



education

Department:
Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

AGRICULTURAL SCIENCES P2

NOVEMBER 2008

MARKS: 150

TIME: 2 hours

This question paper consists of 20 pages and a 1-page answer sheet.

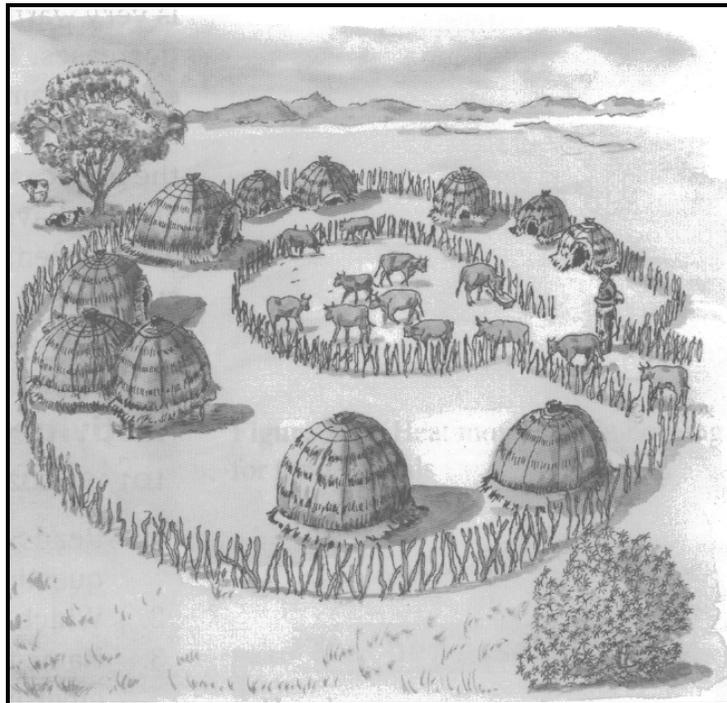
INSTRUCTIONS AND INFORMATION

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 in SECTION B on a NEW page.
5. Number the answers correctly according to the numbering system used in this question paper.
6. Read the questions carefully and make sure you answer only what is asked.
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 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 awarded if more than one cross (X) appears for an answer.

1.1.1 The diagram below represents the layout of a typical homestead of indigenous people from South Africa. The main reason for keeping their cattle at the centre of the homestead was for ...



- A easy access to a protein source as food.
- B traditional reasons and therefore not to anger their ancestors.
- C easier handling and collection by the herd boy of the village (kraal).
- D protection against predators and other dangers.

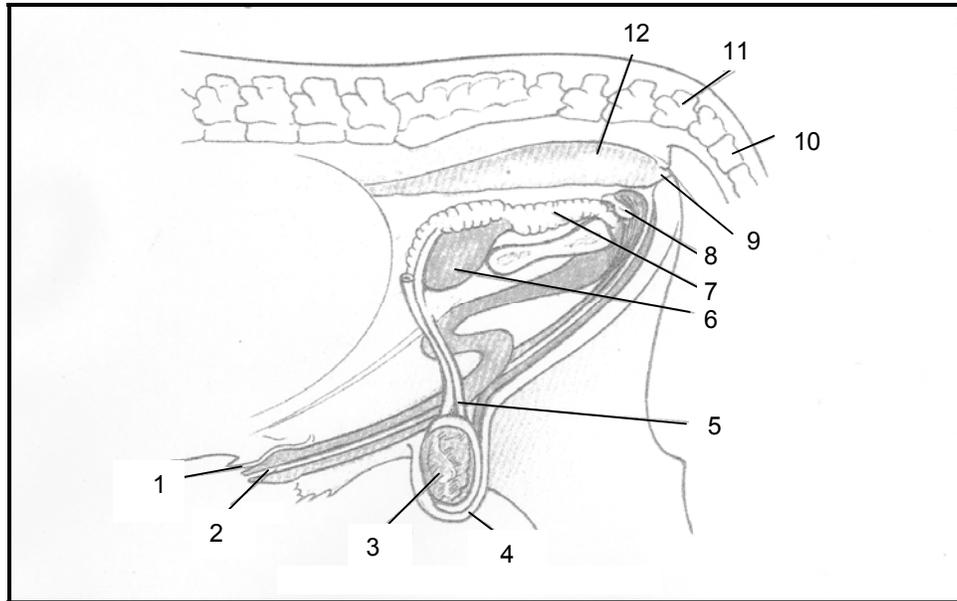
1.1.2 A product of cellulose fermentation in the rumen of a ruminant animal is ...

- A glycerol.
- B amino acid.
- C carbonic acid.
- D acetic acid.

1.1.3 A maintenance ration is the quantity of nutrients an animal requires mainly to ...

- A support life as well as for production.
- B support life.
- C support life, for production and for work.
- D support production.

QUESTIONS 1.1.4 to 1.1.5 relate to the illustration below.



