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Department:
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NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P1

NOVEMBER 2015

MARKS: 150

TIME: 2½ hours

This question paper consists of 16 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. 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 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 number (1.1.1–1.1.10) in the ANSWER BOOK, for example 1.1.11 A.

1.1.1 The only compartment of a ruminant calf's stomach that is functional while it is still suckling:

- A Abomasum
- B Omasum
- C Rumen
- D Reticulum

1.1.2 A feed with a high digestibility coefficient contains ...

- A less fibre and more digestible nutrients.
- B more fibre and more digestible nutrients.
- C less fibre and less digestible nutrients.
- D more fibre and less digestible nutrients.

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

- (i) Carbon dioxide
- (ii) Butyric acid
- (iii) Pepsin
- (iv) Methane

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 Chemical substances added to the feed of farm animals so that they become calmer and eat more:

- A Antibiotics
- B Growth hormones
- C Thyroid regulators
- D Tranquilisers

- 1.1.5 The flight zone of a cow refers to the space ...
- A closer to the crush.
 - B between two gates.
 - C around the side of the cow.
 - D in front of the cow's head.
- 1.1.6 The statements below are correct with regard to the life cycle of a one-host tick.
- Choose the CORRECT combination:
- (i) The eggs hatch into larvae.
 - (ii) The larvae develop into nymphs.
 - (iii) The larvae and nymphs live on an intermediate host.
 - (iv) The nymphs develop into adults.
- A (i), (ii) and (iii)
 - B (i), (ii) and (iv)
 - C (ii), (iii) and (iv)
 - D (i), (iii) and (iv)
- 1.1.7 The bacterial disease mainly affecting the mammary glands of farm animals:
- A Redwater
 - B Mastitis
 - C Anaplasmosis
 - D Anthrax
- 1.1.8 Twins developing from two different ova and fertilised by two different spermatozoa:
- A Freemartin
 - B Monozygotic
 - C Dizygotic
 - D Maceration
- 1.1.9 Choose the CORRECT order of the zygote's development after fertilisation:
- A Zygote → implantation → blastocyst → morula
 - B Zygote → morula → blastocyst → implantation
 - C Zygote → morula → implantation → blastocyst
 - D Zygote → blastocyst → morula → implantation

1.1.10 A hormone that plays an important role in the stimulation of lactation after parturition:

- A Relaxin
- B Luteinising hormone
- C Oxytocin
- D Prolactin

(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 number (1.2.1–1.2.5) in the ANSWER BOOK, for example 1.2.6 B only.

COLUMN A			COLUMN B
1.2.1	A:	Copper	Wasting disease
	B:	Cobalt	
1.2.2	A:	80% TDN	A production ration including fish meal which is used for high-producing dairy cows
	B:	4% DP	
1.2.3	A:	Plant poisoning	Excessive salivation
	B:	Urea poisoning	
1.2.4	A:	Cryptorchidism	Condition where female animals are unable to conceive after several attempts at insemination
	B:	Repeat-breeder syndrome	
1.2.5	A:	Oestrus	Regulated by progesterone
	B:	Ovulation	

(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 number (1.3.1–1.3.5) in the ANSWER BOOK.

- 1.3.1 An alkaline liquid that is produced by the liver and released into the small intestine to assist in the digestion of fats
- 1.3.2 A technique where curtains are used inside a broiler house to help regulate temperature
- 1.3.3 The term given to the organism that is responsible for the transmission of viral diseases such as Rift Valley fever
- 1.3.4 The condition where female animals experience problems during the birth process and need a veterinarian's or the farmer's assistance
- 1.3.5 The inability of a bull to service cows that are in oestrus even though it has interest

(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 number (1.4.1–1.4.5) in the ANSWER BOOK.

1.4.1 A supplement programme is a strategic plan for livestock farmers to ensure that there is sufficient feed to meet the requirements of farm animals throughout the year.

1.4.2 A deep-litter system is when fowls are allowed to roam freely during the day and are confined in sheds at night.

1.4.3 Chronic diseases occur suddenly, unexpectedly and sometimes with no previous signs, consequently leading to rapid death.

