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Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS

AGRICULTURAL SCIENCES P1

2023

MARKS: 150

TIME: 2½ hours

This question paper consists of 15 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 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, e.g. 1.1.11 B.

1.1.1 The compartment in the ruminant stomach that has folds that increase the total surface area for absorption of water:

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

1.1.2 ... is an example of a fat-soluble vitamin that is essential for normal reproduction.

- A Vitamin A
- B Vitamin B₁
- C Vitamin B₆
- D Vitamin B₁₂

1.1.3 Each of the following is a requirement for a feed flow programme:

- (i) Matches feed production capabilities of the farm to the animal feed requirements
- (ii) Ensures negative margin over feed cost
- (iii) Makes feed available to animals throughout the production period
- (iv) Ensures sustainable use of resources

Choose the CORRECT combination:

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

1.1.4 Feeds with proteins of high biological value are used for ...

- A maintenance and growth.
- B growth and fattening.
- C growth and reproduction.
- D production and maintenance.

1.1.5 A sign of aggressive behaviour in cattle:

- A Drooping head and ears
- B Slow movement
- C Lying down and reluctant to get up
- D Pawing

1.1.6 The statements below describe an extensive production system:

- (i) A small number of animals on a huge area of land
- (ii) Little human involvement and technological input
- (iii) High production output
- (iv) Animals fend for themselves

Choose the CORRECT combination:

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

1.1.7 An instrument that is used to administer the deworming liquid to sheep:

- A Burdizzo
- B Dosing gun
- C Scalpel
- D Dewormer

1.1.8 Metabolic diseases are caused by mineral deficiencies and are ...

- A infectious.
- B contagious.
- C notifiable.
- D non-infectious.

1.1.9 The membrane surrounding the foetus and responsible for the removal of urine:

- A Allantois
- B Placenta
- C Chorion
- D Amnion

1.1.10 ONE of the following statements with regard to the normal lactation of dairy cows is INCORRECT:

- A The higher the milk yield, the lower the butterfat content.
- B The higher the milk yield, the higher the butterfat content.
- C The period of milk production in cows is approximately 305 days.
- D Milk production drops before drying up. (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, e.g. 1.2.6 B only.

COLUMN A			COLUMN B
1.2.1	A:	Concentrates	Provide bulkiness to the ration of a ruminant farm animal
	B:	Roughages	
1.2.2	A:	Hindgut fermentation	Digestion facilitated by micro-organisms found in the alimentary canal
	B:	Rumen fermentation	
1.2.3	A:	Nipple drinkers	Supply water to pigs in an intensive production system
	B:	Computerised feeding troughs	
1.2.4	A:	Soil sods	Used in pens to absorb the moisture and insulate cold cement floors
	B:	Wood shavings	
1.2.5	A:	Antibiotics	Protect semen against pH changes
	B:	Glycerol	

(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 process whereby the partially digested stomach content is returned to the mouth for further chewing
- 1.3.2 A preventative measure whereby animals with a contagious disease are kept away from healthy animals
- 1.3.3 A common canal in male animals that is used for excretion of urine and semen
- 1.3.4 An organelle in the head of a sperm cell which contains genetic materials
- 1.3.5 A condition where female animals are unable to conceive after several attempts of artificial insemination

(5 x 2)

(10)

1.4 Change the UNDERLINED WORD 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 Chyme is food that is ball-like and which is mixed with saliva in the mouth of an animal during digestion.

1.4.2 Farming where crops and livestock are produced and sold on a large scale for profit, is called an intensive farming system.

1.4.3 The sheath encloses the primary male reproductive organ.

1.4.4 Maceration occurs when the placenta, together with liquids, dries out and only a hard dried foetus remains in the uterus.

1.4.5 A powerful contraction of the muscles during mating resulting in the deposition of semen into the vagina of a cow is known as secretion.