1.1.4 The primary reproductive organ of the bull in the diagram above is numbered ...

- A 1.
- B 3.
- C 5.
- D 7.

1.1.5 The reproductive organ mentioned in QUESTION 1.1.4 is called the primary reproductive organ because it ...

- A produces the carrier fluid for spermatozoa.
- B produces spermatozoa and testosterone.
- C is the largest of the sex organs.
- D secretes all the sex hormones.

1.1.6 The Marketing Act of 1968 was developed to control the movement and the pricing of agricultural produce. Choose from the list below the advantages of controlled marketing:

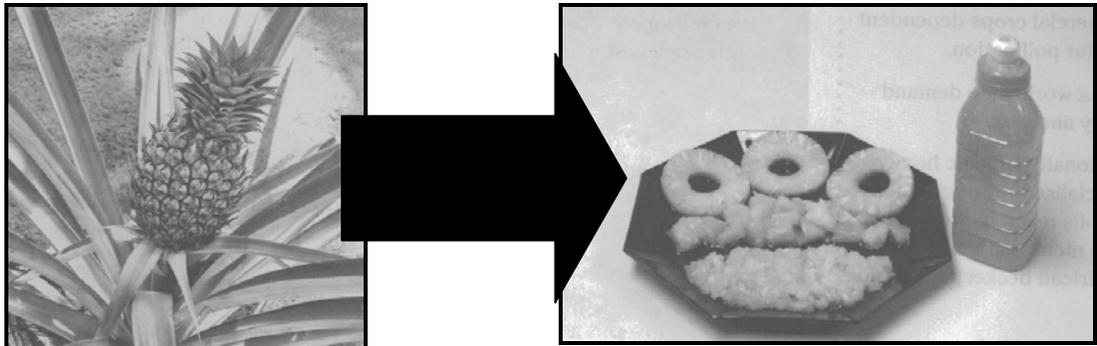
- i Consumers end up paying a largely inflated price for food
- ii Secures stable prices
- iii Creates secure market outlets
- iv Larger enterprises obtain international contracts

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

1.1.7 A farmer must keep record of his farm assets. These assets are recorded in a/an ...

- A enterprise budget.
- B inventory.
- C balance sheet.
- D cash flow budget.

1.1.8 The schematic representation below illustrates the concept of ...



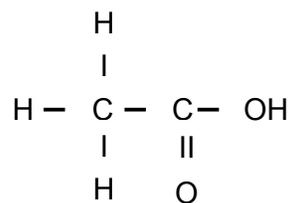
- A overcapitalisation.
- B cultivation.
- C nutrition.
- D value adding.

1.1.9 Which ONE of the following characteristics is associated with the alcohol group of organic compounds?

- i One or more hydrogen atom(s) of an alkane is replaced by a hydroxyl group
- ii 1, 2, 3 propane triol (glycerine)
- iii C_4H_9OH
- iv An amino-grouping forms part of these substances

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

1.1.10 What is represented by the following chemical structural formula?



- A An oxidation product used in the production of vinegar
- B An inorganic substance used as replacement for acetic acid
- C An alkaline substance used in the medication of animals
- D A carbonic acid produced during carbonisation of mineral water

(10 x 2) (20)

- 1.2. Choose a word/term from COLUMN B that matches a description in COLUMN A. Write only the letter (A – M) next to the question number (1.2.1 – 1.2.5) on the attached ANSWER SHEET, for example 1.2.6 N.

COLUMN A		COLUMN B	
1.2.1	A measure taken to protect an animal against viral infections	A	tenure
1.2.2	Apparatus used to deposit the semen during AI (artificial insemination)	B	insemination
1.2.3	Parasites which are mainly controlled by dosing of liquid medication	C	dipping
1.2.4	The return of land or compensation to those who had land taken away from them in the past	D	blue ticks
1.2.5	The chemical molecule that carries the genetic information	E	restitution
		F	pistolette
		G	deoxyribonucleic acid
		H	vaccination
		I	oats hay
		J	redistribution
		K	lucerne hay
		L	roundworms
		M	RNA

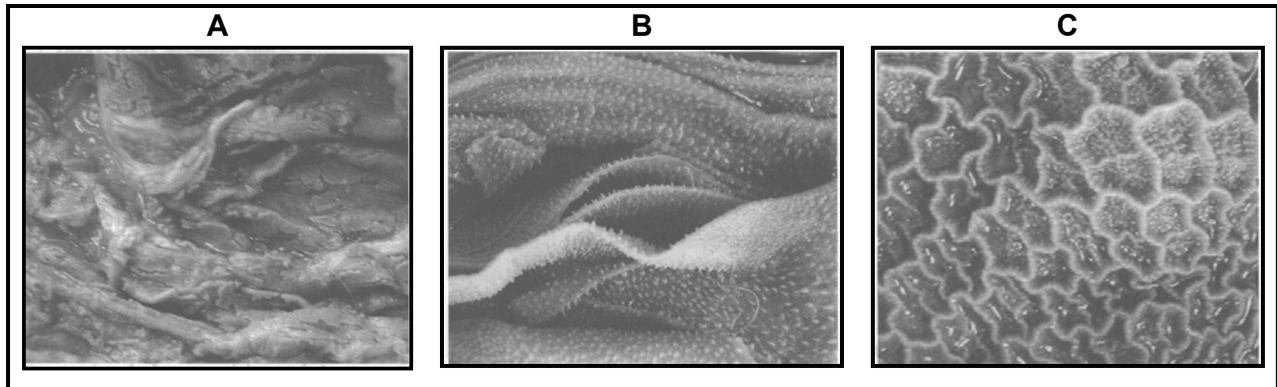
(5 x 2) (10)

