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basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P1

NOVEMBER 2012

MARKS: 150

TIME: 2½ hours

This question paper consists of 17 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. Show ALL your calculations.
10. 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"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
---------------------------------------	----------------------------	----------------------------	----------------------------

- 1.1.1 The part of the alimentary canal of a fowl that is responsible for storing, moistening and softening food is the ...
- A proventriculus.
 - B gizzard.
 - C ventriculus.
 - D crop.
- 1.1.2 The process whereby food is pushed through the alimentary canal by waves of contraction and relaxation of muscles is known as ...
- A rumination.
 - B digestion.
 - C peristalsis.
 - D absorption.
- 1.1.3 The palatability and digestibility of a low-grade roughage for a ruminant can be improved by ...
- A supplementing it with molasses.
 - B adding cellulose.
 - C supplementing it with teff hay.
 - D supplementing it with non-nitrogenous substances.
- 1.1.4 A shortage of iron in the bodies of farm animals leads to a condition known as ...
- A goitre.
 - B anaemia.
 - C parakeratosis.
 - D pica.

1.1.5 An indication of heat stress in pigs is ...

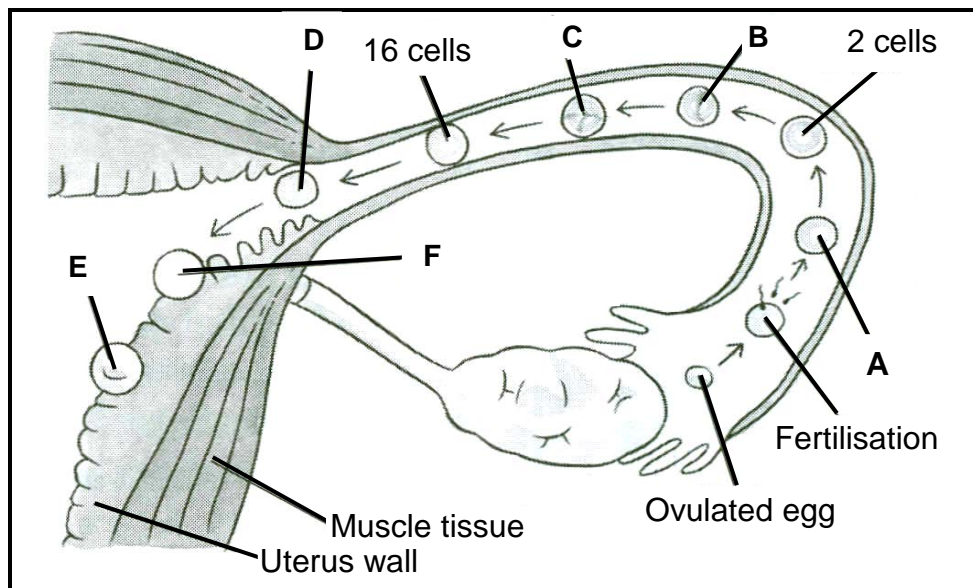
- A screaming.
- B a higher respiratory rate.
- C shivering.
- D hyperactivity.

1.1.6 The farm housing structure below shows a shed that houses a large number of beef cattle. It is normally designed to protect these animals from ...



- A uncontrolled mating.
- B adverse environmental conditions.
- C infectious diseases.
- D internal parasites.

- 1.1.7 The diagram below illustrates the route of an egg cell from fertilisation to implantation.



The differentiation of cells into tissues and organs occurs in the stage indicated by ...

- | | |
|---|----|
| A | D. |
| B | C. |
| C | B. |
| D | A. |

- 1.1.8 A visible sign shown by a cow that is about to give birth:

- | | |
|---|--|
| A | Searches for a bull |
| B | Attempts to urinate and defecate more frequently |
| C | Prefers feeding on concentrates |
| D | Stays with the calves |

- 1.1.9 Parasites in the alimentary canals of farm animals that are responsible for a shortage of red blood cells are ...

