



education

Department:
Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

AGRICULTURAL SCIENCES P1

FEBRUARY/MARCH 2010

MARKS: 150

TIME: 2½ hours

This question paper consists of 16 pages and an answer sheet.

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. SECTION A (QUESTION 1) must be answered on the ANSWER SHEET provided.
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) in your ANSWER BOOK.
8. 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.

EXAMPLE:

1.1.11	<input checked="" type="checkbox"/>	A	B	C	D
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- 1.1.1 The protein with the highest biological value that is found in animal feeds is ...
- A egg protein.
 - B peanut oilcake protein.
 - C fish protein.
 - D lucerne protein.
- 1.1.2 A possible nitrogen source that active microbes in the rumen can utilise for growth is ...
- A sugars.
 - B fats.
 - C volatile fatty acids.
 - D amino acids.
- 1.1.3 The structure found in the stomach of a young ruminant that transports milk directly to the abomasum:
- A Oesophageal groove
 - B Crop
 - C Trachea
 - D Omasum
- 1.1.4 Symbiotic bacteria and protozoa of ruminants occur in the ...
- A omasum.
 - B rumen.
 - C duodenum.
 - D abomasum.
- 1.1.5 Animals secrete ... that will attract the opposite sex.
- A hormones
 - B oestrogen
 - C mucus
 - D pheromones

- 1.1.6 To increase production per head of an animal, the following system of animal production can be applied:
- A Inbreeding
 - B Species crossing
 - C Artificial insemination
 - D Line breeding
- 1.1.7 When designing a deep-litter chicken house, the long sides should face ...
- A east and west.
 - B north and south.
 - C south.
 - D north.
- 1.1.8 The cow abandons her calf immediately after birth. This behavioural condition is considered ... behaviour.
- A repetitive
 - B mutilation
 - C abnormal reproductive
 - D aggressive
- 1.1.9 A sick bull is brought to the ... so that he can be given an intravenous injection by the veterinary surgeon.
- A holding pen
 - B crush
 - C loading ramp
 - D race/chute
- 1.1.10 The purpose of vaccination is to ...
- A prevent parasites.
 - B prevent diseases.
 - C treat diseases.
 - D control parasites.
- (10 x 2) (20)

1.2 In the table below a statement with TWO possible answers is given. Decide whether the statement 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:	Liver	the place where bile is stored in the animal body
B:	Gall bladder	

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:	Metabolic energy	the portion of the gross energy that is used for work, growth and fattening
	B:	Digestible energy	
1.2.2	A:	Genetic deformities	environmental factors that can be controlled in a housing facility
	B:	Very high temperatures	
1.2.3	A:	Optimum level	the level of animal production that would earn the farmer the largest income
	B:	Maximum level	
1.2.4	A:	Relaxin	the hormone responsible for relaxation of the cervix and pelvic muscles
	B:	Oxytocin	
1.2.5	A:	Redwater	a tick-borne disease transmitted by the blue tick
	B:	Gall sickness	

(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 compartment of the stomach of a cow where enzymatic digestion takes place
- 1.3.2 The main purpose for removing and killing aged and very sick game in a national game park
- 1.3.3 The type of agricultural production where no chemicals are used and the system of cultivation is based on ecological principles
- 1.3.4 The structure that develops on the ovary after ovulation at the position of the burst follicle
- 1.3.5 The number of heartbeats in one minute which is used to determine the health condition of an animal (5 x 2) (10)
- 1.4 Change the UNDERLINED WORD(S) in the following statements to make them TRUE. Write the appropriate word(s) next to the question number (1.4.1 – 1.4.5) on the attached ANSWER SHEET.
- 1.4.1 The nitrogen value is an index of the quality of the protein in a feed.
- 1.4.2 Gall is transported in a tube that opens in the jejunum part of the small intestine and plays an important role in the digestion of fat.
- 1.4.3 Using a milling stone to grind cereals would improve their palatability, making the food particles smaller.
- 1.4.4 Cattle are used for slaughtering in a traditional rural community when the father and mother of the bride are compensated for the marriage to their daughter.
- 1.4.5 The type of organism that is responsible for transmitting viral diseases like bluetongue in sheep is called a host. (5 x 1) (5)

TOTAL SECTION A: 45

SECTION B

Start this question on a **NEW** page.