(5 x 1)

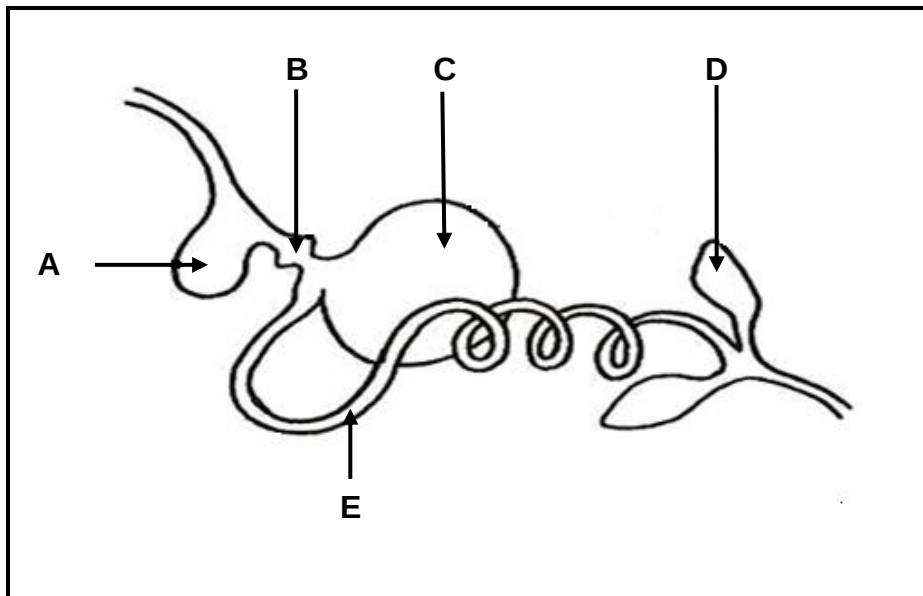
(5)

TOTAL SECTION A: 45

SECTION B**QUESTION 2: ANIMAL NUTRITION**

Start this question on a NEW page.

2.1 The diagram below shows the alimentary canal of a farm animal.



- 2.1.1 Name the farm animal represented by the alimentary canal in the diagram above. (1)
- 2.1.2 Give TWO reasons, which are visible in the diagram above, to support the answer to QUESTION 2.1.1. (2)
- 2.1.3 Indicate the pH of the contents of each of the following parts:
- (a) B (1)
- (b) E (1)
- 2.1.4 State TWO important digestive functions of the substance secreted in part B. (2)
- 2.1.5 Indicate the role played by part C in the digestion of food in the diagram above. (1)

2.2 Pigs that are housed inside furrowing pens with cement floors normally show a mineral deficiency.

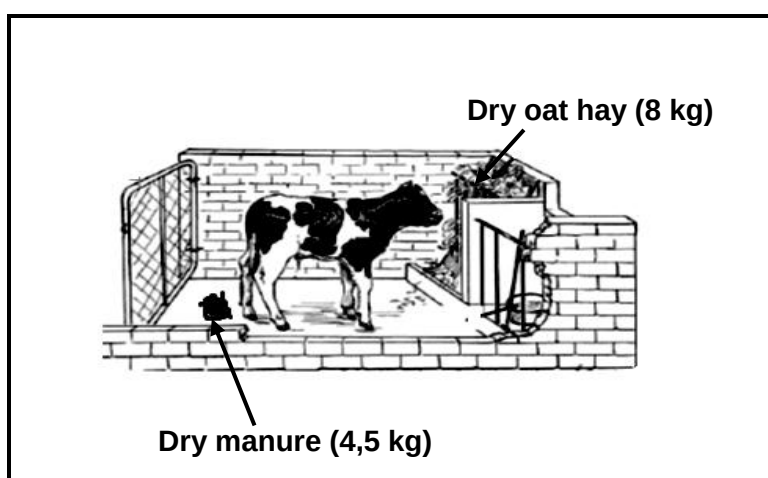
2.2.1 Name the mineral element that is deficient in these pigs. (1)