1.4.4 Broilers are kept intensively in battery cages for the production of eggs.

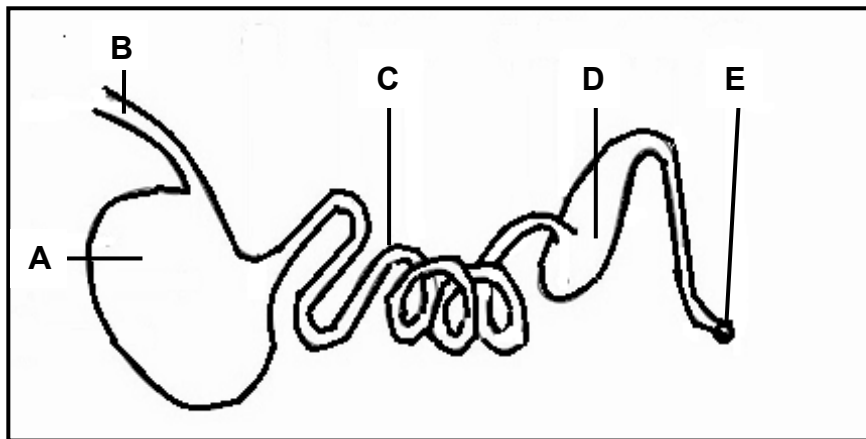
1.4.5 The endoderm is the middle layer from which the heart, skeleton, muscles, urogenital and vascular systems develop. (5 x 1) (5)

TOTAL SECTION A: 45

SECTION B**QUESTION 2: ANIMAL NUTRITION**

Start this question on a NEW page.

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



- 2.1.1 Identify the type of farm animal shown in the diagram above. (1)
- 2.1.2 Refer to at least ONE structure in the diagram above to motivate the answer to QUESTION 2.1.1. (1)
- 2.1.3 Identify the part where each of the following occurs and write down only the letter (A–E):
- (a) Excretion (1)
 - (b) Absorption of amino acids (1)
 - (c) Main absorption of water (1)
- 2.1.4 Give TWO reasons why the animal above can NOT be fed roughages. (2)

2.2 Water, vitamins and minerals should always be included as an integral part of animal nutrition.

2.2.1 State THREE functions of water in animal nutrition. (3)

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

(a) Osteomalacia (1)

(b) Night blindness (1)

(c) Goitre (1)

(d) Anaemia (1)

2.3 The moisture content of hay for cattle in a feedlot is 8%. A herd of beef weaners consumes 30 kg of the hay on average and excretes 12 kg dry manure every day.

2.3.1 Refer to the information above and calculate the digestibility coefficient of the hay. Show ALL the calculations. (5)

2.3.2 Suggest THREE processes that can be applied to improve the digestibility of feeds. (3)

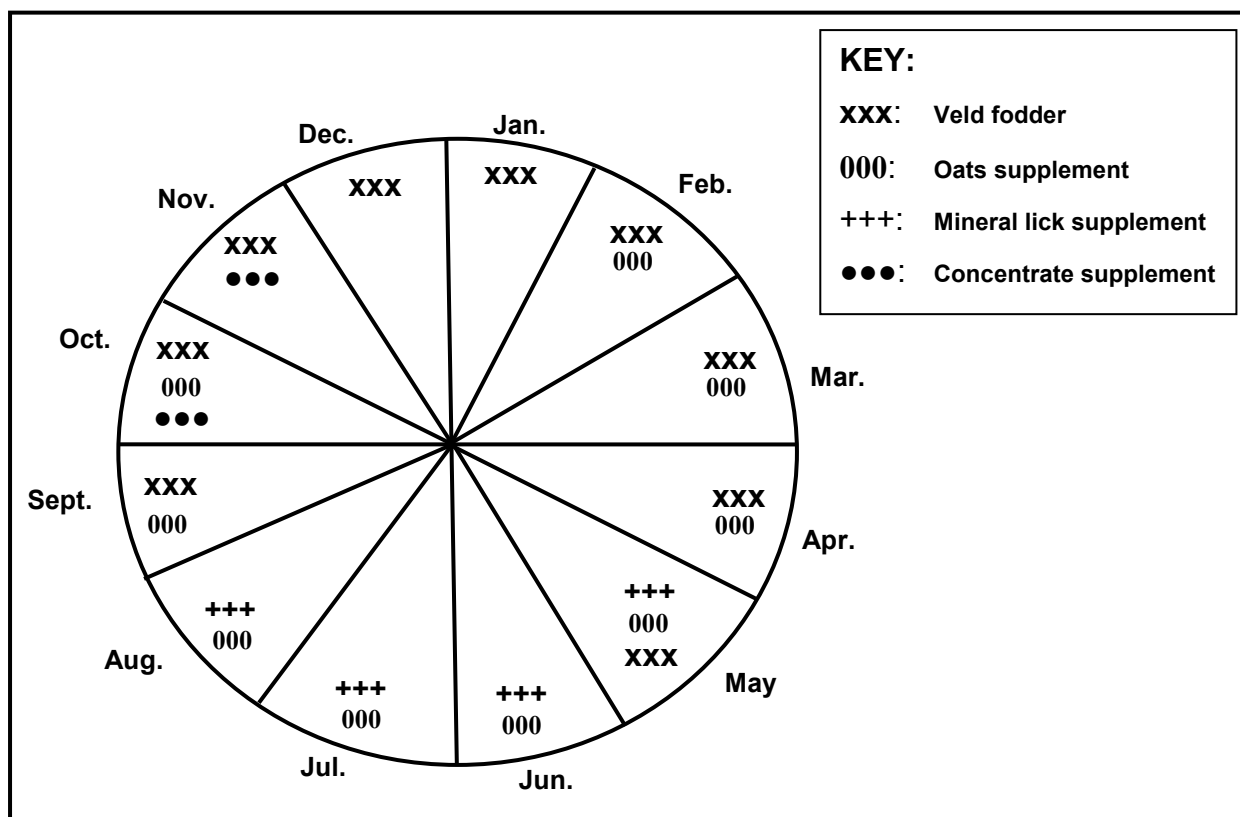
2.4 The table below indicates the feeds available to a dairy farmer to compose a ration.

