Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

JUNE 2023

AGRICULTURAL SCIENCES (ENLARGEMENT)

MARKS: 150

TIME: 2½ hours

FONT SIZE: 18 PT

This question paper consists of 22 pages.

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions in the ANSWER BOOK.

2. Start EACH question on a NEW page.

3. Read ALL the questions correctly and answer only what is asked.

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 units and 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 A.

1.1.1 … is a measure of the quality of protein in a feed.

A Fodder flow
B Biological value
C Digestibility
D Nutritive ratio

1.1.2 The secretions in the duodenum responsible for digestion are …

A succus entericus, bile and gastric juice.
B bile, intestinal juice and saliva.
C pancreatic juice, bile and succus entericus.
D stomach juice, saliva and bile.

1.1.3 Rumination consists of four different processes:

A Rechewing, eructation, assimilation and regurgitation
B Regurgitation, belching, absorption and assimilation
C Regurgitation, rechewing, re-swallowing and eructation
D Rechewing, eructation, re-swallowing and assimilation

1.1.4 The micro-organisms in the rumen digest cellulose to produce the following:

(i) Pepsin
(ii) Methane
(iii) Carbon dioxide
(iv) Fatty acids

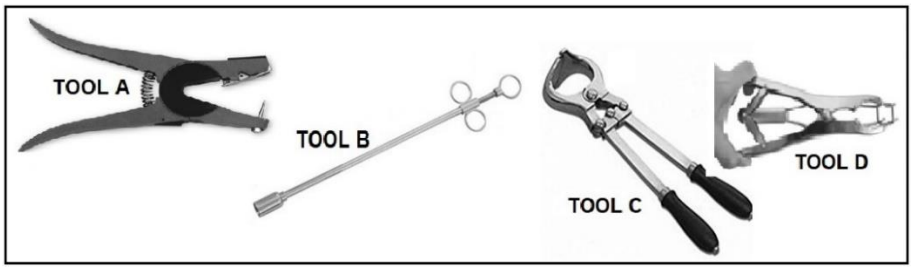
Choose the correct combination below:

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

1.1.5 The flight zone of a bull refers to the space …

A closer to the crush.
B between two gates.
C around the side of the bull.
D in front of the bull's head.

1.1.6 A tool used to castrate young animals:



A Tool **A**
B Tool **B**
C Tool **C**
D Tool **D**

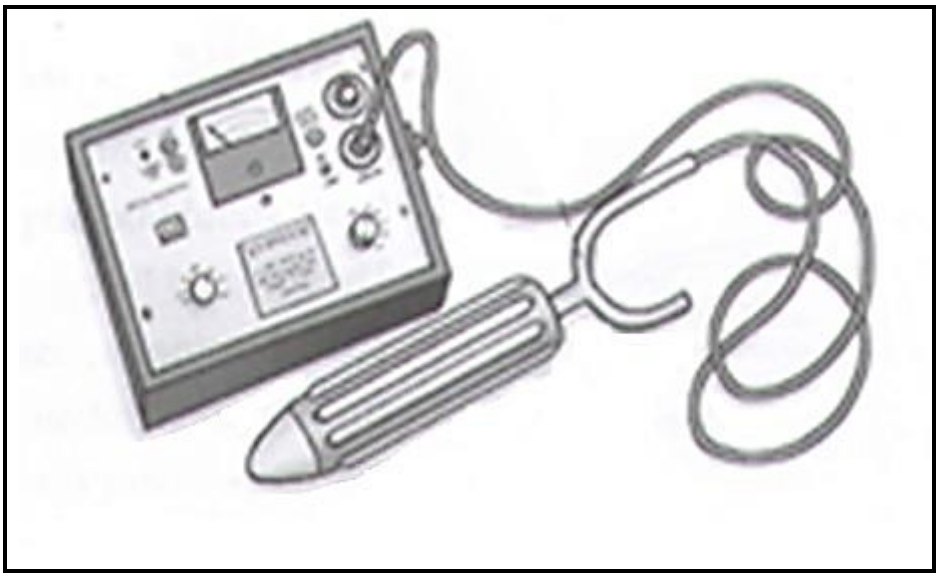
1.1.7 The following are examples of protozoan diseases, except …

A anthrax.
B anaplasmosis.
C redwater.
D coccidiosis.