2.2.2 Indicate TWO deficiency symptoms of the mineral element named in QUESTION 2.2.1 that the pigs will show. (2)

2.2.3 State ONE method to supplement the mineral element named in QUESTION 2.2.1. (1)

2.2.4 Name the feed component that is recommended for the optimum growth of pigs. (1)

2.3 The diagram below shows a farm animal which is used in a feed trial (experiment).



2.3.1 Deduce the purpose of the feed trial above. (1)

2.3.2 Classify the feed used in this feed trial. (1)

2.3.3 Use a formula to calculate the digestibility coefficient of the feed used in the feed trial above. (Show ALL calculations.) (4)

2.3.4 Name the substance that could be added to this feed to improve each of the following:

(a) Palatability (1)

(b) Protein content (1)

2.4 A feed has a total digestible nutrient (TDN) content of 80% and a digestible protein content (DP) of 8%.

2.4.1 Calculate each of the following:

(a) The % of non-nitrogen substances in the feed (2)

(b) Nutritive ratio (NR) of this feed (use a formula) (3)

2.4.2 Name TWO components that make up the non-nitrogen content of a feed. (2)

2.5 The table below shows a feed flow plan used by a farmer.

MONTHS	QUANTITY FEED PRODUCED (kg/month)	FEED REQUIREMENT (kg/month)
1	15 000	20 000
2	20 000	20 000
3	30 000	–
4	40 000	30 000
5	45 000	40 000
6	40 000	42 000

- 2.5.1 If a farmer has 150 beef cattle and each requires 5 kg of feed a day, calculate, in tons, the total feed requirement during month 3. (Show ALL calculations). (3)
- 2.5.2 Indicate whether there will be enough feed for the cattle during month 3. (1)
- 2.5.3 Give a reason for the answer to QUESTION 2.5.2. (1)
- 2.5.4 Identify the month with the least shortage of feed. (1)
- 2.5.5 Name ONE cost effective strategy to address the shortage of feed during certain months in the table above. (1)
- [35]**

QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

Start this question on a NEW page.

- 3.1 The table below represents production output and cost distribution per animal in two feedlots.

FEEDLOT	OUTPUT PER ANIMAL	INPUT COST PER ANIMAL (FEED)	INPUT COST PER ANIMAL (OTHER)
1	R1 720	R600	R180
2	R1 680	R750	R60