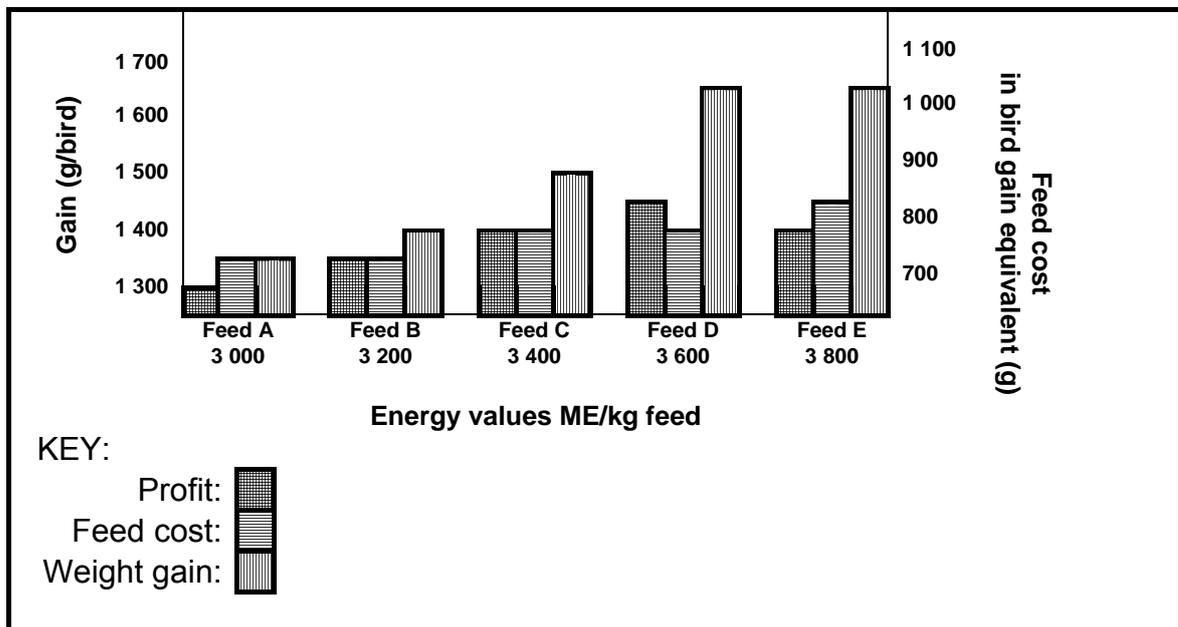
QUESTION 2: ANIMAL NUTRITION

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

Feed	Crude protein %	Crude fibre %	Metabolisable energy MJ/kg
Lucerne pasture	22,5	25,8	9,4
Veld grass	7,0	36,0	8,0
Lucerne hay	14,1	30,1	7,5
Groundnut hay	9,2	24,1	8,7
Milk powder	33,5	0,0	12,0
Maize meal	8,9	2,0	12,0
Blood meal	82,2	0,0	9,1
Fish meal	60,9	0,0	10,6
Sorghum grain	11,0	1,7	12,2

- 2.1.1 Identify TWO feeds listed above that are the best examples of protein-rich concentrates. (2)
- 2.1.2 Explain the reason for monogastric animals not being able to utilise and digest normal pasture grass. (2)
- 2.1.3 Indicate a feed from the table above that has the lowest crude-fibre content. Give a reason for the very low crude-fibre content by referring to the type of feed. (2)
- 2.1.4 Decide what could be a possible reason for the high metabolisable energy in sorghum grain. (2)
- 2.1.5 Suggest a feed that will be the most suitable for production. Give a reason for your answer. (2)

2.2 Study the graph below that represents the feed cost, weight gain and profit of a broiler production unit.



- 2.2.1 Name the largest running-cost item in an intensive production enterprise. (1)
- 2.2.2 Identify from the graph above the ration marked Feeds A to E that would match the following criteria:
 - (a) The ration that produced the highest growth rate (1)
 - (b) The ration with the highest profit (1)
 - (c) The ration with highest energy value (1)
- 2.2.3 Deduce TWO reasons from the graph above that indicates that it is not advisable to use Feed B in this broiler unit. (2)

2.3 A researcher at an animal research station made the following observations:

Observation 1:

A dairy cow took in 24 kg of a fodder with a moisture content of 12%. This cow then excreted 10 kg manure with a moisture content of 25%.