1.1.8 The following is NOT an external parasite.

A Ticks
B Flukes
C Nasal worm
D Mites

1.1.9 The equipment shown in the picture below is used for …



A making the cow to be on oestrus quickly.
B storage of semen.
C collection of semen from the bull.
D detecting a cow on heat.

1.1.10 The advantages listed below are correct with regard to the synchronisation of oestrus.

(i) Shortening and concentrating calving and breeding seasons.
(ii) Labour intensive when administering drugs and hormones.
(iii) Introducing new genetics to the herd.
(iv) Increasing time needed by cows to recover from birthing.

Choose the correct combination below:

A (i), (ii) and (iv)
B (ii), (iii) and (iv)
C (i), (ii) and (iii)
D (i), (iii) and (iv) (10 x 2) (20)

1.2 Indicate whether each of the following statements 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 number (1.2.1 to 1.2.5) in the ANSWER BOOK, for example 1.2.6 B only.

Example:

COLUMN A			**COLUMN B**
1.2.6	A:	Fungal disease	An example is ringworm
	B:	Bacterial disease	

Answer: 1.2.6 None

COLUMN A			**COLUMN B**
1.2.1	A:	Diffusion	Movement of molecules against concentration gradient with the help of energy
	B:	Osmosis	
1.2.2	A:	Islets of Langerhans	Situated in the small intestines between villi for production of succus entericus
	B:	Glands of Lieberkühn	
1.2.3	A:	Avian flu	Example(s) of viral diseases of farm animals
	B:	New castle disease	
1.2.4	A:	Lighting	Equipment in an intensive housing system
	B:	Sunlight	
1.2.5	A:	Ejaculation	Male animal releases semen into the front part of the vagina
	B:	Copulation	

(5 x 2) (10)

1.3 Give ONE term/phrase for each of the following descriptions. Write only the term/phrase next to the question numbers (1.3.1 to 1.3.5) in the ANSWER BOOK.

1.3.1 Movement of soluble end products of digestion through the bloodstream to all parts of the animals' body

1.3.2 An approach that combines advantages of modern, traditional and complementary medication treatment systems for better heath care of farm animals

1.3.3 The process that is taking place in ovaries to produce female gametes

1.3.4 The phenomena whereby a donor cow is treated with hormones to produce many ova during the same oestrus cycle

1.3.5 A condition in males where testes remain in the abdominal cavity and do not descend to the scrotum (5 x 2) (10)

1.4 Change the UNDERLINED WORD(S) in each of the following statements to make them TRUE. Write the appropriate word next to the question numbers (1.4.1 to 1.4.5) in the ANSWER BOOK.

1.4.1 Production ration is the amount of feed that an animal needs to stay in a good condition and to support life.

1.4.2 Diagnosis helps to prevent farm animals from getting different diseases.

1.4.3 The smell of hormones found in the urine of cows on oestrus arouse bulls.

1.4.4 Sertoli cells are responsible for the production of testosterone in the male reproductive system.

1.4.5 Artificial insemination is the process that produces an identical copy of biological material from parents. (5 x 1) (5)

