



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS

AGRICULTURAL SCIENCES P1

2016

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 your 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 number (1.1.1–1.1.10) in the ANSWER BOOK, for example 1.1.11 A.

1.1.1 A farm animal with an alimentary canal consisting of a simple stomach system is classified as a ...

- A ruminant.
- B non-ruminant.
- C hindgut fermenter.
- D herbivore.

1.1.2 The ... is a measure of the protein content of a feed that is used to determine its suitability for production.

- A nutritive ratio
- B moisture content
- C coefficient of digestibility
- D total digestible nutrients

1.1.3 A ration is made up of two feeds (Feed A and Feed B) mixed to get a total digestible protein (DP) content of 15%. If 40 kg of Feed A, with a DP value of 9%, forms part of this mixture, the digestible protein (DP) content for Feed B is ...

- A 5%.
- B 15%.
- C 25%.
- D 6%.

1.1.4 The end product of digestion that causes bloating in ruminant animals:

- A Acetic acid
- B Amino acid
- C Glucose
- D Methane

1.1.5 During handling, a sheep will react best when ...

- A separated from other sheep in the flock.
- B the sheep are kept together.
- C moved from dark to light areas.
- D moved from warm enclosures to cold outdoor pens.

1.1.6 The following will occur during cold environmental conditions in animal production:

- (i) Feed is utilised efficiently.
- (ii) Animals eat more to maintain body temperature.
- (iii) Shelter is needed to prevent unnecessary loss of heat.
- (iv) Heat production increases.

Choose the correct combination:

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

1.1.7 The most appropriate measure to feed boars and dry sows:

- A Limit feed according to need.
- B Ad lib.
- C Feed as much as they want once daily.
- D Only feed when food is available.

1.1.8 An example of a disease that can only be controlled by vaccination:

- A Mastitis
- B Milk fever
- C Rabies
- D Ringworm

1.1.9 The scrotum regulates the temperature during spermatogenesis by ...

- A contracting when it is cold and relaxing when it is hot.
- B pulling the testes down when it is cold.
- C relaxing the testes when temperatures are low.
- D contracting when temperatures are high.

1.1.10 Female animals secrete ... that help(s) to attract male animals.

- A colostrum
- B hormones
- C semen
- D pheromones

(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 number (1.2.1–1.2.5) in the ANSWER BOOK, for example 1.2.6 B only.

COLUMN A			COLUMN B
1.2.1	A:	Mineral lick	Providing minerals at a feeding station controlled by a computer system
	B:	Cafeteria style	
1.2.2	A:	Nipple drinkers	Water supply for pigs in an intensive production system
	B:	Computerised troughs	
1.2.3	A:	Nose ring with rope	Equipment used to make a large animal stand still when it is being medicated
	B:	Halter with a rope	
1.2.4	A:	Soil sods	Used in pens to absorb moisture and to isolate cold cement floors
	B:	Hay and straw	
1.2.5	A:	FSH	Hormone produced by the Graafian follicles
	B:	Oxytocin	

(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) in the ANSWER BOOK.

1.3.1 The substance in urea that may lead to poisoning due to its high concentration levels

1.3.2 A production system where pigs are kept outdoors in a traditional way, where they can move around freely, little attention is paid to them and they are fed waste foods

1.3.3 The failure of a cow to expel the placenta within 12–24 hours after parturition

1.3.4 The process through which the male reproductive cells are formed

1.3.5 The process of removing fertilised egg cells from a superior donor cow

(5 x 2) (10)

1.4 Change the UNDERLINED WORD(S) in each of the following statements to make them TRUE. Write only the answer next to the question number (1.4.1–1.4.5) in the ANSWER BOOK.

1.4.1 Anthelmintics are nutrient supplements that are placed in a field to provide grazing animals with additional nutrients.