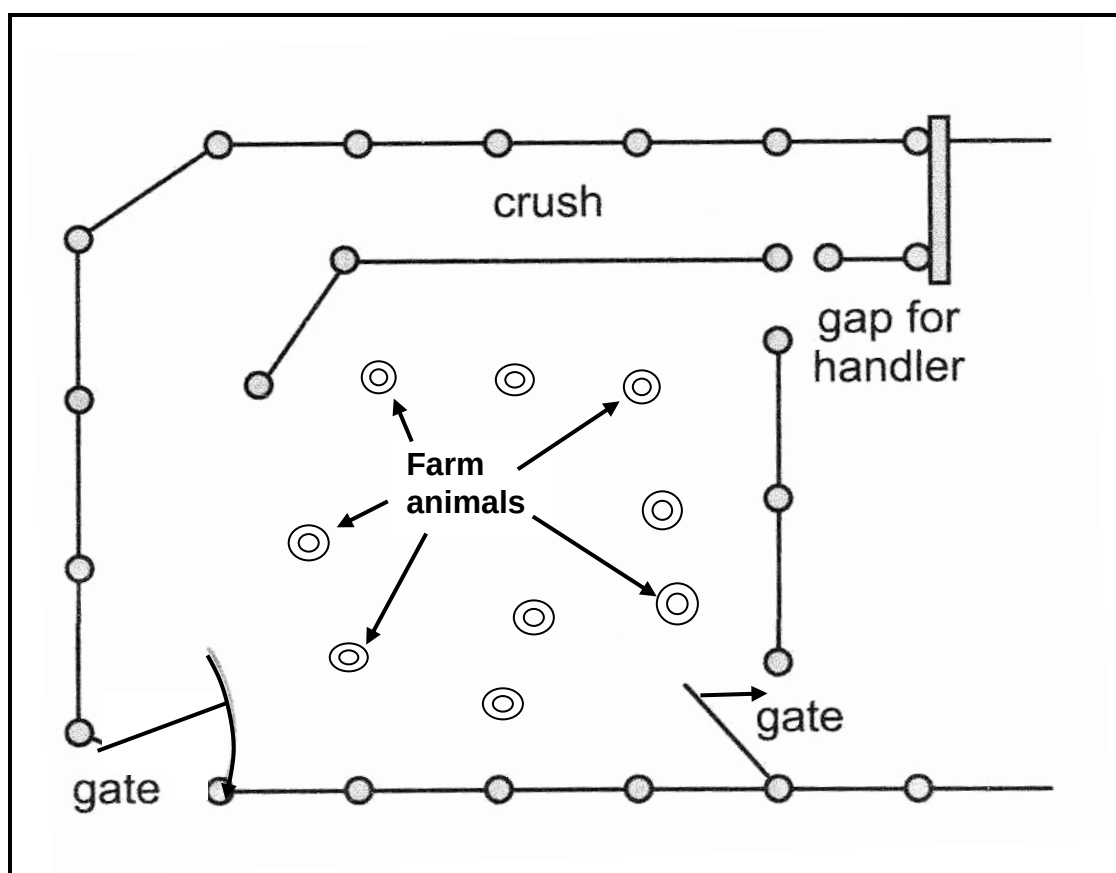
- 3.1.1 Indicate the feedlot that operates at the highest cost. (1)
- 3.1.2 Determine the feedlot that operates in the most cost-effective way. (1)
- 3.1.3 Explain the answer to QUESTION 3.1.2 by referring to the table above. (2)
- 3.2 Indicate how each of the structures below helps farm animals to survive adverse environmental conditions:
- (a) Shelter (1)
- (b) Insulation material (1)
- (c) Roofing (1)

- 3.3 The table below shows the temperature requirements of broilers at different ages.

TEMPERATURE REQUIREMENTS (°C)	AGE (WEEKS)
35	1
30	2
25	3
20	4
20	5
20	6
20	7

- 3.3.1 Identify, in the table above, the temperature requirement of broilers at the age of three weeks. (1)
- 3.3.2 Deduce, from the table above, the trend of temperature requirements of broilers over a period of 7 weeks. (2)
- 3.3.3 Use the data in the table above to draw a line graph showing the temperature requirements of broilers at different ages for the first month of growth. (6)

3.4 The illustration below represents a handling facility for farm animals.



3.4.1 Identify the part of the handling facility above that has animals inside. (1)

3.4.2 Give TWO reasons why it is important to restrain animals in a crush that is attached to the facility above. (2)

3.4.3 State TWO basic guidelines to be considered when handling cattle. (2)

3.5 The table below shows information on diseases that affect farm animals.

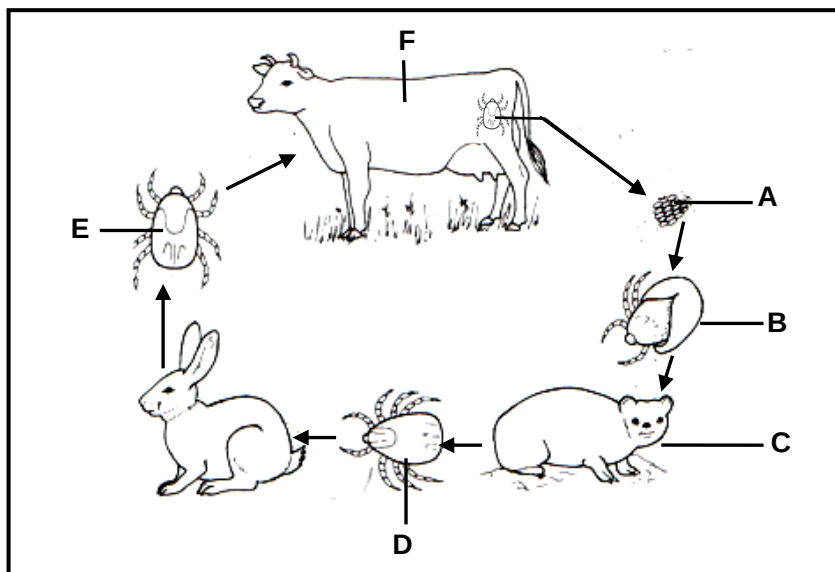
DISEASE	PATHOGENIC AGENT	KEY SYMPTOMS	TYPE OF ANIMAL AFFECTED/INFECTED
Newcastle disease	A	Respiratory distress, nasal discharge and death	Poultry
B	Bacteria	Infected udder swollen, hot and painful	Lactating farm animals
Coccidiosis	Protozoa	Diarrhoea, dehydration and weight loss	C
Lumpy wool	Fungus	D	Sheep