- 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 The property of vitamins which is used to divide them into two main groups
- 1.3.2 A feed has a Total Digestible Nutrient (TDN) content of 85% and a Digestible Protein (DP) content of 10%. Calculate the percentage Digestible Non-nitrogen content of the feed.
- 1.3.3 The process of differentiation or sorting of agricultural products according to laid down standards
- 1.3.4 The inclusion of a number of different enterprises in a farming system to minimise the risk
- 1.3.5 The disaccharide that is formed from two glucose molecules (5 x 2) (10)
- 1.4 Change the underlined word in the following to make the statements TRUE. Write the word next to the question number (1.4.1 – 1.4.5) on the attached ANSWER SHEET.
- 1.4.1 Mechanical digestion is the breakdown of food by digestive enzymes.
- 1.4.2 The number and type of micro-organisms in the abomasum of a ruminant animal depend mainly on the quantity of roughage in the ration.
- 1.4.3 Availability describes the change in price with a change in demand during the marketing of agricultural products.
- 1.4.4 Permanent labourers are employed for repetitive tasks such as annual harvesting of a crop.
- 1.4.5 The enlargement of the thyroid gland is due to a deficiency of cobalt.
(5 x 1) (5)

TOTAL SECTION A: 45

SECTION B**START THIS QUESTION ON A NEW PAGE.****QUESTION 2**

2.1 The photographs below show the internal structure of the stomach of a ruminant.



- 2.1.1 Identify each part of the ruminant stomach visible in the photographs labelled A, B and C. (3)
- 2.1.2 Link the structure(s) in the photographs (marked A, B and C) that best represent(s) the following statements:
- (a) When the cud has been chewed finely enough, it passes directly to this part of the stomach where the excess water is forced out. (1)
 - (b) Fermentation of cellulose by bacteria and protozoa occurs here. (1)
 - (c) The mucous membrane of this stomach is glandular and secretes gastric enzymes. (1)

- 2.2 Dairy herds should be divided into groups with basically similar feed requirements. The yearly feed requirements of a single lactating dairy cow producing an average of 30 litres of milk per day are indicated in the table below. The farmer feeds his dairy cows a ration which consists of 60% roughage and 40% concentrate (calculated on dry material basis).

Farm animal	Live weight (kg)	Total dry material requirements (kg)	Metabolic energy requirements (MJ)
Lactating cow	650	50 676	564 447

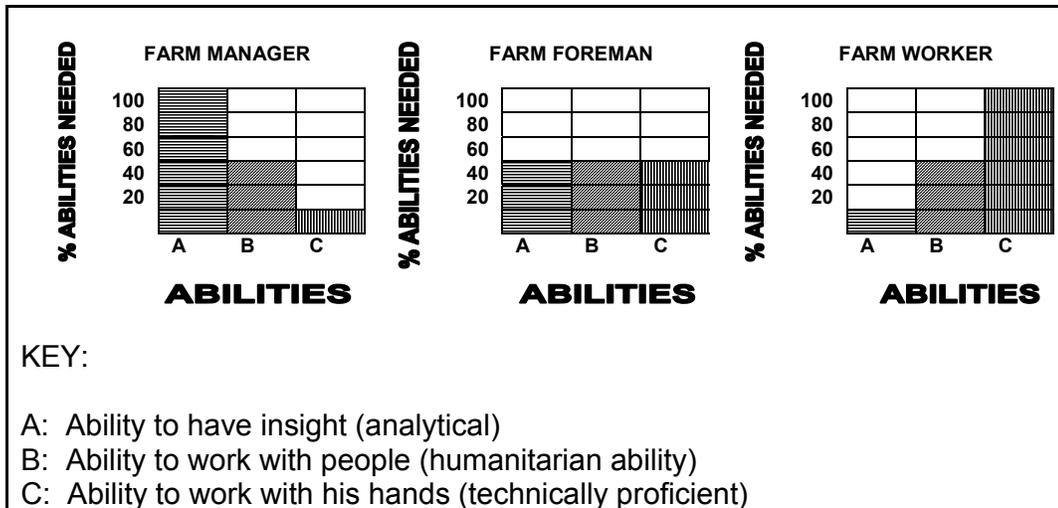
- 2.2.1 Determine the mass of dry material (DM) of the roughage component of a dairy cow. (2)
- 2.2.2 This farmer's kikuyu pasture has an estimated average annual dry matter production of 37 tons DM/ha. Calculate the number of cows that a hectare of kikuyu pasture will support in terms of the dry material for the roughage requirements of the ration. (2)
- 2.2.3 Differentiate between *roughage* and a *concentrate*. (2)
- 2.3 The nutritive ratio of a ration refers to the ratio between the digestible non-nitrogen substances and the digestible protein content of a feed. This value plays a very important role in the scientific feeding of animals for optimal growth and production. The following feeds were used in a feeding programme for cattle:

