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Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P1

FEBRUARY/MARCH 2012

MARKS: 150

TIME: 2½ hours

This question paper consists of 15 pages and 1 answer sheet.

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. SECTION A (QUESTION 1) must be answered on the attached ANSWER SHEET.
3. SECTION B (QUESTIONS 2 to 4) must be answered in the ANSWER BOOK.
4. Start EACH question from SECTION B on a NEW page.
5. Read ALL the questions carefully and answer only what is asked.
6. Number the answers correctly according to the numbering system used in this question paper.
7. Place your ANSWER SHEET for SECTION A (QUESTION 1) inside your ANSWER BOOK.
8. Non-programmable calculators may be used.
9. 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 make a cross (X) in the block (A–D) next to the question number (1.1.1–1.1.10) on the attached ANSWER SHEET. NO marks will be allocated if more than one cross (X) appears for an answer.

Example:

1.1.11	<input checked="" type="checkbox"/>	B	C	D
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- 1.1.1 Cellulase is an enzyme that is found in the rumen of a ...
- A horse.
 - B fowl.
 - C pig.
 - D goat.
- 1.1.2 Osteomalacia is caused by a deficiency of ... in the animal body.
- A calcium
 - B iron
 - C copper
 - D zinc
- 1.1.3 ... is linked to a shortage of vitamin B₂ in the ration of chickens.
- A Anaemia
 - B Curled toe paralysis
 - C Night blindness
 - D Osteoporosis
- 1.1.4 ... is a process that requires energy for the absorption of nutrients into the animal body.
- A Diffusion
 - B Osmosis
 - C Passive absorption
 - D Active absorption
- 1.1.5 The ... is responsible for the grinding of food by means of small stones found in it.
- A crop
 - B ventriculus
 - C proventriculus
 - D caecum

1.1.6 Milk production is a process that follows a series of actions until milk is released from the teat opening. Select the correct order of these events given below:

- A Alveoli → gland cavity → milk tubes → teat cavity
- B Milk tubes → alveoli → gland cavity → teat cavity
- C Alveoli → milk tubes → gland cavity → teat cavity
- D Gland cavity → alveoli → milk tubes → teat cavity

1.1.7 A feeding approach where farm animals have unlimited access to roughages or licks:

- A Ad lib
- B Dosing
- C Soil sod
- D Injections

1.1.8 Which ONE of the following is INCORRECT with respect to the precautions that need to be considered when livestock is transported to an abattoir?

- A Different types of animals should NOT be transported together.
- B Pregnant and injured animals should NOT be transported.
- C Animals of different ages and sexes should NOT be transported together.
- D Air and light should NOT be allowed to enter the part of the truck where animals are kept.

1.1.9 Animals are likely to react unpredictably when they are ...

- A treated in a familiar manner.
- B moved in a group.
- C in a peaceful environment.
- D whipped.

1.1.10 Shelter used for the most cost-effective production output is essential for ...

- A selective production.
- B minimum production.
- C optimal production.
- D average production.

(10 x 2) (20)

- 1.2 In the table below a description and TWO possible answers are given. Decide whether the description in COLUMN B relates to A only, B only, both A and B or NONE of the answers in COLUMN A and make a cross (X) in the block (A–D) next to the question number (1.2.1–1.2.5) on the attached ANSWER SHEET.

Example:

COLUMN A		COLUMN B
A:	heartwater	a tick-borne disease transmitted by the blue tick
B:	redwater	

Answer:

The statement refers to:			
ONLY A	ONLY B	A AND B	NONE
A	B	C	D

COLUMN A		COLUMN B
1.2.1	A: lipase	the enzyme in the small intestines responsible for fat digestion
	B: amylase	
1.2.2	A: castration	causes infertility in farm animals
	B: congenital diseases	
1.2.3	A: balling gun	instrument used by a veterinarian to give medicine to a sick animal
	B: drenching gun	
1.2.4	A: cud	regurgitated bolus that is transported back to the mouth by means of retro-peristalsis
	B: chyme	
1.2.5	A: rigor mortis	poor meat quality due to injury caused by poor or incorrect handling of animals
	B: bruising	

(5 x 2) (10)