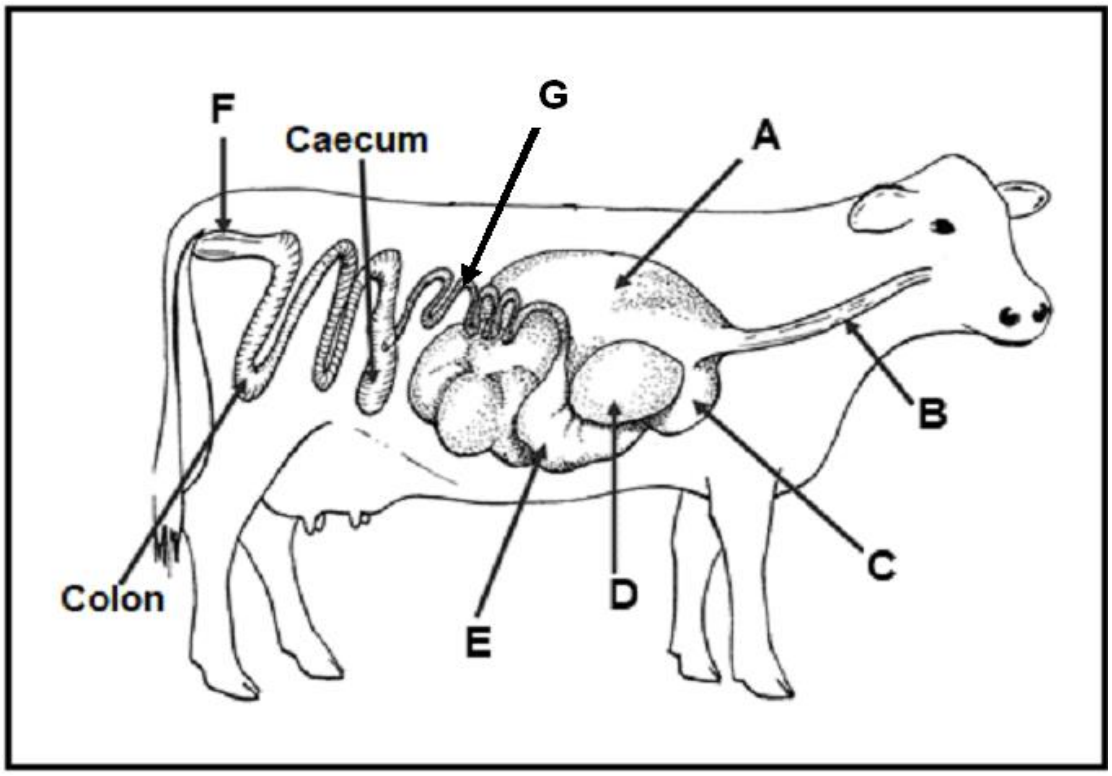
TOTAL SECTION A: 45

SECTION B

QUESTION 2: ANIMAL NUTRITION

Start this question on a NEW page.

2.1 The diagram below represents the alimentary canal of farm animals.



2.1.1 Identify parts **D** and **F** from the diagram above. (2)

2.1.2 Classify the animal with the alimentary canal in the diagram above. (1)

2.1.3 Justify the answer to QUESTION 2.1.2 based on what is visible from the diagram. (1)

2.1.4 Identify the LETTERS (**A**–**G**) where each of the following function occurs:

(a) Waste material is stored temporarily before excretion (1)

(b) Microbial fermentation of ingested feed (1)

(c) Absorption of soluble end products of digestion into the bloodstream (1)

2.1.5 Name the part of the fowl that performs the same function as **E**. (1)

2.2 Name a vitamin or mineral deficiency that may lead to each of the following:

2.2.1 Osteomalacia (1)

2.2.2 Night blindness (1)

2.2.3 Goitre (1)

2.2.4 Anaemia (1)

2.3 A cow ingested 19 kg of hay with a dry matter content of 85%, and excreted 2,5 kg of dry manure.

2.3.1 Calculate the digestibility coefficient of hay. Show ALL the calculations. (5)

2.3.2 Suggest any TWO methods the farmer can use to improve the digestibility of hay. (2)

2.4 The table below shows TWO feeds with different composition.

FEEDS	COMPOSITION INDICATORS (%)					NUTRITIVE RATIO (NR)
	DM	DP	TDN	Ca	P	
FEED A	85	10	90	0,5	0,3	
FEED B	86	20	65	0	0,3	1 : 2