Feed	Total digestible nutrients %	Digestible protein %
A	81,9	6,9
B	78,0	13,2

- 2.3.1 Calculate the nutritive ratio for each of the feeds (Feed A and Feed B). (4)
- 2.3.2 Deduce, from your calculation, the feed type indicated above that will be most suitable to raise heifers. Give a reason for your answer. (2)

2.4 Sipho decided to start a farming enterprise. He had to plan this farming operation carefully (prepare a business plan). Sipho realised that the success of an undertaking depends largely on the ability of the entrepreneur in his capacity as manager.

While gathering more information on the management of a farm, Sipho got hold of the following data that depicts the abilities of labour in a farming environment. This data emphasises the ability levels of the different positions in a farming enterprise.



2.4.1 Tabulate the ability differences between a farm foreman and a farm worker. Use the data in the diagrams to support your answer. (6)

2.4.2 Identify any FOUR steps of the planning process Sipho had to go through in the development of a strategy to start his farming enterprise. (4)

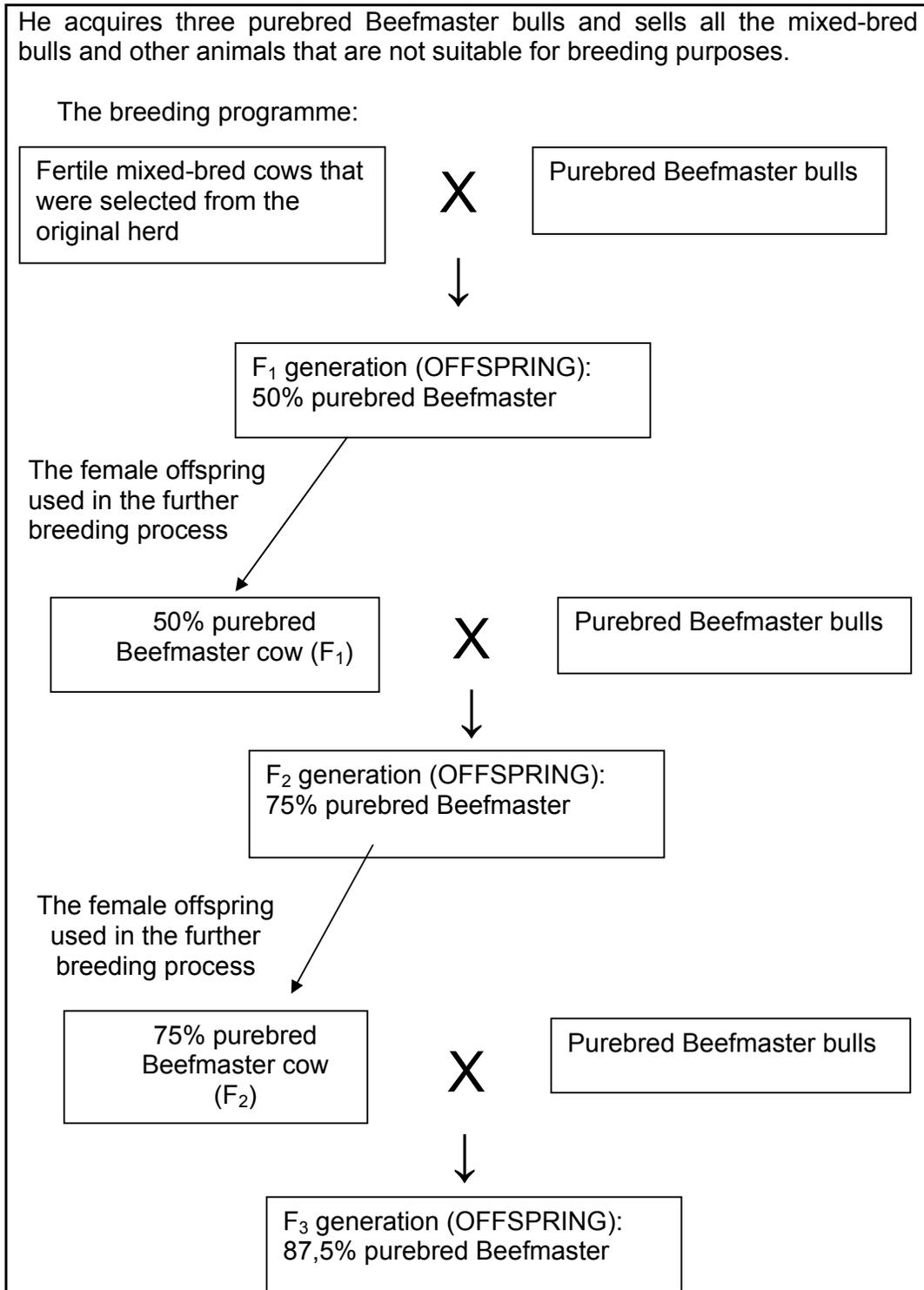
2.4.3 Sipho had to make appointments in his proposed enterprise. A young candidate sent Sipho his CV in which he indicated that he had the following skills:

