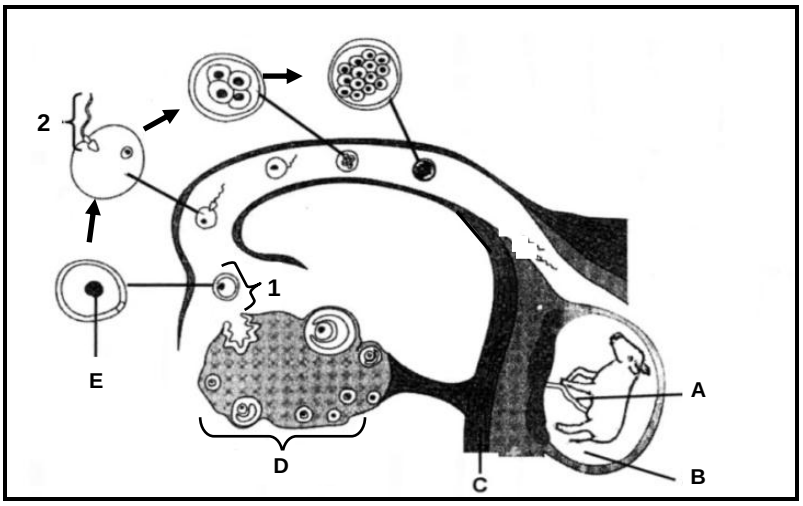
Cowper's glands; prostate; seminal vesicles

4.1.1 Surrounds the urethra at the neck of the bladder (1)

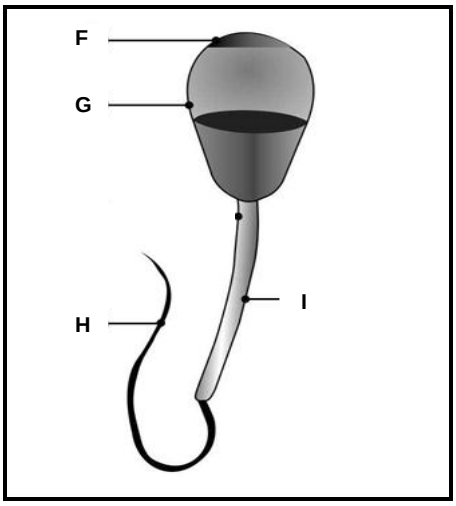
4.1.2 Located at the base of the penis on either side of the urethra and secrete an alkaline fluid that cleans the urethra (1)

4.1.3 Secretes a sticky yellowish fluid that provides energy to the sperm cells (1)

4.2 The pictures below illustrate a part of the reproductive system and a gamete.



A



B

4.2.1 Identify the following:

(a) Part **I** in picture **B** (1)

(b) Part **H** in picture **B** (1)

(c) The process taking place in **1** (1)

(d) The process taking place in **2** (1)

4.2.2 Indicate the hormone responsible for the process in **1** to take place. (1)

4.2.3 State ONE function of structure **D**. (1)

4.2.4 State ONE function of fluid **B** in picture **A**. (1)

4.2.5 Describe how part **F** enables the cell in picture **B** to penetrate the ovum. (2)

4.2.6 Name the process that leads to the formation of the cell in picture **B**. (1)

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4.3 Artificial insemination (AI) improves the conception rate in cows. To achieve the expected objective, the farmer needs to observe the signs of oestrus in order to detect heat.

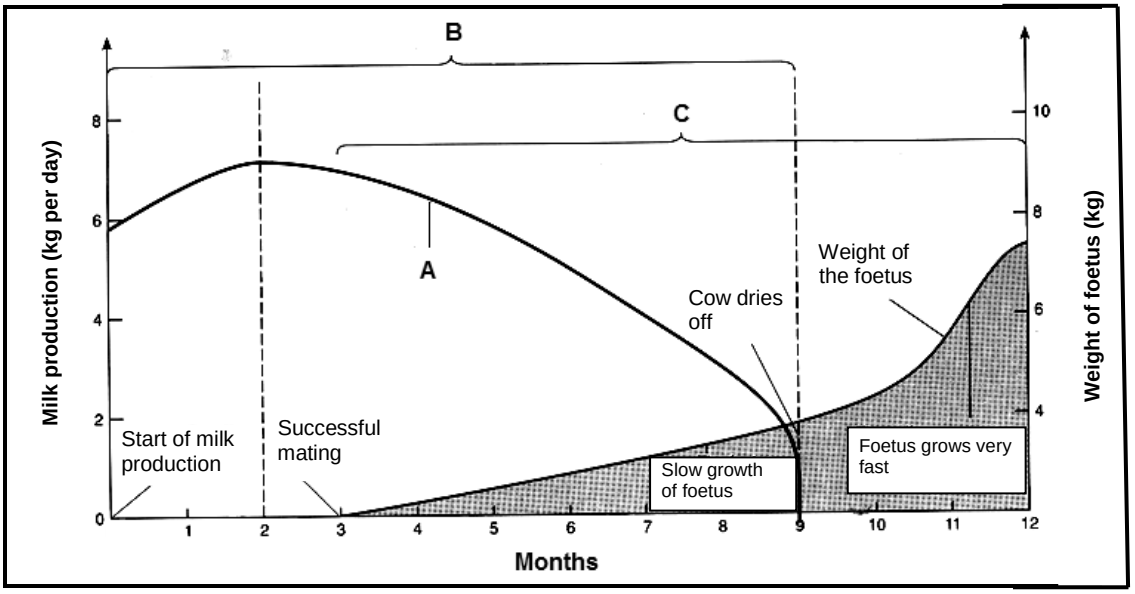
4.3.1 Name the phase of the oestrus cycle during which artificial insemination could be performed. (1)

4.3.2 State TWO methods that dairy farmers could use to detect heat in cows. (2)

4.3.3 State TWO characteristics of good quality semen. (2)

4.3.4 State TWO disadvantages of artificial insemination. (2)

4.4 The graph below shows different reproductive processes that occur in dairy cows.



4.4.1 Identify curve **A**. (1)

4.4.2 Deduce the following from the graph above:

(a) The reproductive process from month 3 to 12 (1)

(b) The stage of the process in QUESTION 4.4.2(a) between month 9 and 12 (1)

4.4.3 Identify the month when the reproductive process in QUESTION 4.4.2(a) normally ends. (1)

4.4.4 Name TWO causes of abortion. (2)

4.4.5 Give a reason why it is necessary for pregnant lactating cows to dry off before the next lactation. (1)

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4.5 The table below represents three different techniques used in animal reproduction.

1	2	3
Cows are treated with hormones to come into oestrus at approximately the same time.	As many as possible embryos are taken from selected female animals after fertilisation.	The nucleus of a cell is removed and placed into another prepared egg cell.

4.5.1 Name the reproductive techniques numbered **1**, **2** and **3**. (3)

4.5.2 Name TWO hormones that are used in technique **1** to achieve the intended results. (2)

4.5.3 Name TWO female animals involved in technique **2**. (2)

4.5.4 State the aim of technique **3**. (1)
[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150

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