REQUIRED DIGESTIBLE PROTEIN VALUE (DP) %	FEED	DIGESTIBLE PROTEIN VALUE (DP) %
17%	Maize	9%
	Peanut oilcake	44%

2.4.1 Use the Pearson square method to balance the ration. (3)

2.4.2 Calculate the percentage of maize to be included in the ration. (2)

- 2.5 The chart below indicates the available feed and supplement requirements in a sheep production unit.



2.5.1 Identify the months during which the veld fodder was sufficient. (2)

2.5.2 Give a reason for the answer to QUESTION 2.5.1 by referring to the chart above. (1)

2.5.3 Give a reason for introducing a concentrate in October and November. (2)

2.5.4 Assume that the veld, as mentioned above, supplied 3,4 tons of fodder for January.

Calculate:

(a) In kg, the quantity of fodder supplied by the veld in January (1)

(b) The demand on the veld in January if 50 sheep each consumes 2 kg of fodder per day. Show ALL calculations. (2)

[35]

QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

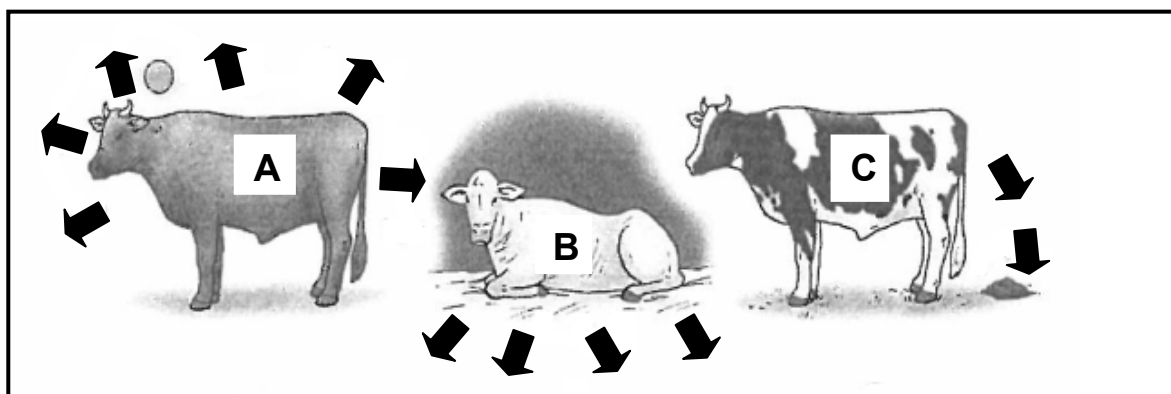
Start this question on a NEW page.

- 3.1 The photographs below indicate two types of production systems (**A** and **B**) generally practiced in South Africa.