He had a higher diploma in agriculture (passed with distinction) and he was on the student council of his college (very popular with students). No mention was made of any technical skills.

Name the possible position Sipho could offer this candidate. (1)

2.5 Mr Ntuli owns a cattle production enterprise in a rural area of the country. He is not satisfied with the production output of his enterprise. His herd consists mainly of cattle of all breeds (mixed breeds). After consultation with an agricultural advisor he embarks on a plan of action to improve his herd.

The following schematic representation summarises his actions in this situation:



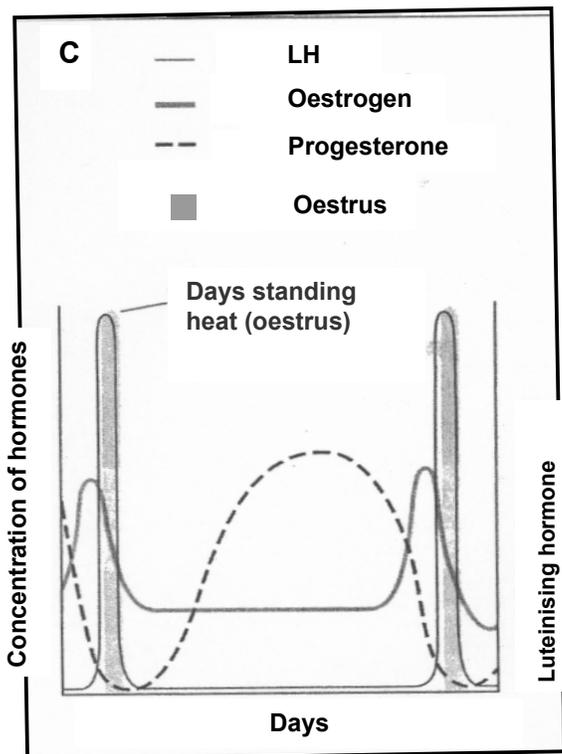
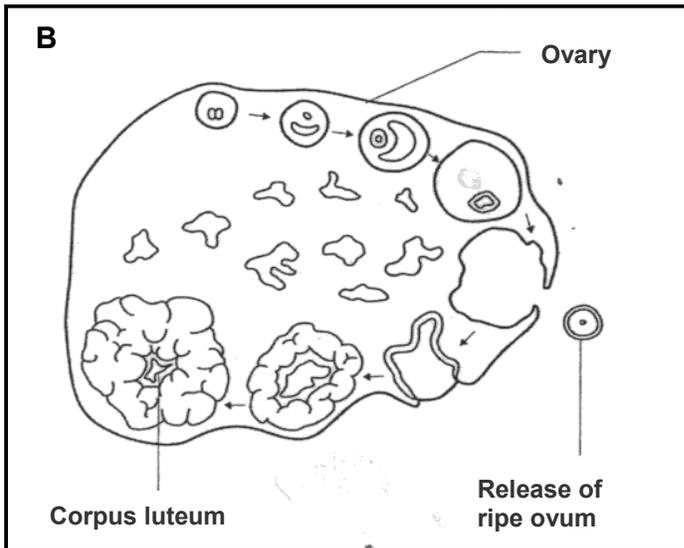
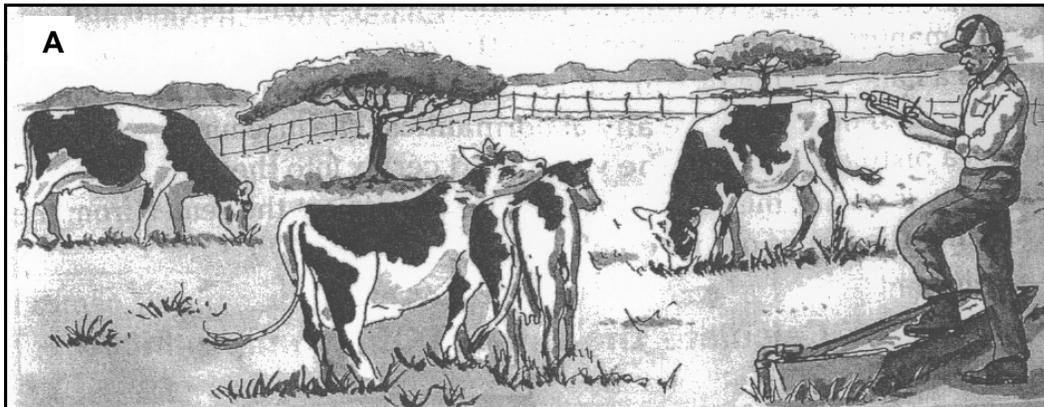
- 2.5.1 Name the type of breeding that is represented by the above schematic representation. (1)
- 2.5.2 State ONE advantage of the breeding type mentioned in QUESTION 2.5.1. (1)
- 2.5.3 Draw a schematic representation that represents the mating of a cow and a bull to illustrate the probability of producing heifer calves. (2)
- 2.5.4 Determine the number of generations needed to develop 87,5% purebred animals from cows of an unspecified breed. (2)
- [35]**