Observation 2:

The dairy cow needed a concentrate with a digestible protein (DP) content of 18% (feed requirement for this dairy cow). Two feeds are available, Feed A (with a DP value of 24%) and Feed B (with a DP value of 6%).

2.3.1 Calculate the coefficient of digestibility of the fodder in Observation 1 above. Show ALL your calculations. (4)

2.3.2 Use the Pearson square to calculate the ratio in which Feeds A and B need to be mixed to get to the required DP value as indicated in Observation 2 above. (5)

2.4 Read the following passage with regard to the nutritional requirements of horses:

The digestive system of a horse is adapted to handle the digestion of roughages. The large intestine is a large fermentation vessel where food is broken down into simpler and smaller compounds. Bacteria and other micro-organisms assist in this digestion process.

The very best diet for a horse is green pasture which has been well fertilised and has a variety of other herbal plants.

As a rule of thumb a 16-hand high horse needs 16 kg of roughage per day. Apart from the roughage, the concentrate requirement could be judged using the following criteria:

1. Horses not working: $\frac{1}{3}$ concentrate and $\frac{2}{3}$ roughage
2. Horses being handled or trained normally: $\frac{1}{2}$ concentrate and $\frac{1}{2}$ roughage
3. Horses driven and prepared for endurance rides: $\frac{2}{3}$ concentrate and $\frac{1}{3}$ roughage

Old horses need more fibre and foals should not consume feed from their mother's manger until they are six months old.

After excessive rain when grasses in the pastures are very green and juicy, it would be risky to take the horses out of the stable as the excessive green fodder could be toxic to them.

[Adapted from: *Farmer's Weekly*, 18 July 2008]

2.4.1 Name the TWO main differences between roughages and concentrates. (4)

2.4.2 Suggest ONE reason why the large intestine is more adapted for digestion of roughages. (1)

2.4.3 Evaluate why a foal should not eat from the feed in its mother's manger until it is 6 months old. (1)

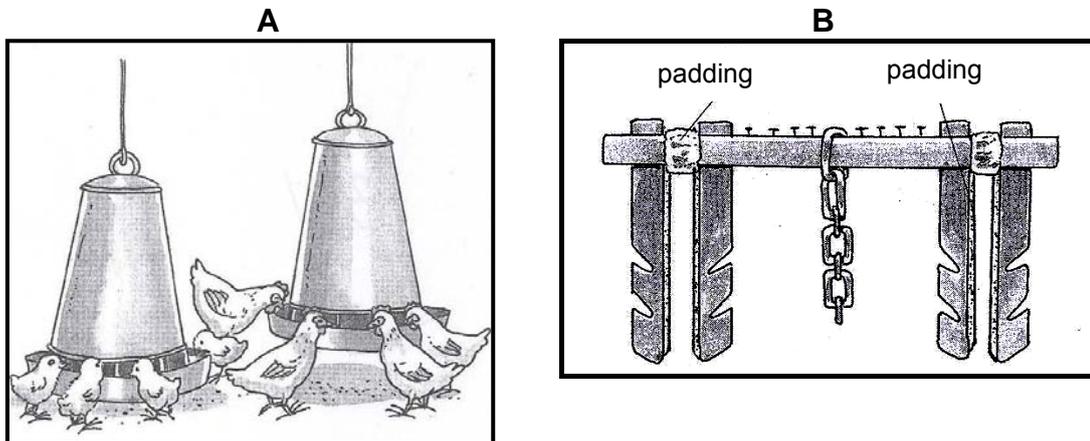
2.4.4 Justify the difference in the ratios of concentrates and roughages given to the horses mentioned above. (4)

[35]

Start this question on a NEW page.

QUESTION 3: ANIMAL PRODUCTION

3.1 The pieces of equipment labelled A and B below are used in animal production to simplify man's techniques of animal production.



3.1.1 Identify each of the pieces of equipment shown above. (2)

3.1.2 Name the main function of each of the pieces of equipment mentioned in QUESTION 3.1.1. (2)

3.2 The results of controlling some of the environmental factors have a large impact on pig production (farming). The analysis of measurements taken of the feed and water usage at different temperatures are given in the table below.