2.4.1 Calculate the nutritive ration of **FEED A.** (3)

2.4.2 From the table in QUESTION 2.4, deduce the feed that is most suitable for growing lambs. (1)

2.4.3 Justify the answer to QUESTION 2.4.2. (1)

2.5 The value of a feed depends on its energy content.

2.5.1 Give TWO importance of Net Energy. (2)

2.5.2 Name TWO purposes for calculating the energy value of feed. (2)

2.6 The feeds below are available to the farmer to formulate a ration for dairy cows in early lactation:

FEED	DIGESTIBLE PROTEIN VALUE (%)	REQUIRED DIGESTIBLE PROTEIN VALUE (%)
Sorghum meal	12	15
Sunflower oilcake meal	45	

2.6.1 Use a Pearson square to calculate the ratio into which the two feeds above should be mixed for the dairy cows to get the required digestible protein. (4)

2.6.2 Calculate the percentage of sunflower oilcake meal in the mixture. Show ALL calculations. (3)

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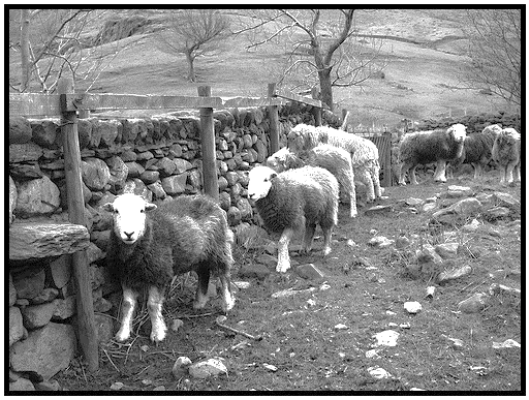
QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

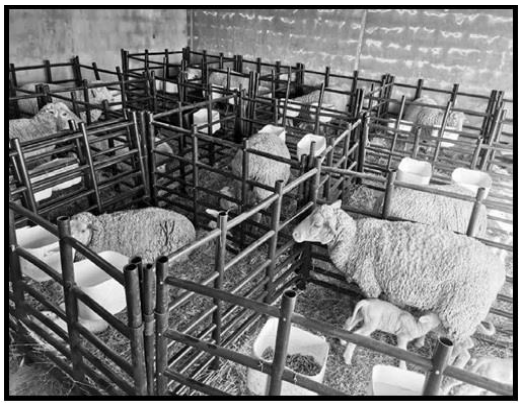
Start this question on a NEW page.