- | | |
|---|-------------|
| A | blowflies. |
| B | mites. |
| C | ticks. |
| D | roundworms. |

1.1.10 The disease in farm animals that leads to aggressive behaviour, frequent bellowing, excessive salivation and paralysis of the hindquarters is ...

- A bluetongue.
- B bird flu.
- C foot-and-mouth disease.
- D rabies.

(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 appropriate block next to the question number (1.2.1–1.2.5) on the attached ANSWER SHEET.

Example:

COLUMN A		COLUMN B
A	maize meal	an example of a concentrate that is rich in protein
B	bone meal	

Answer:

The statement refers to:			
A only	B only	A and B	None
	X		

COLUMN A			COLUMN B
1.2.1	A	dosing	method to supplement deficient minerals in farm animals
	B	injections	
1.2.2	A	nutrition	aspects used to manage the health of farm animals for optimal production in intensive production units
	B	hygiene	
1.2.3	A	corpus luteum	necessary for the formation of the Graafian follicles in cows
	B	progesterone	
1.2.4	A	ovulation	release of female reproductive cells for fertilisation
	B	gestation	
1.2.5	A	flush feeding	supplementary feeding that promotes the ovulation rate
	B	concentrate feeding	

(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) on the attached ANSWER SHEET.
- 1.3.1 A vitamin needed for the normal absorption of calcium and phosphorus from the gastrointestinal tract
- 1.3.2 The collective name for the finger-like projections in the rumen of farm animals
- 1.3.3 The process during which ground lucerne is compressed
- 1.3.4 A long, thin tube used to deposit semen into the uterus of female animals during artificial insemination
- 1.3.5 A preventative measure whereby sick animals with contagious diseases are kept away from the herd to prevent the spread of diseases (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 Micro-organisms in the abomasum hydrolyse proteins to form peptides, amino acids and ammonia.
- 1.4.2 A production ration is the quantity of feed necessary to sustain the body mass and composition of farm animals.
- 1.4.3 Metestrus (Metestrus) is the longest period of the oestrus cycle that allows for the development of the corpus luteum.
- 1.4.4 Toxins are chemicals produced in the animal body to provide protection from diseases.
- 1.4.5 Milk fever is a metabolic disease that can be controlled with iron supplements. (5 x 1) (5)