1.4.2 The chemical substances produced by an animal to provide protection against disease are called antibiotics.

1.4.3 Prolactin is responsible for the maintenance of pregnancy and its level drops soon after birth.

1.4.4 Maceration results in the fluids of the foetus and placenta being reabsorbed and no secondary infection occurring.

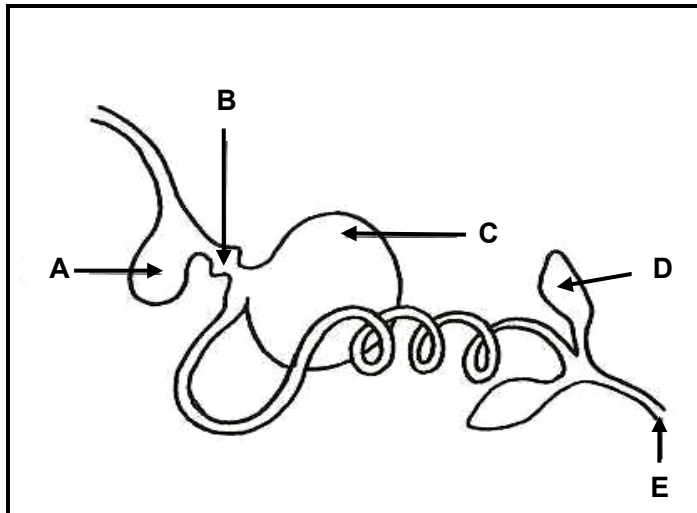
1.4.5 The artificial vagina is the apparatus used to physically inseminate female animals. (5 x 1) (5)

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 poultry.



2.1.1 Identify parts **A**, **B** and **C** in the diagram above. (3)

2.1.2 Write down the letter (A–E) of the part of the alimentary canal that normally contains small stones. (1)

2.1.3 Give a reason for the presence of the stones in the part indicated in QUESTION 2.1.2. (1)

2.1.4 Name TWO parts of the alimentary canal of poultry that will not be found in sheep. (2)

2.2 The table below shows the feed composition, feed intake and feed excreted by a calf that consumed 5 kg of feed with a 15% moisture content.

FEED COMPOSITION	FEED INTAKE (%)	FEED EXCRETED (%)
Moisture	7,7	3,8
Crude protein	5,0	3,0
Crude fibre	78	72
Minerals	4,0	2,2

2.2.1 Identify the feed component that has the lowest absorption rate in the body of the calf. (1)

2.2.2 Substantiate the answer to QUESTION 2.2.1 by giving TWO reasons. (2)

2.2.3 Give ONE reason, from the table, why the feed above cannot be recommended for milk-producing cows. (1)

2.2.4 Calculate the dry material of the feed in kg. (2)

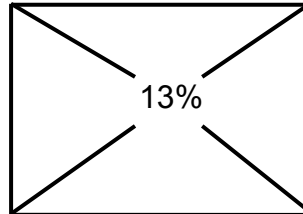
2.3

PRODUCT	CRUDE PROTEIN (%)	PRICE PER TON (R)
Maize meal	11	3 210
Soybean meal	44	4 576

A ration with a crude protein content of 13% is required in a production enterprise. The Pearson square method was used to balance this ration, as illustrated below:

Maize meal 11%

Maize meal 31 parts



Soybean meal 44%

Soybean meal 2 parts

2.3.1 Calculate the percentage of:

- (a) Maize meal in the ration above (2)
- (b) Soybean meal in the ration above (2)

2.3.2 Calculate the cost of soybean meal if 285 kg of ration are mixed. (3)

2.4

The table below shows the biological value (BV) of different feeds that are fed to growing piglets.

TYPES OF FEED	BIOLOGICAL VALUE (BV)
Fishmeal	90
Soymeal	70
Wheat	60
Peanut meal	75
Maize meal	55
Bone meal	78

- 2.4.1 Explain the concept *biological value*. (2)
- 2.4.2 Indicate the relationship between the biological value and the quality of a feed. (2)
- 2.4.3 Identify the feed with the lowest biological value in the table above. (1)
- 2.4.4 Determine the suitability of the feed identified in QUESTION 2.4.3 for animal production. (1)
- 2.4.5 Explain why it is important to feed pigs with a feed that has a high biological value. (2)

- 2.5 The table below shows the fodder crops that form part of a farmer's fodder flow planning.