3.1 The pictures below represent two different production systems.

PICTURE A



PICTURE B



3.1.1 Identify the animal production systems represented by **PICTURE A** and **PICTURE B** above. (2)

3.1.2 Justify the answer to QUESTION 3.1.1 based on the above pictures. (2)

3.1.3 Differentiate between *subsistence* and *commercial farming systems*. (2)

3.2 The table below shows the average growth rate of beef and poultry at different temperatures.

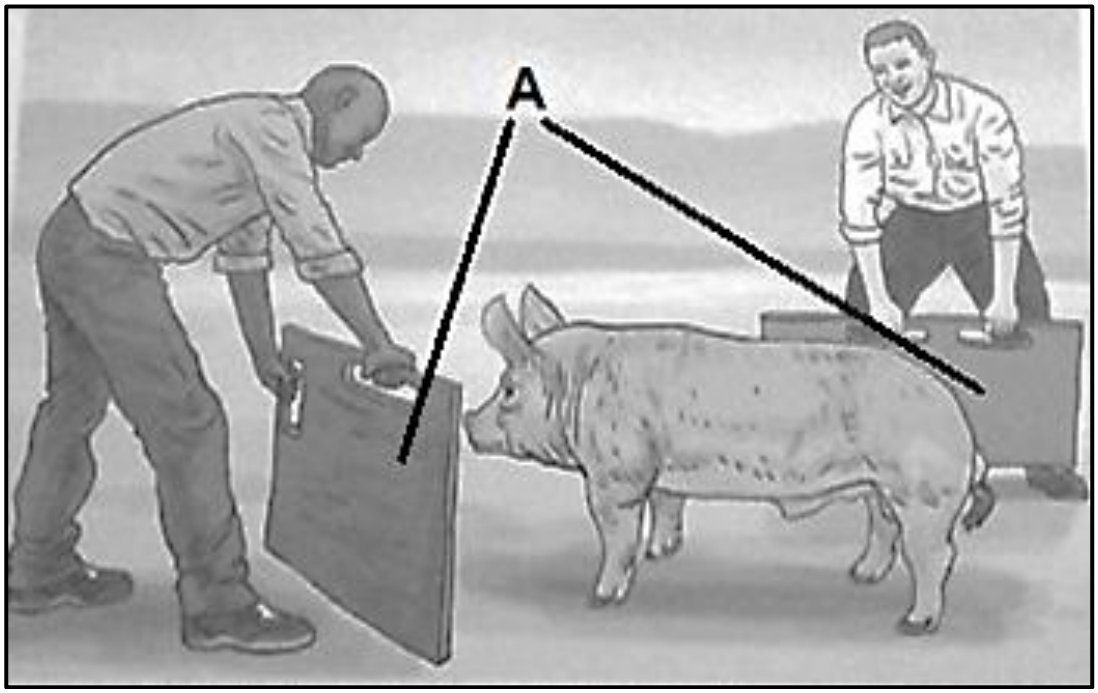
AVERAGE GROWTH RATE (%)		TEMPERATURE (°C)
BEEF	POULTRY	
65	45	50
80	70	40
95	90	30
25	10	20
15	5	10

3.2.1 Use the information provided in the table above and draw a line graph representing average growth rate of beef and poultry at different temperatures. (6)

3.2.2 Explain the trend between beef and poultry at different temperatures shown in the table above. (2)

3.2.3 Indicate ONE method to protect poultry against extreme cold weather conditions in order to maintain optimal production levels. (1)

3.3 The picture below shows a pig moved with the aid of the boards.



3.3.1 Identify the equipment labelled **A** in the picture above. (1)

3.3.2 Name TWO reasons for handling pigs by farmers. (2)

3.4 The table below shows diseases, pathogen, symptoms and type of animal:

DISEASE	PATHOGEN	SYMPTOMS	TYPE OF ANIMAL
A	Fungi	The round wounds with a scabby surface form on the skin of farm animals	All farm animals
Heartwater	**B**	Neurological signs including chewing movements, tongue protrusion, eyelids twitching and circling	Ruminant farm animals
C	**D**	Inflammation of the udder leading to drop in milk production	Mostly dairy breeds
Rabies	**E**	**F**	Cattle, sheep and dogs

Complete the table above by writing down ONLY the missing information for
A, **B**, **C**, **D, E** and **F**. (6)