3.5.1 Complete the table above by providing the missing information for **A**, **B**, **C** and **D**. (4)

3.5.2 Name TWO preventative measures to reduce the spread of Newcastle disease. (2)

3.5.3 Give TWO financial implications of animal diseases. (2)

- 3.6 The diagram below indicates various stages of the life cycle of a parasite in farm animals.



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 that hatches from the egg (1)
- (b) The nymph that will feed on the second host (1)
- (c) The tick that will feed on the third host (1)
- (d) The first host after the larvae stage (1)

- 3.7 Metallic salts can be toxic and poisonous if consumed in excess by farm animals. Precautionary measures should be taken to avoid the risk of poisoning.

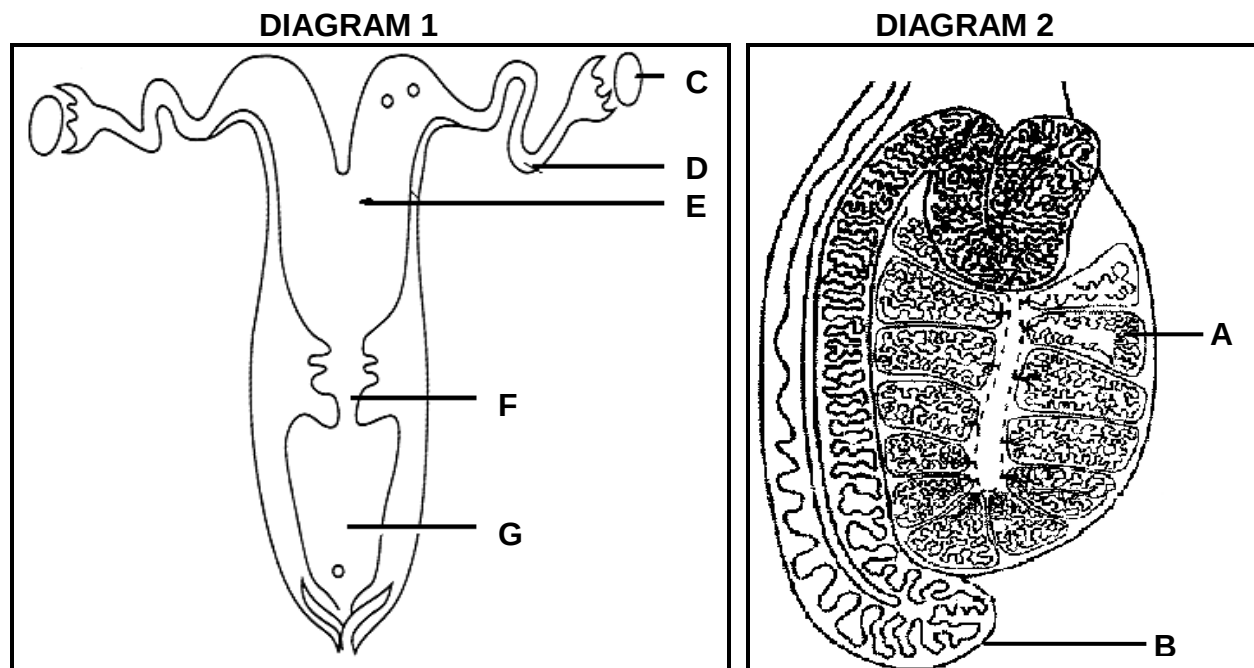
Indicate TWO symptoms of urea poisoning.