- 1.3 Give ONE word/term/phrase for each of the following descriptions. Write only the word/term/phrase next to the question number (1.3.1–1.3.5) on the attached ANSWER SHEET.
- 1.3.1 Roughage with a high moisture content which is mostly used as a feed source for dairy cattle
- 1.3.2 A nutrient supplement that is placed in a pasture field to provide the grazing animals with additional nutrients
- 1.3.3 A breeding system in which individuals from one breed are allowed to mate with individuals from another breed
- 1.3.4 A place in the handling facility where cattle are kept during the handling process to avoid injuries
- 1.3.5 A relatively small area where a large number of animals are kept and fed for optimal production purposes (5 x 2) (10)
- 1.4 Change the UNDERLINED WORD(S) in each of the following statements to make them TRUE. Write only the appropriate word(s) next to the question number (1.4.1–1.4.5) on the attached ANSWER SHEET.
- 1.4.1 Calcium is an essential mineral nutrient for the synthesis of vitamin B₁₂ by rumen micro-organisms.
- 1.4.2 A herd of cattle from a stud breeder, who are closely related, can be described as a heterogeneous population.
- 1.4.3 There are many exotic breeds that originate from different areas in South Africa.
- 1.4.4 Ectothermic animals maintain a constant body temperature even though the environmental temperature varies.
- 1.4.5 Commercial farming focuses on the production of farm animals for homestead use only and not for profit. (5 x 1) (5)

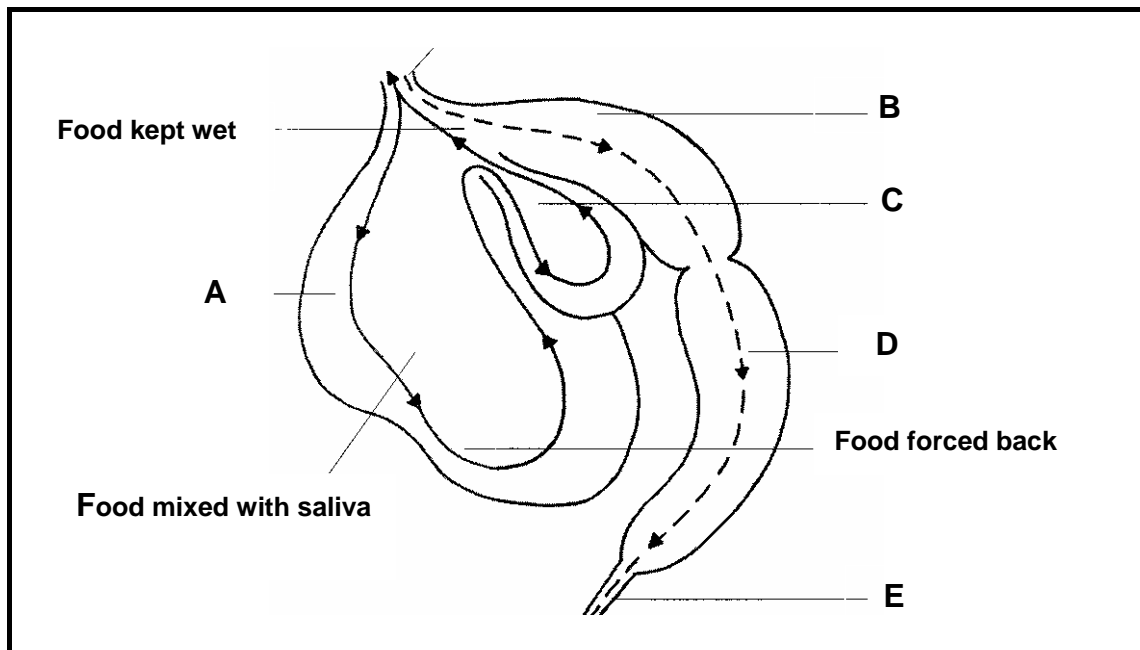
TOTAL SECTION A: 45

SECTION B

Start this question on a NEW page.

QUESTION 2: ANIMAL NUTRITION

- 2.1 The diagram below illustrates the process of rumination in the stomach of a ruminant. The arrows point out the movement of the food in the different parts of this alimentary canal.