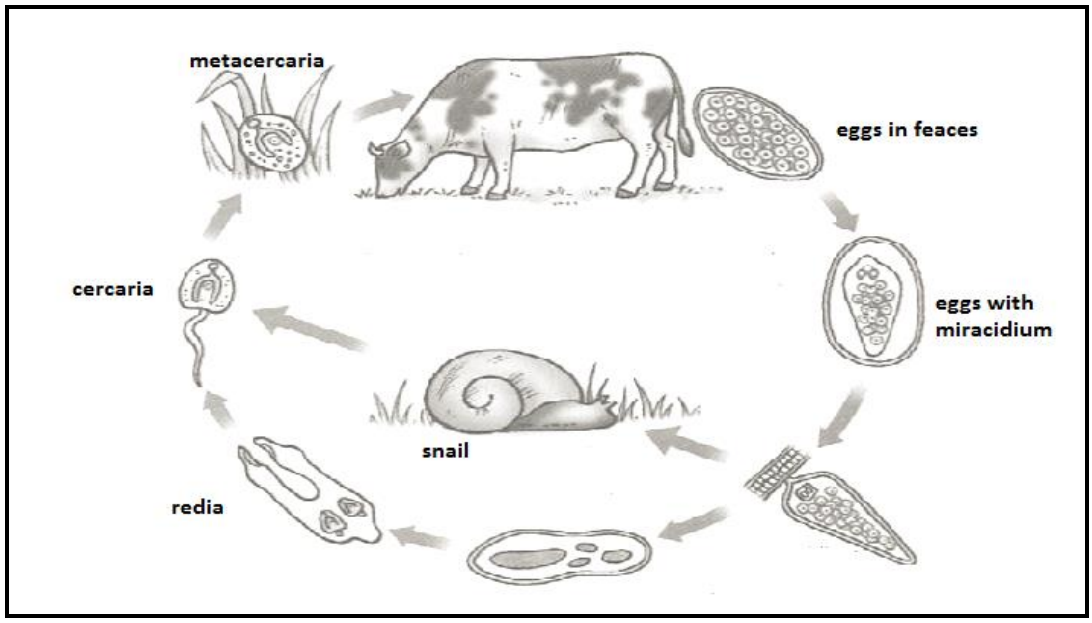
3.5 Mites are closely related to ticks, but are much smaller and cannot be seen with a naked eye. Mites are found on less hairy parts of the skin on the bodies of farm animals.

3.5.1 Classify the parasite indicated in the statement above. (1)

3.5.2 Give a reason from the scenario for the answer to QUESTION 3.5.1. (1)

3.5.3 Indicate THREE examples of parasites belonging to the same class as mites other than ticks. (3)

3.6 The schematic representation below shows the life cycle of a parasite.



3.6.1 Name the parasite shown in the schematic representation above. (1)

3.6.2 Identify the intermediate host in the schematic representation above. (1)

3.6.3 Suggest TWO pasture management measures to control the parasite mentioned in QUESTION 3.6.1 above. (2)

3.7 Give TWO examples of metallic salt poisoning. (2)

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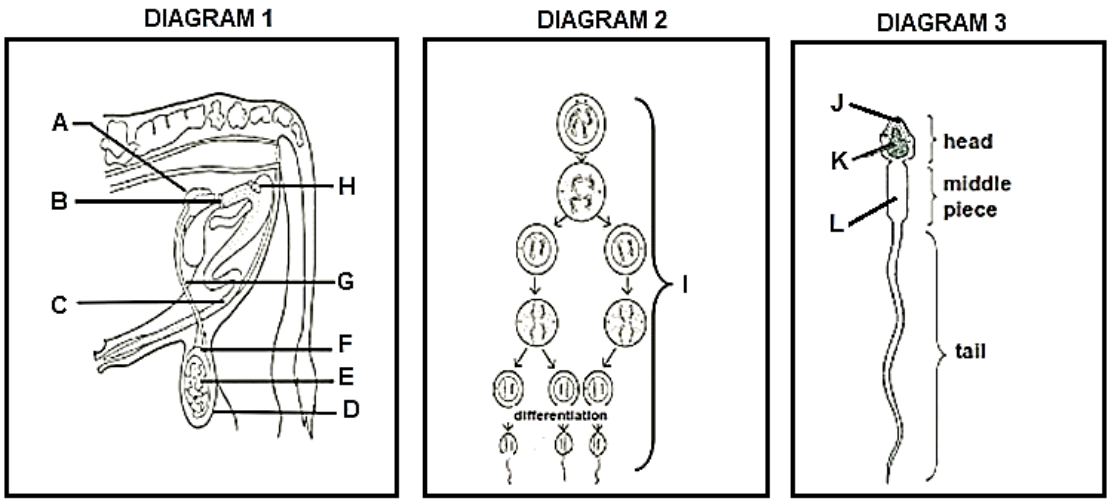
QUESTION 4: ANIMAL REPRODUCTION

Start this question on a NEW page.