START THIS QUESTION ON A NEW PAGE.

QUESTION 3

3.1 A large commercial farming enterprise has decided to make use of a well-trained inseminator to do AI (artificial insemination) in its herd of dairy cattle. He keeps a record in his own logbook. The diagrams below illustrate the following aspects:

- Diagram A: The inseminator recording the activities of the cows
- Diagram B: An ovary at the different stages of the oestrus cycle
- Diagram C: A graph that shows the changes in the hormone levels during oestrus



- 3.1.1 The inseminator observes that cows mount each other. Describe the possible hormonal changes that lead to the cows' behaviour by referring to Diagram C. (2)
- 3.1.2 Diagram C illustrates the hormone level changes of a cow at the different stages of the oestrus cycle. Explain ONE effect of the high levels of oestrogen on the cow during the heat period. (2)
- 3.1.3 State the best time of the day to inseminate a cow if signs of heat are detected in the morning for the first time. (1)
- 3.1.4 Identify the process occurring in Diagram B. (2)

3.2 The diagrams below represent some external parasites and a routine activity which commonly occurs in an animal production enterprise.

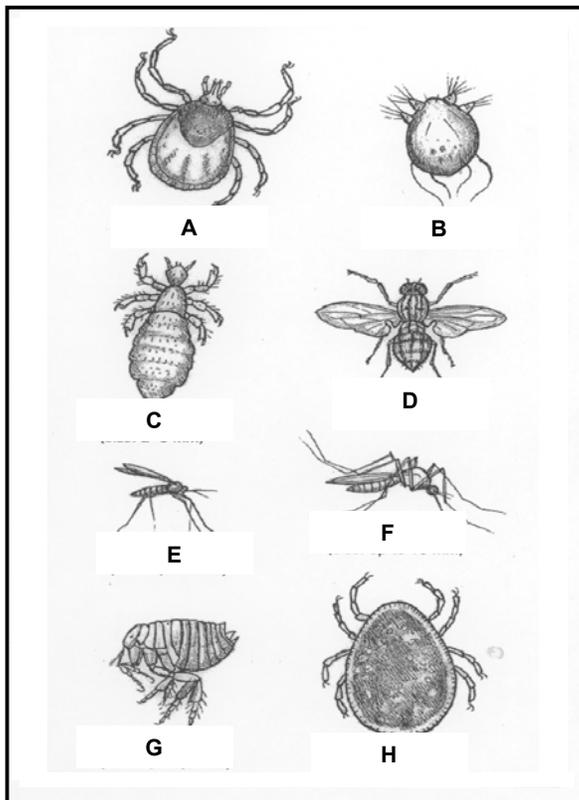


DIAGRAM 1: EXTERNAL PARASITES



**DIAGRAM 2: ROUTINE
ACTIVITY IN AN ANIMAL
PRODUCTION
ENTERPRISE**

- 3.2.1 Identify the organisms labelled A and G. (2)
- 3.2.2 From the list in Diagram 1, choose an organism which best matches the following descriptions. Write only the letter (A – H) in the ANSWER BOOK.
- (a) A winged organism that is responsible for skin irritations and wool loss in the area around the tail parts of a sheep
- (b) Increases the incidence of heart water in a herd of cattle (2)

- 3.2.3 A farmer has a high incidence of redwater in her cattle herd. The local extension officer from the Department of Agriculture has advised her to implement a programme of animal protection which includes the use of a practice which is illustrated in (Diagram 2). Deduce from the data provided the organism that is mainly controlled by this practice. (2)
- 3.2.4 Name a possible alternative way to control this organism (mentioned in QUESTION 3.2.2) on animals. (1)

- 3.3 South Africa has a variety of indigenous cattle breeds. The photograph below shows the Tuli breed of cattle that has been selected by tribal chiefs for their good temperament and fertility.