1. WATER USAGE	
Times that water facility was used (per day per pig)	Temperature (°C)
1	10
3	18
4	22
6	30
10	38
14	42

2. FEED INTAKE	
Times that feeding facility was used (per day per pig)	Temperature (°C)
9	10
7	18
6	22
4	30
2	38
1	42

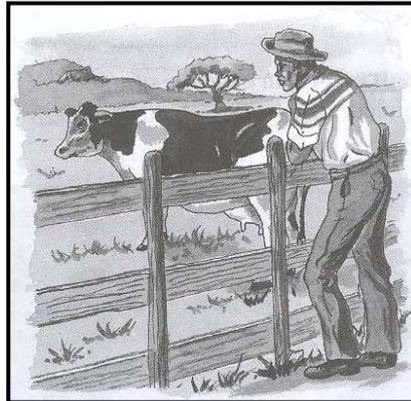
3.2.1 Name TWO environmental factors, apart from temperature, that will have an effect on pig production. (2)

3.2.2 Metal thieves stole some of the copper piping which supply water to the pig housing facility. Explain the effect on pig production when this watering facility becomes defective in the summer period. (2)

3.2.3 Use the data collected in the table to draw a bar graph which shows water usage and feed intake. (6)

3.3 Read the following case study with regard to increasing productivity:

Case study: Increasing productivity



Farmer Dlamini's property is situated in the summer rainfall area of the country. Hot summers and very cold winter periods are typical of the area. He is considering starting a feedlot to increase his production and is in the process of upgrading his animals. He is thinking about laying a pipeline to a neighbouring farm to obtain a more constant and better quality water supply. He is also considering applying for an electricity supply to his farm.

- 3.3.1 Suggest the animal trait that Mr Dlamini should consider if he decides to raise animals in the available pastures as indicated in the picture above. (2)
- 3.3.2 Name the production system that Mr Dlamini plans to utilise to drastically increase his animal production capacity. (1)
- 3.3.3 Give ONE reason why the production system mentioned in QUESTION 3.3.2 would increase his production output. (1)
- 3.3.4 Mr Dlamini plans to improve the production performance of his animals. Name TWO possible ways of achieving this objective. (2)

- 3.4 The following case study represents livestock production among the Zulu people:

Traditionally, the Zulu people's economy and culture have been dominated by livestock production and ownership. Livestock numbers increase through natural breeding, through bride exchanges and inheritance.

Practical knowledge of the environment plays a crucial role in the production of livestock. Success in production is dependent on natural resources such as land, grazing and water and favourable weather conditions.

The owners are conscious about diseases that attack their stock and have a considerable knowledge of medicines they should apply. *Ubuwuma* (*Withania somnifera*), a leaf poultice, is used as a remedy for many cattle diseases like gall sickness, worms and even open wounds. The sap of *inhlaba* (*Aloe ferox*) is applied for blood diseases and a retained placenta in cattle.

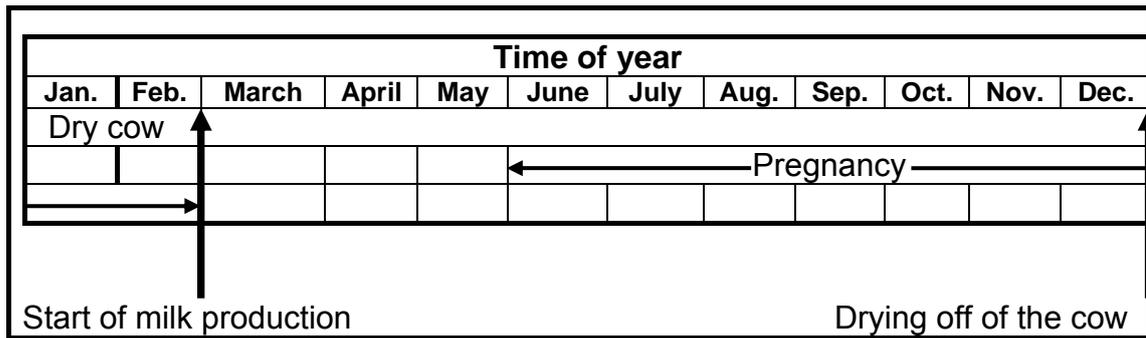
There are also fixed rules (taboos) relating to the handling of livestock in the stock kraal. Women are forbidden to herd and enter the kraal. There is a common belief that women in the state of ritual impurity, for example a menstruating woman or a woman who has just had a miscarriage, will contaminate the whole herd, which will result in poor production.