4.1 The diagrams below illustrate the reproductive system of a bull and the reproductive process for gametes formation.



4.1.1 Identify the parts labelled **A**, **C** and **F** in **DIAGRAM 1**. (3)

4.1.2 Name the process represented by **I** in **DIAGRAM 2**. (1)

4.1.3 Match the functions listed below with a LETTER (**A**–**L**) from the **DIAGRAMS 1, 2** or **3** above.

(a) Produce male gametes and hormones

(b) Generates energy for male gametes

(c) Assists the male gamete to penetrate the ovum by releasing enzymes (3)

4.1.4 Indicate TWO congenital defects that can influence the process in **DIAGRAM 2.** (2)

4.1.5 Give a reason why part **D** in **DIAGRAM 1** is situated outside the abdominal cavity of the male animal. (1)

4.2 Identify the electronic or mechanical devices used to detect heat in farm animals described below:

(a) Placed on cows as a marker and stretches from the hip bone to where the tail begins

(b) Laced around a cow's lower leg to record movement

(c) Glued to the rump of cows suspected to be on heat, and prolonged pressure from mounting animals will turn white detector to red colour (3)

4.3 The illustration below shows phases in the reproductive process of female animals.

PHASE A	PHASE B
It lasts for 12 to 16 days on average. It is the longest phase of the cycle. The corpus luteum is fully functional.	The phase lasts about 2 to 3 days on average. It is characterised by rapid follicle growth and the animal becomes excited.
PHASE C	**PHASE D**
The phase lasts to about 3 to 5 days, and is the time during which ovulation occurs. Corpus luteum undergoes early development.	The average length of the phase is 12 to 18 hours. Female farm animal is receptive to males and will stand for mating to take place.

4.3.1 Name the reproductive process indicated in the illustration above. (1)

4.3.2 Identify **PHASE B** and **PHASE C** above. (2)

4.3.3 Name TWO hormones that control **PHASE D**. (2)

4.3.4 Give TWO visible sexual behaviours displayed by bulls. (2)

4.4 The list below represents stages of a reproductive technique:

A The donor cow is treated with multiple hormone injections

B Evaluation of embryos for successful implantation to the recipient cow

C Selection of a superior donor cow

D During ovulation the donor cow is inseminated with good quality semen

E The uterus is flushed after seven days to extract embryos

4.4.1 Identify the reproductive technique represented above. (1)

4.4.2 Re-arrange the stages of the reproductive technique in QUESTION 4.4 in their chronological order. Use LETTERS (**A**–**E**) only. (5)

4.4.3 Name TWO methods of collecting semen to be used during the reproductive technique. (2)

4.5 The diagrams below represent a cow at different stages of parturition.

DIAGRAM 1

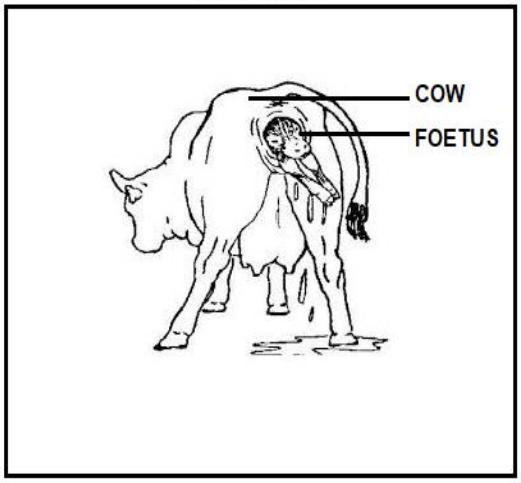
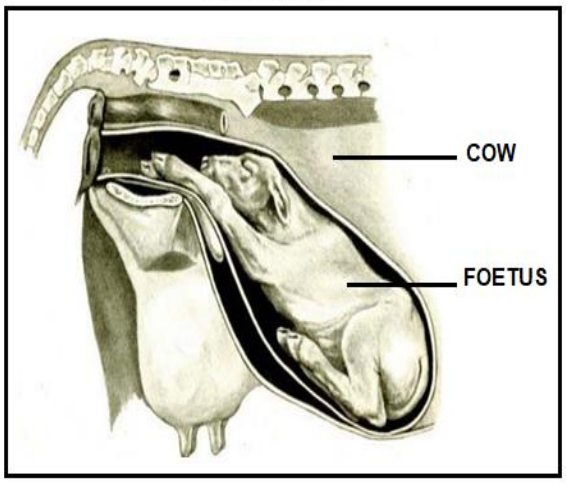