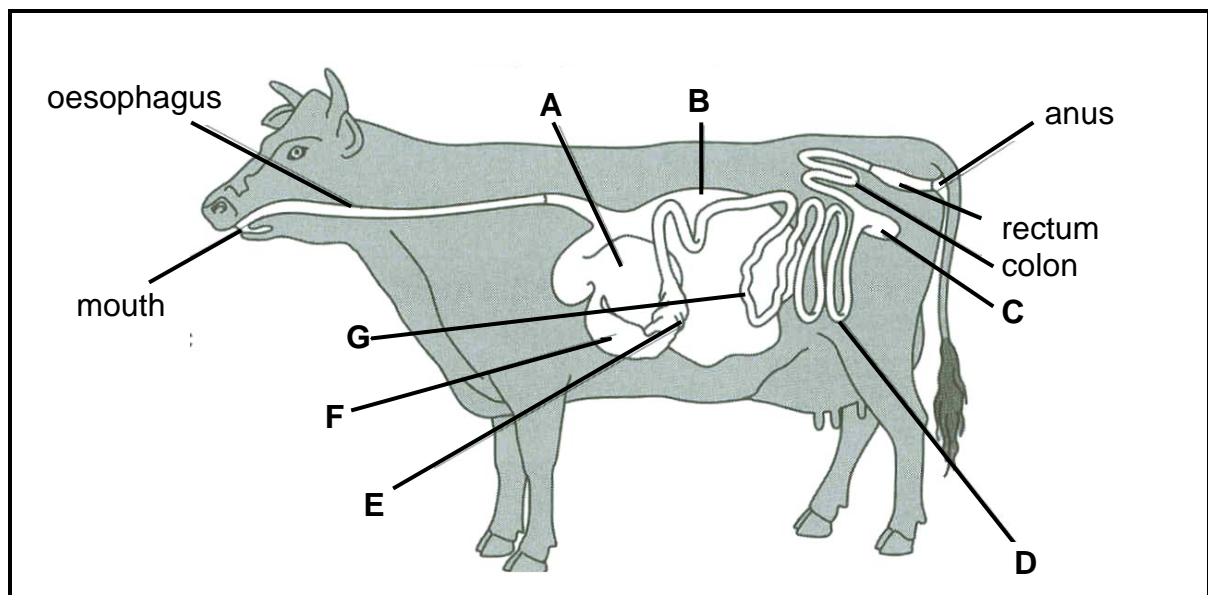
TOTAL SECTION A: 45

SECTION B

Start this question on a NEW page.

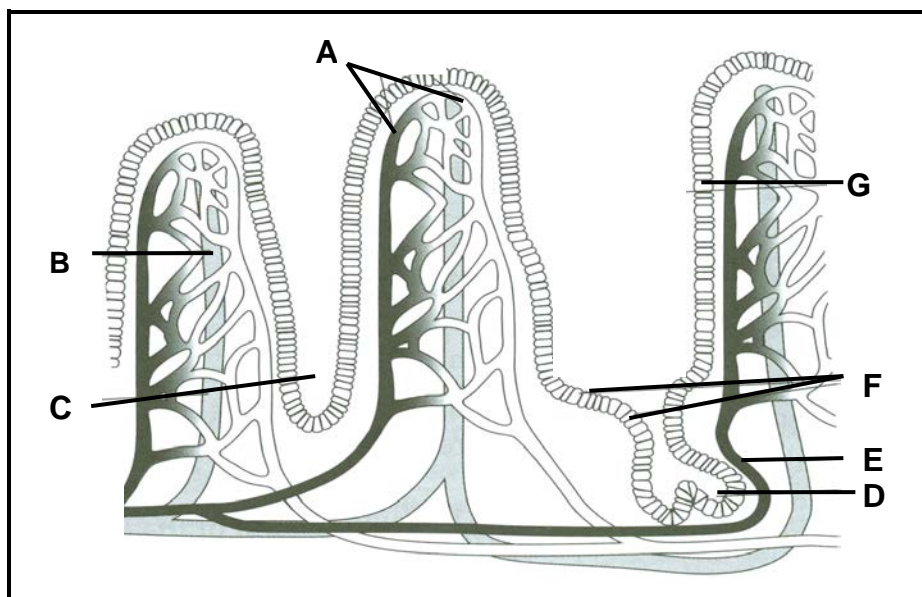
QUESTION 2: ANIMAL NUTRITION

2.1 The diagram below illustrates the digestive system of a ruminant.



- 2.1.1 Select THREE labelled parts that constitute the forestomach of ruminant animals. (3)
- 2.1.2 State TWO ideal conditions required for microbial activity in the ruminant stomach. (2)
- 2.1.3 Describe TWO functions of micro-organisms in the digestive system of ruminants. (2)
- 2.1.4 Enzymatic digestion of feed occurs in the true stomach of a ruminant animal. Give a reason to support this statement. (2)
- 2.1.5 Name a part in the digestive system of a fowl that is adapted to perform the same function as the true stomach of ruminant animals. (1)

2.2 The structure below represents a cross section of a villus.



2.2.1 Name a part in the alimentary canal where the structure illustrated above is found. (1)

2.2.2 Name the main nutrients absorbed by parts **A** and **B**. (2)

2.2.3 Describe how the villus is suited to its function of absorption. (2)

2.3

Vitamin A is produced by ruminant animals such as cattle, sheep and goats from a pigment found in green grass and stored in the liver. When no green grass is available during the dry period, the animals will use the vitamin A stored in the liver. It is thus advisable to supplement it during winter in a summer-rainfall area.