[Source: *Successful Agricultural Sciences Grade 12*, p. 73]

- 3.4.1 Identify THREE natural resources from the case study which are important for livestock production. (3)
- 3.4.2 Name TWO ways in which livestock numbers increase among the Zulu people. (2)
- 3.4.3 Compare the traditional treatment of diseases with that of commercially farmed livestock. (2)
- 3.4.4 State TWO rules (taboos) with regard to the handling and protection of livestock. (2)
- 3.4.5 Indicate the medicine which is recommended by the Zulu people for the treatment of reproductive disorders. (1)
- 3.5 The data below was taken from a draft management programme for a dairy producer who synchronised the dairy production enterprise.

In the management plan for the year, the farmer tried to make provision for the following aspects:

- A Artificial insemination
- B Calving
- C Milk production
- D Conception
- E Pregnancy

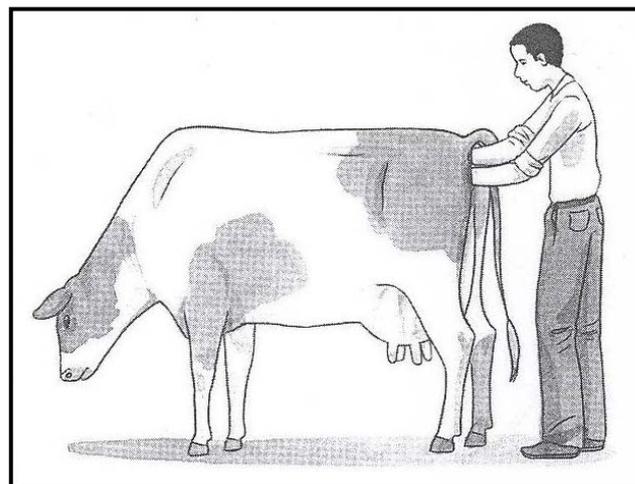


- 3.5.1 Indicate the TWO months in which artificial insemination took place in the herd of this dairy farmer. (2)
 - 3.5.2 Deduce the process which coincided with the start of milk production in this dairy herd. (1)
 - 3.5.3 Name TWO ways in which this dairy producer would be affected if the cows that were inseminated at the time indicated in QUESTION 3.5.1 did not conceive. (2)
- [35]**

Start this question on a NEW page.