- 2.1.1 Identify the parts labelled **A** and **B** in the stomach area illustrated above. (2)
- 2.1.2 Briefly describe the process of rumination by referring to the arrows that show the movement of food in this alimentary canal. (3)
- 2.1.3 Select a letter (A–E) of a part on the diagram that corresponds with the following descriptions:
- (a) A chamber similar to that of the non-ruminant in terms of digestive juices it secretes and the functions it performs (1)
 - (b) The compartment of this stomach that has a honeycomb patterned lining (1)
 - (c) The chamber where foreign objects like wire are lodged (1)
- 2.1.4 Name TWO functions of bacteria and protozoa in this alimentary canal. (2)

2.2 The value of a feed can be determined by calculating the digestibility coefficient. A cow ingested 15 kg of hay with a moisture content of 10% and excreted 4 kg dry material in the manure.

2.2.1 Calculate the digestibility coefficient of the hay. Show ALL your calculations. (4)

2.2.2 Define the term *digestibility of a feed*. (1)

2.2.3 Explain how the crude fibre content influences the digestibility of a feed. (2)

2.3 The table below represents the nutritional information of selected feeds.

FEED	CRUDE PROTEIN (%)	CRUDE FIBRE (%)	METABOLISABLE ENERGY (MJ/kg)
Lucerne hay	30,1	40,1	7,4
Maize meal	8,9	2,0	12,0
Silage	7,8	4,2	4,1

2.3.1 Select a feed that is most suitable for each of the following situations:

- (a) A juicy roughage for the stimulation of milk production (1)
- (b) For young growing ruminants (1)
- (c) For fattening of pigs (1)

2.3.2 The farmer wants to mix concentrates for a ration for animals with a crude protein requirement of 14%. There is sunflower oilcake meal available with a crude protein content of 38%.

Use the Pearson square method to calculate the ratio in which maize meal and sunflower oilcake meal should be mixed to meet the requirements mentioned above. (5)

2.4 The data provided in the table below relates to the biological values (BV) of feedstuffs derived from animal and plant origin, which are provided for the nutrition of growing pigs.

ANIMAL FEED	BIOLOGICAL VALUE (BV)
Fish meal	90
Soya beans	80
Wheat	60
Groundnuts	75
Maize	50
Meat meal	100

2.4.1 Briefly explain the term *biological value (BV)* of a protein. (2)

- 2.4.2 The role played by the quality of the protein in a ration for ruminants is less important than that for non-ruminant farm animals. Justify this statement. (2)
- 2.4.3 Draw a bar graph to compare the biological values of proteins for the different feedstuffs provided for the growing pigs, as shown on the table at QUESTION 2.4. (6)
- [35]

Start this question on a NEW page.

QUESTION 3: ANIMAL PRODUCTION

- 3.1 The table below represents the temperature ranges of farm animals and expected growth rates expressed as averages for their population.