- 3.3.1 Name TWO ways in which these animals are adapted for harsh environmental conditions like heat, drought, diseases and parasites. (2)
- 3.3.2 Name an indigenous cattle breed that has high economic importance at present. This is due to the fact that it has all the characteristics of the indigenous breeds and as a breed has not been lost through interbreeding. (1)
- 3.4 HIV/Aids impacts on the productivity of farm labourers on commercial and subsistence farms, which in turn impacts on the productivity of the agricultural sector. Between 1985 and 2002 seven million agricultural labourers died of HIV/Aids related diseases in South Africa. Most of these victims were between the ages of 20 and 40.
- 3.4.1 Describe the possible impact of HIV/Aids on the broader agricultural industry and on socio-economic development. (2)
- 3.4.2 Name FOUR actions you would include in a strategic plan to be used by farm managers to address the impact of HIV/Aids on farming operations. (4)
- 3.4.3 Give an example of labour legislation that deals with health issues. (1)

3.5 Agricultural operations are usually capital intensive. Access to capital is a big challenge for a prospective entrepreneur who wishes to enter the agricultural industry.

3.5.1 Define the term *capital*. (1)

3.5.2 Name TWO institutions that are used by commercial farmers to acquire capital to buy farm land. (2)

3.5.3 Name the type of capital that requires collateral for a loan. (1)

3.6 Scientists working at a leading animal research station have identified genes that can be transferred to cattle to produce beef with very lean meat. The table below represents the fat content of beef measured at a commercial cattle breeder over the last 50 years.

Time (year)	Total fat content (g/100 g)	Saturated fat content (g/100 g)
1960	5,5	2,2
1970	3,4	1,8
1980	2,8	1,3
1990	2,2	1,1
2000	1,9	0,9
2010 (expected)	0,4	0,2

3.6.1 Draw a line graph to represent the values of total fat content in beef measured over a period of 50 years using the data in the table above. (The X-axis represents the time/year and the Y-axis the total and saturated fat content.) (4)

3.6.2 What is the tendency of the values in this graph? (1)

3.6.3 Give a reason for the low fat content in beef expected in 2010. (1)

3.6.4 Why do breeders aim to produce meat with a lower fat content? (1)

[35]

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QUESTION 4

4.1 The handling of farm animals is an essential part of the effective management of any herd in an animal production enterprise.

Animals need to be handled calmly for the following reasons:

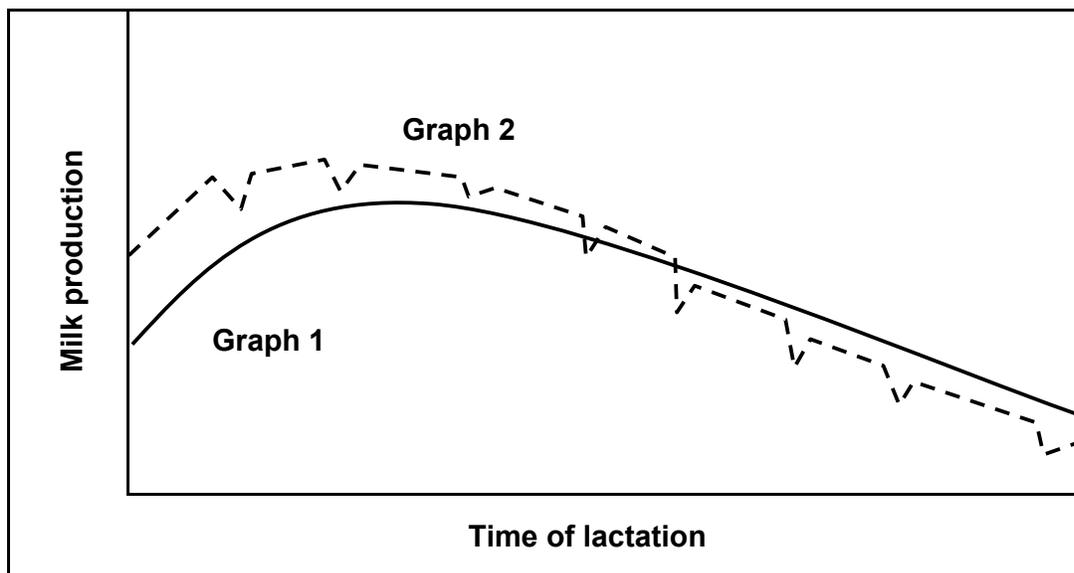
- Prevent damage of carcasses at the abattoir (meat quality)
- Prevent injury of handlers or other animals
- The temperament of some breeds differs
- Reproduction purposes like milk production on a daily basis
- During parturition animals are more protective of their young

The size of the animals will determine the way animals are handled, for example some animals, like cattle, require more sophisticated and stronger facilities.

The data below shows the interaction between production and handling of dairy cattle.

Type	Qualities measured			
	Effectiveness of food conversion	Temperament	Annual milk yield (litres)	% cream in milk
Breed A	Medium	Calm	4 500	4,0
Breed B	High	Nervous	5 000	3,0

The graphs below show the average data of the different breeds.