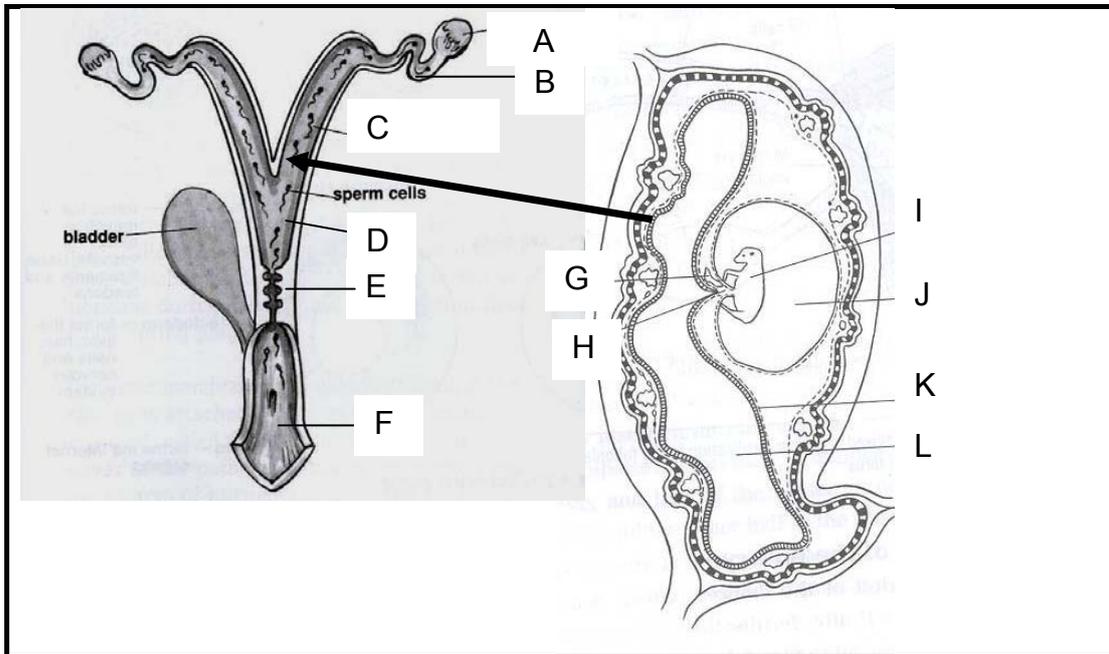
QUESTION 4: ANIMAL REPRODUCTION, PROTECTION AND CONTROL

- 4.1 The diagram below illustrates a special state of the reproductive cycle of the cow.



- 4.1.1 Name the process demonstrated in this diagram. (1)
- 4.1.2 Predict the part or instrument in the digestive and reproductive systems respectively touched or held by the:
 - (a) Right hand (1)
 - (b) Left hand (1)

4.2 The diagram below represents reproductive organs and a stage in the reproduction process in cattle.



4.2.1 Indicate the correct position where the processes below occur in the female animal to have successful reproduction. Use the letter provided in the diagram above for your answer.

- (a) Embryo development
- (b) Fertilisation
- (c) Ovulation
- (d) Follicle development (4)

4.2.2 Arrange the following processes in the correct sequence as they occur in the female animal to have successful reproduction:

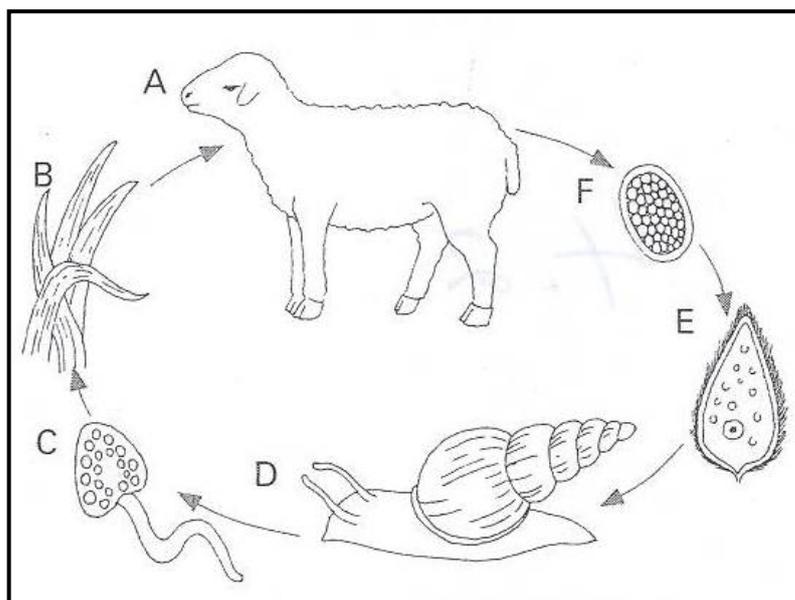
- Fertilisation
- Ovulation
- Follicle development (3)

4.2.3 Indicate any stage in the oestrus cycle in which the female animal will not allow mating. (1)

4.2.4 Give TWO reasons why livestock breeders may use other, more sophisticated methods of reproduction in their animals instead of allowing normal mating to take place. (2)

4.2.5 Explain the main reason why the body weight of a cow normally decreases as the milk production increases. (2)

- 4.3 The diagram below indicates various stages of the life cycle of an internal parasite.