**A****B**

- 3.1.1 Identify production systems **A** and **B**. (2)
- 3.1.2 Compare the differences between production system **A** and production system **B**, using the following headings:
- (a) Environmental control (2)
 - (b) Productivity (2)
 - (c) Human input (2)
- 3.1.3 Give ONE main reason why cattle are kept in the facility represented by system **B**. (1)

- 3.2 The diagram below represents farm animals and the ways in which they lose heat.



- 3.2.1 Identify THREE ways in which heat (energy) is lost in animals **A**, **B** and **C**. (3)
- 3.2.2 Indicate TWO ways in which heat (energy) is lost, other than those shown in the diagram above. (2)
- 3.2.3 Name TWO signs of heat stress in farm animals. (2)
- 3.2.4 Suggest TWO management practices to reduce the type of heat loss in animal **A**. (2)

- 3.3 The table below represents the average pulse and respiratory rates of different farm animals.

FARM ANIMALS	AVERAGE PULSE RATE (HEART BEATS PER MINUTE)	AVERAGE RESPIRATORY RATE (BREATHS PER MINUTE)
Cattle	65	20
Horses	40	15
Sheep	80	20
Goats	75	15
Pigs	60	10

- Draw a line graph to indicate the average pulse rate and respiratory rate of the different farm animals in the table on one graph. (6)

- 3.4 The table below represents the vaccination plan that a farmer uses to prevent acute animal diseases on a farm.

DISEASE	PATHOGEN INVOLVED	MAJOR SYMPTOM OF THE DISEASE	FARM ANIMALS IMMUNISED	TIME TO VACCINATE
A	Bacteria	Swelling of neck, causing respiratory distress and bloody discharge from the nose, mouth and rectum	B	Any time
Redwater	C	Dark red urine	D	Annually
Foot-and-mouth disease	Virus	E	Cattle, sheep and goats	F
Rift Valley fever	G	High fever, blood-stained nasal discharge and abortion in affected female animals	Cattle, sheep and goats	Annually

- 3.4.1 Complete the table above. Write only the answer next to the letter (A–G) in the ANSWER BOOK. (7)

- 3.4.2 Name the vector for redwater. (1)

- 3.5 Parasites can cause serious economic losses; hence the farmer should ensure that parasites are effectively controlled.

Suggest the most appropriate method used to administer remedies to control each of the following parasites and conditions:

- 3.5.1 To eradicate round and flat worms (1)

- 3.5.2 To treat external parasites such as ticks and mites (1)

- 3.5.3 To treat blowfly attacking open wounds (1)

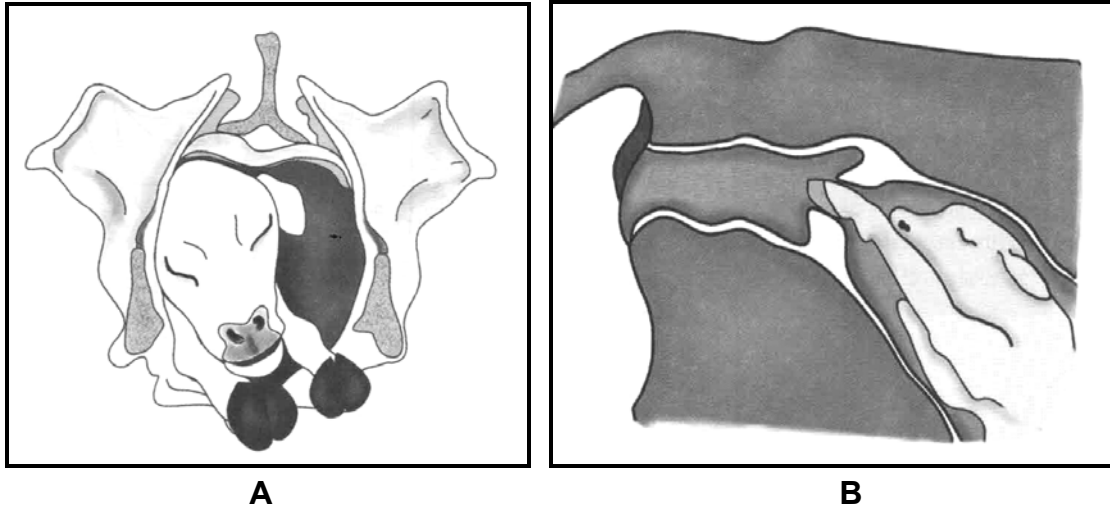
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QUESTION 4: ANIMAL REPRODUCTION