- 4.1.1 Identify the breed represented by Graph 2 and give a reason for your answer. (2)
- 4.1.2 Recommend ONE of the above breeds for the following situation:
A commercial farmer with limited facilities and who milks by hand. (1)
- 4.1.3 Explain how the incorrect handling of farm animals could harm them and affect their value. (4)
- 4.2 Special attention should be given to safety when animals are moved along a road. When moving animals, an indemnification to remove those animals from a specific farm is required.

Design and draw up your own removal permit. This is the document you hand to the buyer. This document serves as proof that the animals are not stolen and protects the buyer against prosecution. (4)
- 4.3 You have been invited to visit a group of small farmers and address the nutritional problems that they are experiencing with their goats.

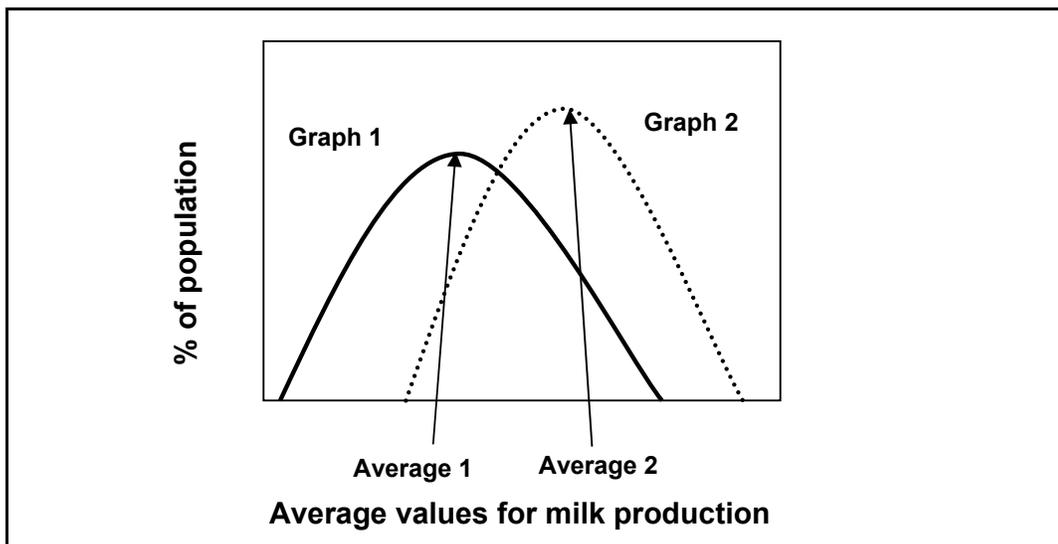
In an analysis of their situation the following was noted:

These farmers have no formal training in agriculture and their production figures are very poor. They depend only on the available grazing to keep their animals healthy. Nutrition seems to be one of their major challenges because they are situated in a summer rainfall area with dry, harsh conditions.

In a discussion with some of the farmers the following symptoms were clearly identified during the winter period:

Lower fertility and resistance against bacterial eye infections
- 4.3.1 Name the possible vitamin deficiency that these animals are experiencing based on the deficiency symptoms mentioned above. Give a function of this vitamin to support your answer. (2)
- 4.3.2 Describe the condition of the pastures during winter and explain why the vitamin mentioned in QUESTION 4.3.1 would be deficient. (4)
- 4.4 The shortage of critical and scarce skills in the agricultural sector poses a great challenge to the sector to reach the goal of a united and prosperous agricultural sector in South Africa. This challenge is being addressed through the establishment of the AgriSETA, which aims at capacitating the workforce with critical skills like general management, agricultural economics, farming and farm management, process engineering, horticulture, marketing, export readiness, et cetera.
- 4.4.1 Give THREE reasons that would convince farm managers to register their workers for a skills development programme. (3)

- 4.4.2 Name the benefits of a programme as mentioned in QUESTION 4.4.1 to the farm workers. (2)
- 4.4.3 One of the major problems with farm labour is competition with industries. Briefly explain the possible implications that a skills development programme might have with regard to this problem. (2)
- 4.5 A group of beef farmers in your area identified the following possible markets for their products:
- Small butcheries
 - Large supermarket chains
 - Local people who buy directly from the farm
 - Auctions
- 4.5.1 Name the group most suitable for the marketing of prime beef. Give a reason for your answer. (2)
- 4.5.2 Identify a market from the list provided that holds the highest security risk for the beef producer. Give a reason for your answer. (2)
- 4.6 The following two curves represent the average milk production of a dairy herd (solid line) and that of a later generation of the same herd (dotted line).



- 4.6.1 Give a reason for the bell shape of the graph with the average in the centre. (3)
- 4.6.2 Give a reason for the higher average in the second graph (Average 2) compared to that of the first graph (Average 1). (2)
- 4.6.3 Deduce from the graph the part of the population (Graph 2) that you would select for breeding purposes. (2)

[35]**TOTAL SECTION B: 105****GRAND TOTAL: 150**

ANSWER SHEET

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

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