GROWTH RATE (% AS COMPARED TO THE AVERAGE)		TEMPERATURE (°C)
COWS	PIGS	
110	130	35
100	90	25
90	50	15
80	25	5
70	5	0

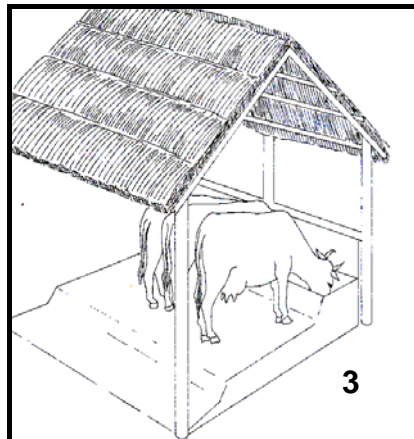
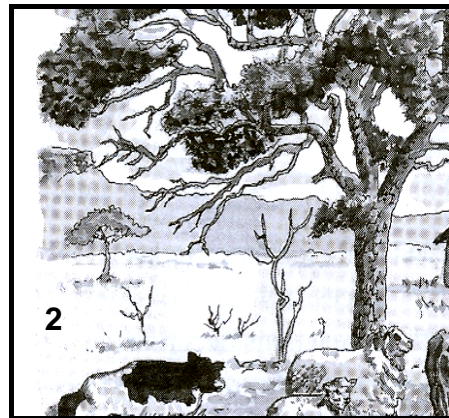
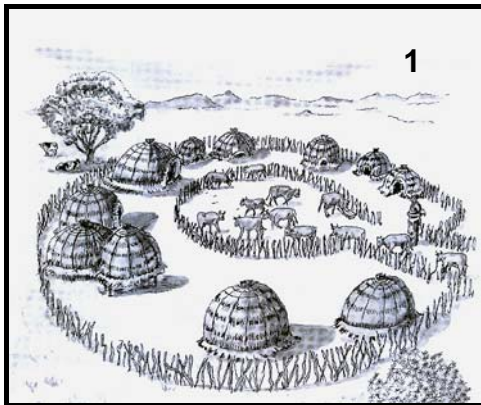
- 3.1.1 Select the type of farm animal from the table above that would require more environmental control measures under cold climatic conditions. Give a reason for your answer. (2)
- 3.1.2 Describe TWO methods to protect animals against extreme weather conditions in order to maintain optimal production levels. (2)
- 3.1.3 Discuss the advantage that the constant body temperature of a homoeothermic animal has on the metabolic rate. (2)
- 3.1.4 Cows have a better growth rate than pigs at an environmental temperature of 5 °C. Motivate this statement. (2)

3.2

In South Africa the climate for the production of farm animals varies from region to region and different regions utilise different animal breeds and systems of production. Some animals require shelter and other forms of environmental control for optimal production. Other production systems utilise vast grazing areas for animal production and rely on relevant environmental conditions.

Knowledge of animal characteristics and the expected behaviour of livestock farmers during the handling of farm animals play a significant role in determining the methods and types of production that will be used in the production process.

- 3.2.1 Name TWO main production systems commonly practised by animal producers in South Africa. (2)
- 3.2.2 Name THREE factors that farmers should take into account when deciding on the site for the construction of shelter to maximise production. (3)
- 3.2.3 State TWO factors that determine the behaviour of an animal. (2)
- 3.2.4 Name TWO characteristics or warning signs that can be displayed by animals to indicate fear, aggression and contentment, which the handler should bear in mind when working with animals. (2)
- 3.3 The diagrams below illustrate different systems of production.

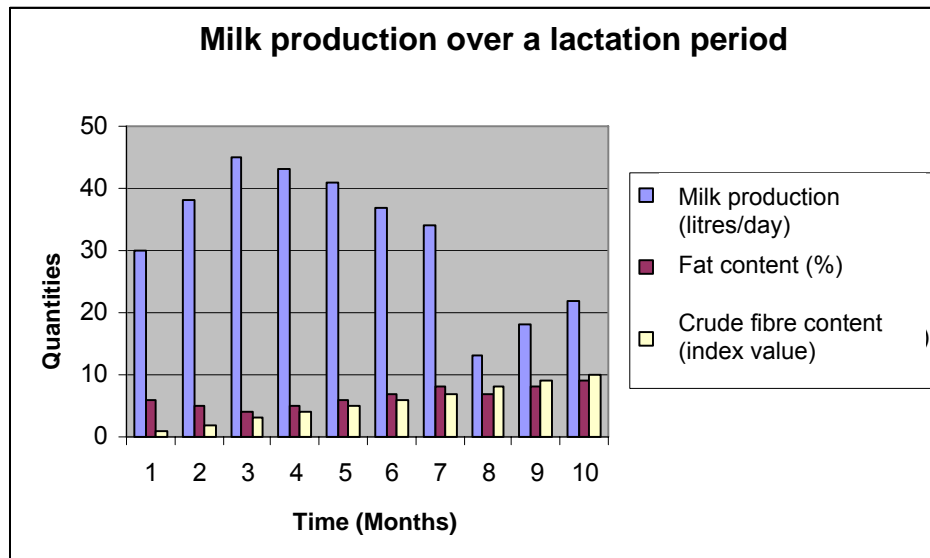


- 3.3.1 From the diagrams marked 1 to 3, select the shelters which are the most suitable for the following systems of production:
- (a) Extensive farming (1)
 - (b) Indigenous system of farming (1)
- 3.3.2 Name TWO characteristics that are normally associated with the system of production marked 2. (2)