[Source: *Farming SA*, September 2011]

2.3.1 Indicate a season of the year when vitamin A is mainly supplemented and support your answer by referring to the data given in the passage above. (2)

2.3.2 Name TWO methods used to supplement vitamin A. (2)

2.4

The digestibility coefficient of a feed is that portion of the feed that is taken in by the animal, digested, absorbed and used for body functions. It is not excreted in the manure and is expressed as a percentage of dry matter. A cow eats 30 kg of concentrate with a moisture content of 10% and 16 kg material is excreted in the manure with a moisture content of 35%.

2.4.1 Use an appropriate formula to calculate the digestibility coefficient of this feed. Show ALL your calculations. (5)

2.4.2 Explain how the quantity of feed taken in can affect the digestibility of a feed. (2)

2.5 A cow was given a feed with a total digestible nutrient (TDN) value of 75% and a digestible protein (DP) value of 20%. Calculate the following:

2.5.1 The percentage of digestible non-nitrogenous substances of this feed (1)

2.5.2 The nutritive ratio (NR) of this feed (2)

2.6 As an animal nutritionist on a dairy farm, you are required to compile a balanced ration for lactating cows using the following feeds:

REQUIRED DIGESTIBLE PROTEIN VALUE (DP)	FEED	DIGESTIBLE PROTEIN VALUE (DP) %
16%	A	14
	B	21

2.6.1 Determine the ratio required for each feed by using the Pearson square method. (3)

2.6.2 Calculate the percentage of feed B that should be added to the feed mixture to get the desired digestible proteins in the ration of the cows. Show ALL your calculations. (3)
[35]

Start this question on a NEW page.

QUESTION 3: ANIMAL PRODUCTION

3.1

ANGORA FARMERS COUNT THEIR LOSSES

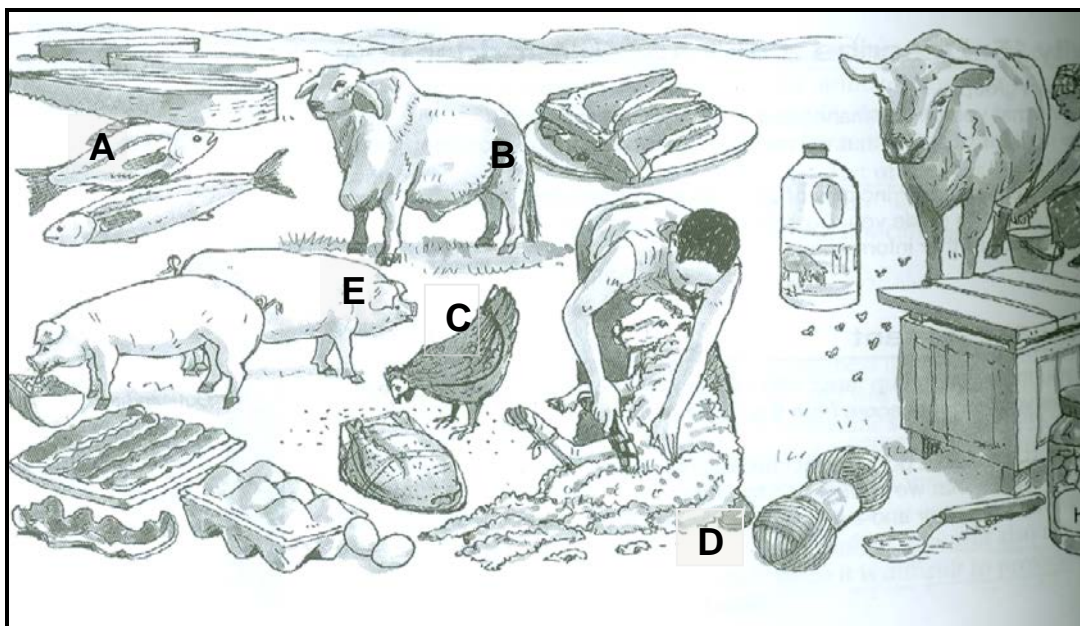
Four thousand Angora goats died in the cold and wet conditions in the Rietbron and Willowmore areas in July. The newborn animals could not withstand the bitter cold, strong winds and rain. It was not only the loss of animal progeny, but mohair was also lost.