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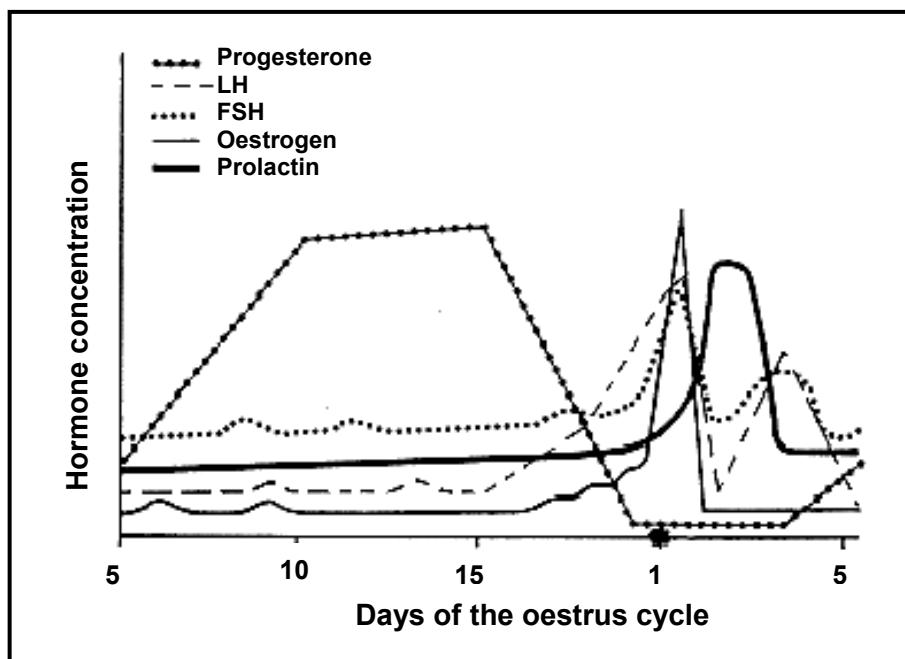
Pictures **A** and **B** below represent some stages of parturition in cattle.

4.1



- 4.1.1 Name the stages of parturition in picture **A** and picture **B**. (2)
- 4.1.2 Identify, in picture **A** or **B**, the incorrect positioning of the calf. Give a reason for the answer. (2)
- 4.1.3 Which picture (**A** or **B**) corresponds to the following activities? (1)
- (a) Oxytocin is released to initiate contractions. (1)
 - (b) Contractions occur every two minutes. (1)
 - (c) The umbilical cord breaks and the calf starts breathing. (1)
- 4.1.4 There are noticeable behavioural changes in the cow during stage **B**. Name THREE of these changes. (3)

- 4.2 The graph below represents the hormone levels of a cow at different stages in the oestrus cycle.



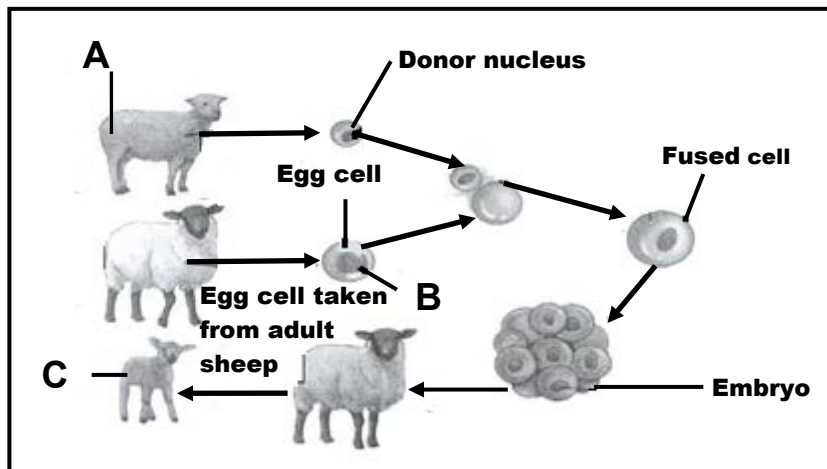
- 4.2.1 Define the term *oestrus cycle*. (2)
- 4.2.2 Identify the days during which the progesterone level is the highest. (1)
- 4.2.3 Give a reason for the sudden drop in the level of FSH between days 2 and 3. (1)
- 4.2.4 Give a reason for the increase in the level of progesterone from days 3 and 4. (2)
- 4.2.5 Indicate the influence of oestrogen on LH. (1)
- 4.2.6 Name the gland in the animal body where prolactin is produced. (1)

- 4.3 Farmers can use several electronic and mechanical devices to detect heat in farm animals.