3.3.3 Compare, in table format, the production systems marked **2** and **3** with regard to the following aspects:

- | | |
|---------------------------|-----|
| (a) Environmental control | (2) |
| (b) Drought risk | (2) |
| (c) Production output | (2) |

3.4 The graph below illustrates the effect of crude fibre on fat content and milk yields for a dairy cow.

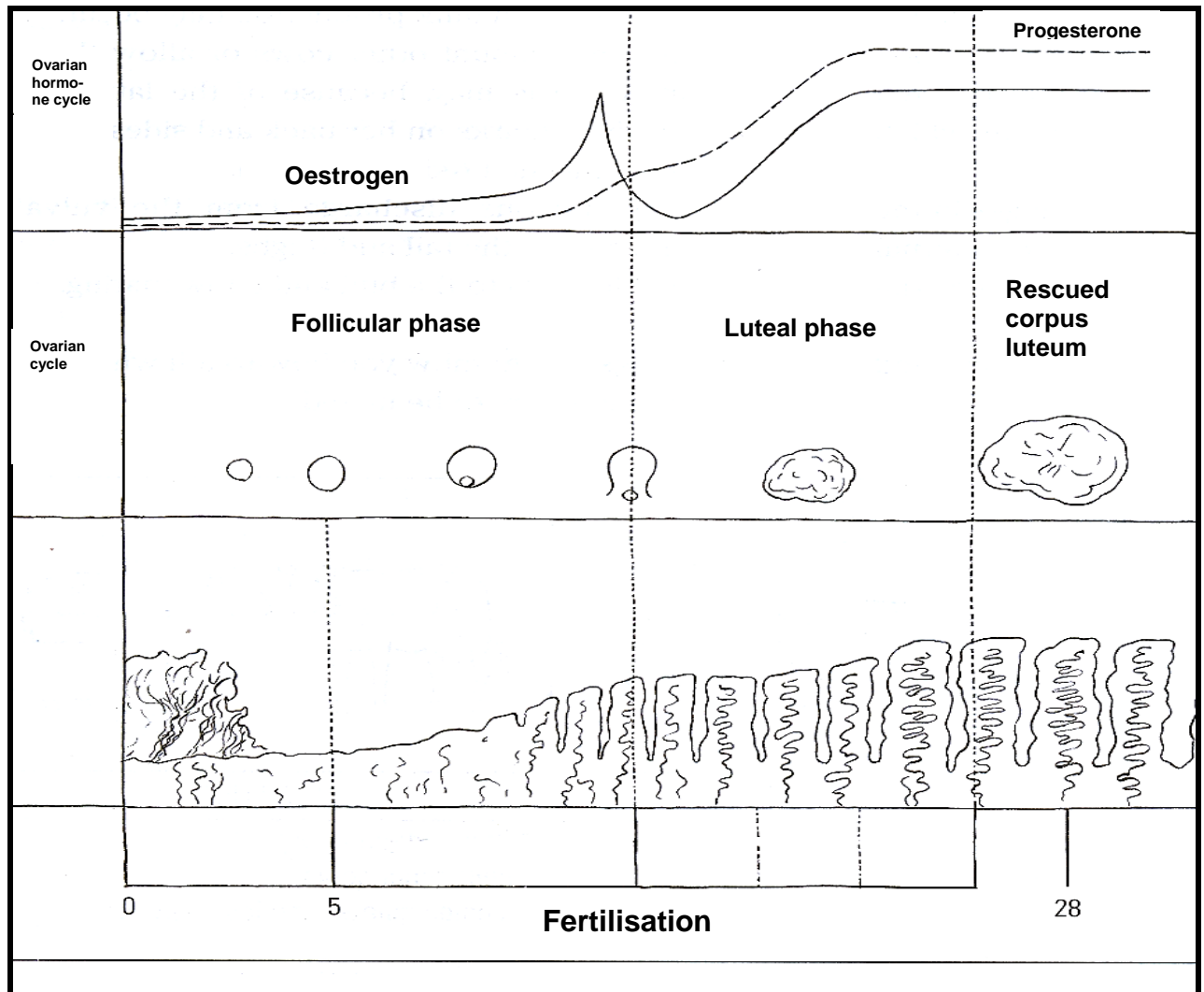


- 3.4.1 Describe the effect of the crude fibre value on the fat content of the milk from month **4** to month **7**, illustrated in the graph above. (2)
- 3.4.2 Predict the effect of crude fibre on the quantity of milk produced from month **4** to **7**. (2)
- 3.4.3 The cow did not follow a normal lactation curve and developed a disease. Identify the possible time that this cow developed this disease and give a reason to support your answer. (2)