With the assistance of the agricultural extension officer, the farmers were subsidised to build shelters that had special insulation material, foldable walls and heaters.

[Adapted from *Farmer's Weekly*, 12 August 2011]

- 3.1.1 Name the production system practised by the farmers before the cold period in July. Give a reason your answer. (3)
- 3.1.2 Explain why the above-mentioned solution by the extension officer is recommended for these goats in relation to the following:
- (a) Shelter (2)
 - (b) Insulation material (2)
 - (c) Heaters (2)
- 3.1.3 Discuss the necessity of a subsidy (money given by government) to assist the farmers in the passage above. (2)

- 3.2 The pictures below represent agricultural production. Different groups of farm animals are represented by the letters A to E.



- 3.2.1 Identify TWO primary products obtained from farm animals in the picture above. (2)
- 3.2.2 Comment on optimising the production of farm animal **C** with regard to: (2)
- (a) Space requirements (2)
 - (b) Feeding facilities (2)
- 3.2.3 Compare the handling facilities that could be used for farm animal **B** to those of farm animal **D**. (4)

3.3

Cattle become nervous and wild when exposed to incorrect handling. They can learn to trust and tolerate people if they are treated with understanding and gentleness. Cattle that stress easily are also more likely to have poor quality carcasses that are usually discounted or condemned. Good management can calm wild and stress-prone cattle that produce dark and poor carcasses.

[Adapted from *Farmer's Weekly*, 1 May 2009]

- 3.3.1 Identify TWO behavioural patterns of cattle that are not properly handled. (2)
- 3.3.2 Name TWO economic benefits of good cattle management. (2)

3.4

Research revealed that in the past sheep had lean meat with fat concentrated in certain parts of the body, because these animals adapted themselves to the hardy African conditions. This concentration of fat in certain parts of the body helped with the release of excess body heat in hot conditions. A number of these animal breeds still exist today, for example Blackhead Persian sheep.

Modern farming practices ensure that the fat layer becomes more evenly distributed in the body. These practices lead to a better carcass quality.

The table below represents the body fat concentration of a mutton sheep breed as measured by a commercial livestock breeder:

YEARS	BODY FAT CONCENTRATION (HINDQUARTER) (g/100 g)
1960	30
1970	25
1980	20
1990	15
2000	10
2010	5

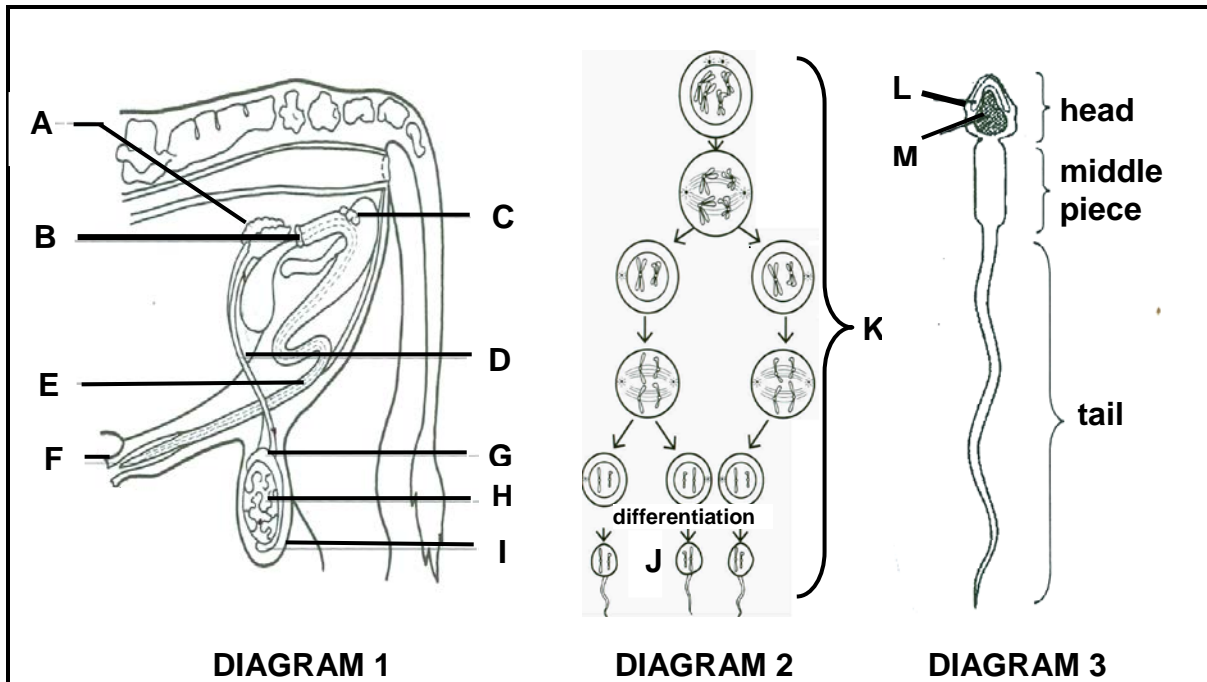
- 3.4.1 Explain why breeders aim at producing meat with more even fat distribution. (2)
- 3.4.2 Draw a line graph of the total fat content measured over a period of 50 years using the data in the table above. (The x -axis represents the year and the y -axis the fat content.) (6)
- 3.4.3 Describe the trend in fat distribution over a 50-year period evident from the graph. (2)

[35]

Start this question on a NEW page.

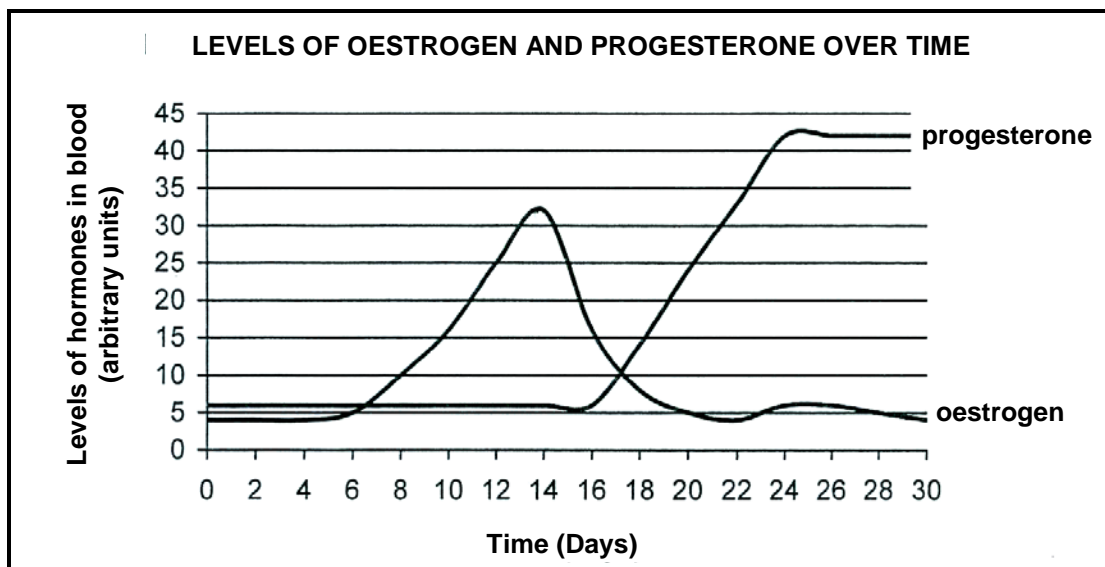
QUESTION 4: ANIMAL REPRODUCTION, PROTECTION AND CONTROL

- 4.1 The diagrams below represent the reproductive organs of a bull, the processes of sperm formation and the development in the sex cells.