Identify each device described below:

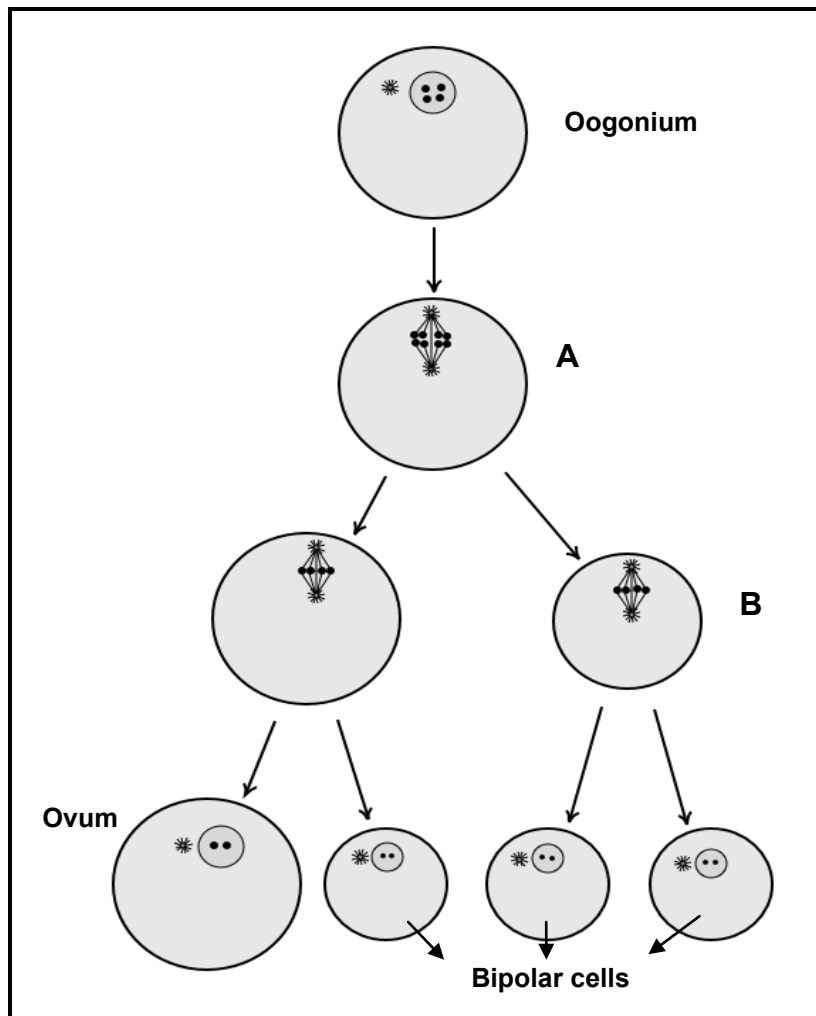
- 4.3.1 Placed around a cow's lower leg to record movement (1)
- 4.3.2 Marker that is placed on a teaser cow to leave a mark on the back of a mounted cow (1)
- 4.3.3 Placed on cows as a marker and stretches from the hip bone to where the tail begins (1)

4.4 The diagram below represents a reproductive process in sheep.



- 4.4.1 Identify the type of reproductive process in the diagram above. (1)
- 4.4.2 Define the process in QUESTION 4.4.1. (2)
- 4.4.3 Describe the stage represented by **B**. (1)
- 4.4.4 Suggest THREE aims of the process in QUESTION 4.4.1. (3)

- 4.5 The diagram below represents a process that takes place in the reproductive system of a cow.



- 4.5.1 Identify the process illustrated in the diagram above. (1)
- 4.5.2 Name the type of cell division responsible for the formation of cell **A**. (1)
- 4.5.3 Give a reason why cells **B** divide through meiosis. (1)
- 4.5.4 Indicate the end products of division of the following processes:
- (a) Oogenesis (1)
 - (b) Spermatogenesis (1)
- 4.5.5 Name the organ where you will find the following:
- (a) Spermatogonium (1)
 - (b) Oogonium (1)

[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150