DIAGRAM 2

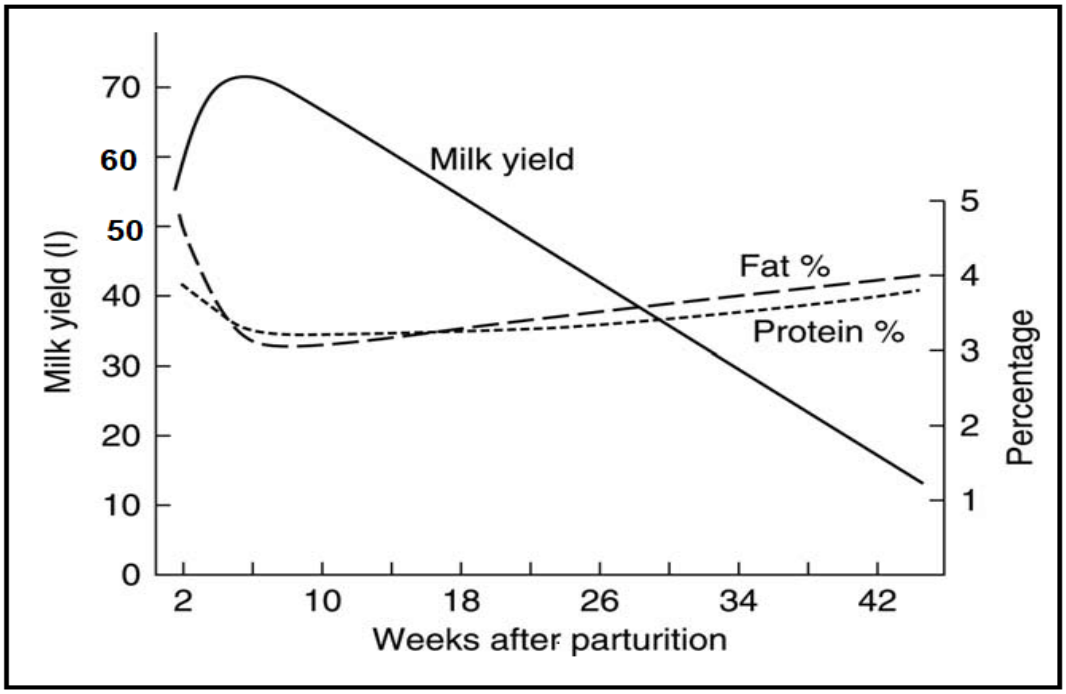


4.5.1 Name the stage of parturition represented by **DIAGRAM 1** above. (1)

4.5.2 Identify the birth position shown in **DIAGRAM 2** above. (1)

4.5.3 Indicate TWO signs of parturition shown by a cow before giving birth. (2)

4.6 The graph below shows the milk production cycle of a dairy cow.



4.6.1 Give the name of the curve represented above. (1)

4.6.2 Identify the range of weeks during which milk production is at its peak. (1)

4.6.3 Name the hormone responsible for development of mammary glands and milk production. (1)

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TOTAL SECTION B: 105
GRAND TOTAL: 150