- 3.4.4 Indicate the success of the treatment for this disease by referring to the graph above. (2)
- [35]**

Start this question on a NEW page.

QUESTION 4: ANIMAL REPRODUCTION, PROTECTION AND CONTROL

4.1 The diagram below illustrates hormone release during the oestrus cycle.



- 4.1.1 Describe THREE changes that the follicle undergoes during the oestrus cycle by referring to the diagram above. (3)
- 4.1.2 Name a function of the following hormones in the oestrus cycle:
- (a) Progesterone (1)
 - (b) Oestrogen (1)

4.2 Indicate how the following physiological factors cause infertility in farm animals:

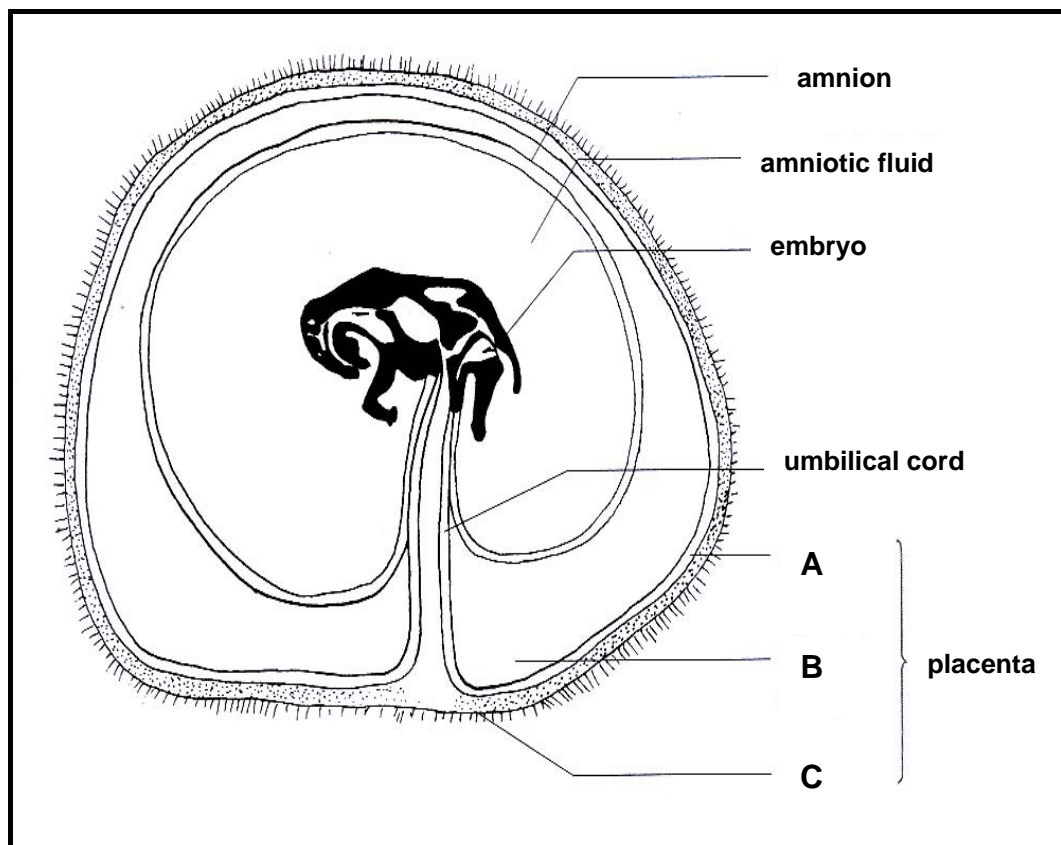
4.2.1 Anoestrus

(2)