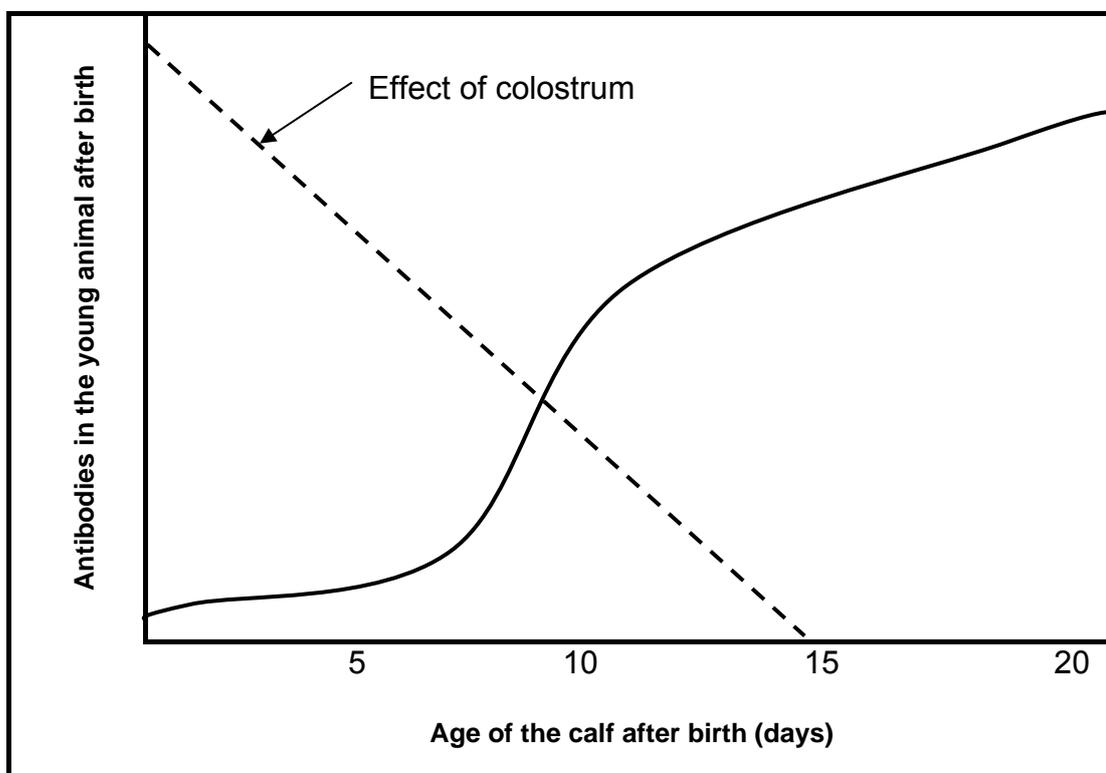


- 4.3.1 Identify the parasite that is shown in the diagram above. (1)
- 4.3.2 Suggest TWO methods that could be used to control this parasite. (2)
- 4.3.3 Give TWO reasons why the detrimental effect of parasites on animals is sometimes underestimated. (2)
- 4.4 Below is a list of common diseases and parasites associated with farm animals. Choose from the list the disease or parasite that could be associated with each of the conditions that follow.

bluetongue; paralysis; nose worm; ringworm; brucellosis;
tick fever; foot and mouth disease; redwater; bloat

- 4.4.1 A disease characterised by the occurrence of blisters which are more or less round and later develop sores on the mucous membranes of the mouth and tongue and between the hooves (1)
- 4.4.2 A bacterial disease that is associated with abortion in cattle (1)
- 4.4.3 A disease that is common in areas where ticks occur such as the Bushveld region (1)
- 4.4.4 A disease that forms a round wound with a scabby surface on cattle and sheep (1)
- 4.4.5 An infected animal with this disease has a red-coloured urine (1)
- 4.4.6 A disease that is carried by midges during the rainy season and prevented by vaccination (1)

- 4.5 The following graph illustrates the build-up of antibodies in the animal body from birth:



- 4.5.1 Briefly indicate when colostrum was secreted. (1)
- 4.5.2 Explain the function of antibodies in the animal body. (2)
- 4.5.3 Indicate the effect of colostrum on the young animal shortly after birth by referring to the graph above. (2)
- 4.5.4 State a measure taken by a farmer to stimulate the development of antibodies in the animal body. (1)
- 4.6 The control of parasites and diseases is an essential part of the routine work done on the farm. To manage animal health, the farmer needs to apply a number of basic principles.

State THREE principles necessary to develop a health control programme for animals.

(3)
[35]

TOTAL SECTION B: 105

GRAND TOTAL: 150

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

	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