(2)
[35]

QUESTION 4 : ANIMAL REPRODUCTION

Start this question on a NEW page.

4.1 The diagrams below show the reproductive organs of farm animals.



4.1.1 Write down the letter (**A–G**) of the part in the diagrams above that is associated with EACH of the following:

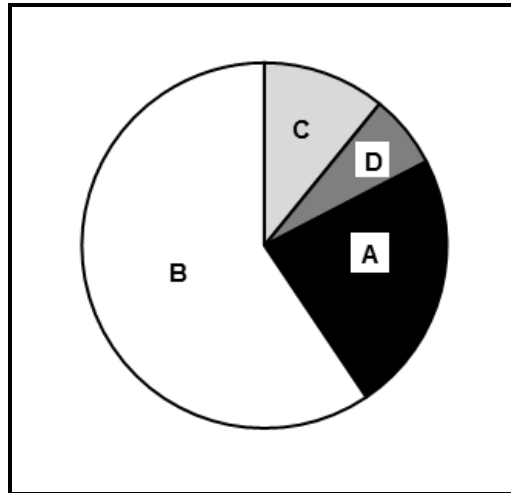
- | | |
|-------------------------------|-----|
| (a) Site of fertilisation | (1) |
| (b) Where copulation occurs | (1) |
| (c) Maturation of sperm cells | (1) |

4.1.2 Name a membrane in **E** that is responsible for the implantation of a zygote. (1)

4.1.3 Identify the part in **DIAGRAM 1** that performs a function similar to the one performed by **A** in **DIAGRAM 2**. Write down only the letter (**A–G**). (1)

4.1.4 Give TWO congenital defects that may cause sterility in **DIAGRAM 2**. (2)

4.2 The pie chart below illustrates different stages of the oestrus cycle in cows.



4.2.1 State the duration of the above cycle in cows. (1)

4.2.2 Indicate the stage of the oestrus cycle represented by each of the following letters:

(a) B (1)

(b) D (1)

4.2.3 In the pie chart above, identify the part that represents the stage of high FSH secretion. Write down only the letter (**A–D**). (1)

4.2.4 Name TWO practical methods used by dairy farmers to identify the cows in heat. (2)

4.2.5 Indicate what happens to the corpus luteum if the cow becomes pregnant. (1)

4.3 Mating behaviour in bulls is regulated by certain factors.

4.3.1 Give TWO factors that regulate mating behaviour in bulls. (2)

4.3.2 Name a chemical substance found in the urine of cows in oestrus that stimulates libido in bulls. (1)

4.4 The techniques below are used by farmers to increase the reproductive rate of farm animals:

- Cloning
- Artificial insemination
- Synchronisation of oestrus
- Embryo transfer

4.4.1 Identify a reproductive technique to which each of the following statements is applicable:

(a) Production of offspring that are genetically identical to the parent (1)

(b) Needs hormonal treatment (1)

4.4.2 Define the term *embryo transfer*. (2)

4.4.3 State TWO advantages of artificial insemination. (2)

4.4.4 Name a reproductive stage that follows immediately after successful artificial insemination. (1)

4.5 Normal presentation of the foetus before parturition is very crucial to avoid difficult birth.

4.5.1 Give the appropriate term for *difficult birth*. (1)

4.5.2 State TWO causes of difficult birth. (2)

4.5.3 Name a hormone responsible for the relaxation of the cow's muscles before parturition. (1)

4.5.4 Give THREE noticeable behavioural changes in a cow which is about to give birth. (3)

4.6 Milk production in cows is stimulated by hormones.

4.6.1 Name the hormones responsible for each of the following:

(a) Milk production (1)

(b) Milk release (1)

4.6.2 Indicate TWO stimuli that enhance the release of milk. (2)

[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150