- 4.1.1 Name parts **A**, **B**, **C** and **H**. (4)
- 4.1.2 Identify process **K**. (1)
- 4.1.3 State ONE function each of parts **D** and **L**. (2)
- 4.1.4 Describe how congenital defects can influence the process in DIAGRAM 2. (2)
- 4.1.5 Give a reason why part **H** in DIAGRAM 1 is situated outside the abdominal cavity of a male animal. (1)

- 4.2 The graph below shows the levels of two hormones, namely oestrogen and progesterone in a cow that became pregnant.



- 4.2.1 Identify the times when the levels of oestrogen and progesterone are equal. (2)
- 4.2.2 Indicate the level of oestrogen in the blood on day 14. (1)
- 4.2.3 Give evidence from the graph that suggests that an ovum was fertilised. (2)
- 4.2.4 Explain TWO effects that the peak period of oestrogen has on the animal. (2)
- 4.2.5 What would happen to the corpus luteum if this cow was not pregnant? (1)

- 4.3 The passage below deals with the infestation of bont ticks in livestock.

THE TICK CHALLENGE IN LIVESTOCK

Ticks play an important role as transmitters of diseases in animals, the type of which depends on the species of tick in question. Diseases such as redwater, gall sickness and heartwater are all acquired via tick bite and subsequent injection of the parasite that enters the bloodstream and causes the disease in the host animal. Production losses occur as a result of such tick-borne diseases by way of underperformance or even death of the infected animals.

Ticks with long mouth parts often create an opening in the skin of an animal that allows for the introduction of bacteria to deeper layers beneath the skin. This results in a loss of tail tips or ear lobes in cattle. In the eastern coastal regions of Southern Africa, the bont tick challenge has led to a loss of teat function in cows as a result of mastitis and abscesses in the udder.

[Source: *Farming SA*, September 2011]

- 4.3.1 Give TWO reasons why ticks are the most economically significant parasites in livestock farming by referring to the passage. (2)
- 4.3.2 Classify the bont tick according to its life cycle and give a reason to support your answer. (2)
- 4.3.3 Give a possible reason for a serious bont tick outbreak in the coastal region. (2)
- 4.3.4 Many fly species are also external parasites that bite and suck blood from their host. Name a fly species that attacks open wounds and tick bites in wool sheep breeds. (1)
- 4.3.5 Name TWO biological methods of controlling ticks. (2)
- 4.4 Livestock diseases can be caused by a number of disease-carrying agents and have a negative impact on the economy of the country. To prevent these losses a farmer must develop a vaccination plan suitable for his environment.

The following table shows only a part of a sheep vaccination plan.

MONTHS	SEASON	STAGE	HEALTH CARE ACTIVITY
September October November	Spring	Lamb	<ul style="list-style-type: none"> Vaccinate against bluetongue after the lambing season. Place an order for pulpy kidney vaccine.
December January February	Summer	Weaners	<ul style="list-style-type: none"> Vaccinate lambs against pulpy kidney (give booster dose three weeks later) and bluetongue. Place an order for enzootic abortion vaccine for ewes.
March April May	Autumn		<ul style="list-style-type: none"> Vaccinate ewes against enzootic abortion before the mating season. Place an order for bluetongue vaccine for rams.

- 4.4.1 From the data above, identify the stage when the vaccine for pulpy kidney was administered. (1)
- 4.4.2 Identify the minimum time in months that the lambs are kept with the ewes before they are removed. (1)
- 4.4.3 Why is it important to vaccinate ewes before the mating season? (2)

4.4.4 Explain how the State assists the farmer in the following:

- (a) Quarantine services (2)
- (b) Veterinary research (2)
- [35]**

TOTAL SECTION B: 105
GRAND TOTAL: 150

ANSWER SHEET**CENTRE NUMBER:**

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EXAMINATION NUMBER:

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SECTION A**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

	A only	B only	A and B	None
1.2.1				
1.2.2				
1.2.3				
1.2.4				
1.2.5				

(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