4.2.2 Infantilism

(2)

4.3 The diagram below illustrates the development of the foetus of a cow.



4.3.1 Name the TWO parts labelled **A** and **C** that form part of the placenta.

(2)

4.3.2 Identify the conditions that may occur if the following are experienced:

(a) When the fluids from the foetus are all resorbed and the foetus becomes dry and hard

(1)

(b) The foetus dies and the softer tissues decay, leaving hard tissues behind

(1)

4.4 South Korean animal rights activists, wearing livestock masks, mounted a protest because of foot-and-mouth disease and bird flu in Seoul, South Korea. Since November 2010 Korea has killed more than 1,93 million livestock when the first outbreak of the disease was reported several months ago.

[Adapted from *Cape Times*, 24 January 2011]

- 4.4.1 Indicate why foot-and-mouth disease is such a threatening disease. (1)
- 4.4.2 Describe TWO control measures to prevent the spread of this disease. (2)
- 4.4.3 Indicate THREE main types of livestock affected by foot-and-mouth disease. (3)
- 4.4.4 Describe THREE symptoms of foot-and-mouth disease. (3)
- 4.5 The picture below illustrates a product that controls ticks.

RESISTANCE BREAKER

What is resistance?

- The ability of the tick to resist the effect of the chemical active used against it
- Resistance is genetically inheritable

How does resistance develop?

- Repeated use of a specific chemical
- Insufficient strength of a dip mixture
- Genetic mutations of the parasite

Not seeing it, does NOT mean it is not there!

- **March/April** – *Critical*, more adult ticks are treated so that fewer eggs are viable in the upcoming season,
- **September/October** – *Critical*, more larvae and nymph stages are treated and are prevented from reaching the adult stage,
- **December/January** – *Additional, optional* treatment for areas with extreme tick activity.

Registration Holder: Bayer (Pty) Ltd., Animal Health Division
Co. Reg. No. 1968/011192/07

- 4.5.1 Briefly describe how the tick-control measure in the picture above works. (2)

- 4.5.2 Suggest TWO measures that farmers can put in place to prevent ticks from developing resistance to the miticide/acaricide. (2)
- 4.5.3 State TWO ways in which animal breeders and cattle farmers can deal with tick resistance that is genetically inherited. (2)
- 4.5.4 Identify the critical stage of the life cycle of ticks where the eggs are viable. (1)
- 4.5.5 Name TWO ways of controlling this pest in grazing camps. (2)
- 4.6 Internal parasites cause huge economic losses to livestock production in South Africa.
- 4.6.1 Name TWO common symptoms of farm animals that are infected with internal parasites. (2)
- 4.6.2 Indicate TWO environmental conditions that exist in camps that are being used by animals that will contribute to a higher internal parasite infestation rate. (2)
- [35]**
- TOTAL SECTION B: 105**
GRAND TOTAL: 150

ANSWER SHEET**SECTION A****CENTRE NUMBER:**

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EXAMINATION NUMBER:

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QUESTION 1.1

1.1.1	A	B	C	D
1.1.2	A	B	C	D
1.1.3	A	B	C	D
1.1.4	A	B	C	D
1.1.5	A	B	C	D
1.1.6	A	B	C	D
1.1.7	A	B	C	D
1.1.8	A	B	C	D
1.1.9	A	B	C	D
1.1.10	A	B	C	D

(10 x 2) (20)

QUESTION 1.2

	ONLY A	ONLY B	A AND B	NONE
1.2.1	A	B	C	D
1.2.2	A	B	C	D
1.2.3	A	B	C	D
1.2.4	A	B	C	D
1.2.5	A	B	C	D

(5 x 2) (10)

QUESTION 1.3

- 1.3.1 _____
- 1.3.2 _____
- 1.3.3 _____
- 1.3.4 _____
- 1.3.5 _____

(5 x 2) (10)

QUESTION 1.4

- 1.4.1 _____
- 1.4.2 _____
- 1.4.3 _____
- 1.4.4 _____
- 1.4.5 _____

(5 x 1) (5)

TOTAL SECTION A: 45