NO.	FODDER	Ha	DM (t/Ha)	TOTAL PRODUCTION (t/year)	COST (R/Ha)	TOTAL COST (R)
1.	Kikuyu (pasture)	25	10	...	680	17 000
2.	Ryegrass (hay)	20	15	300	...	31 160
3.	Fescue (hay)	15	...	210	1 130	16 950
4.	Maize (silage)	...	10	100	1 055	10 550
TOTAL		68		860		75 660

- 2.5.1 Use the data above to calculate the following:

- (a) Quantity of Fescue (DM t/Ha) (2)
- (b) Number of hectares planted with maize (for silage) (2)

- 2.5.2 Identify the fodder crop, in the data above, that can be utilised as:

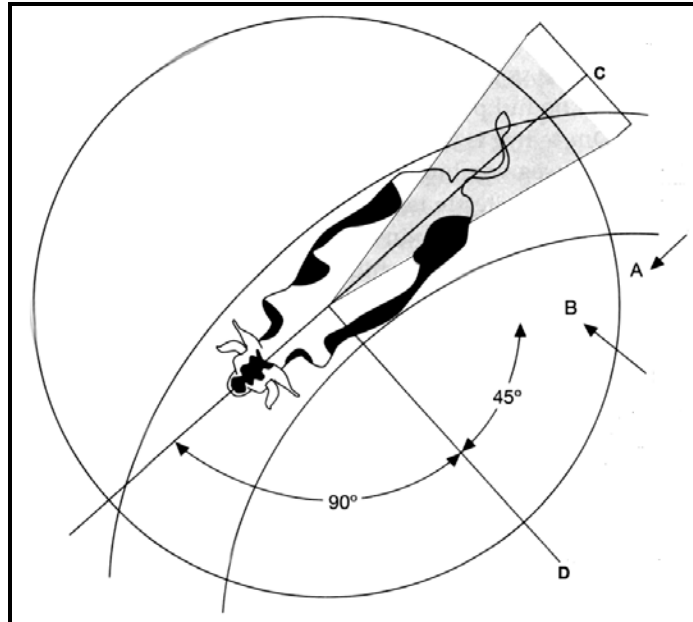
- (a) Summer grazing (1)
- (b) A succulent crop during the winter (1)
- (c) The most economic hay (1)

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QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

Start this question on a NEW page.

3.1 The schematic image below represents the behaviour of a farm animal.



3.1.1 Name the areas indicated by **C** and **D**. (2)

3.1.2 Where should the handler of an animal stand to be safe? Give ONE reason for the answer. (2)

3.1.3 List THREE guidelines that are important when handling cattle. (3)

3.2 Farmer A runs a highly intensive dairy unit with 400 cows and 2 milking parlours with 6 milking machines each. The cows produce 10 000 l of milk per day that are sent to a big processing factory in the city. The cows also produce 1 440 tons of manure per year.

Farmer B owns 4 cows that produce 20 l of milk per day combined. The farmer has a family of 15 members and 7 dogs. The 4 cows graze alongside the road during the day. The manure collected in the kraal where the cows sleep at night is used to fertilise the garden.

3.2.1 Identify, in the scenario above, the farming system practised by:

(a) Farmer A (1)

(b) Farmer B (1)

3.2.2 Justify the answer to QUESTION 3.2.1. (2)

3.2.3 Which farmer contributes most to environmental decline/deterioration? (1)

3.2.4 Support the answer to QUESTION 3.2.3 by stating TWO environmental effects. (2)

- 3.3 The photograph below shows an apparatus used in the production process of sheep as a management practice.



- 3.3.1 Identify the apparatus in the photograph above. (1)
- 3.3.2 Name the function of this apparatus in sheep production. (1)
- 3.3.3 Give TWO reasons why sheep farmers prefer this apparatus to other apparatuses. (2)
- 3.3.4 At what age should this process be performed on lambs under intensive production conditions? Give a reason to substantiate the answer. (2)
- 3.3.5 Name ONE other apparatus that can be used for the same purpose as the one identified in QUESTION 3.3.1. (1)

3.4

DISEASE	ORGANISM: BACTERIUM, VIRUS, PROTOZOAN OR FUNGUS	SYMPTOMS	TYPE OF ANIMAL
Mastitis	A	Inflammation in the udder	Farm animals
Rift Valley fever	Virus	High abortion rate	B
Redwater	C	Fever, anaemia and death	Cattle
D	Fungus	Forms a crust on the skin	Wool sheep

- 3.4.1 Complete the table above by writing down the missing information for **A**, **B**, **C** and **D**. (4)
- 3.4.2 Identify a disease in the table that affects only dairy cows. (1)
- 3.4.3 Suggest a management practice that may be used to prevent redwater. (1)
- 3.4.4 Name the farm animal that is most susceptible to mastitis. (1)

3.5 *Lantana camara* and *Dichepetalum cymosum* or poison leaf ('gifblaar') are two of the most common and important hepatotoxic plants for farm animals.

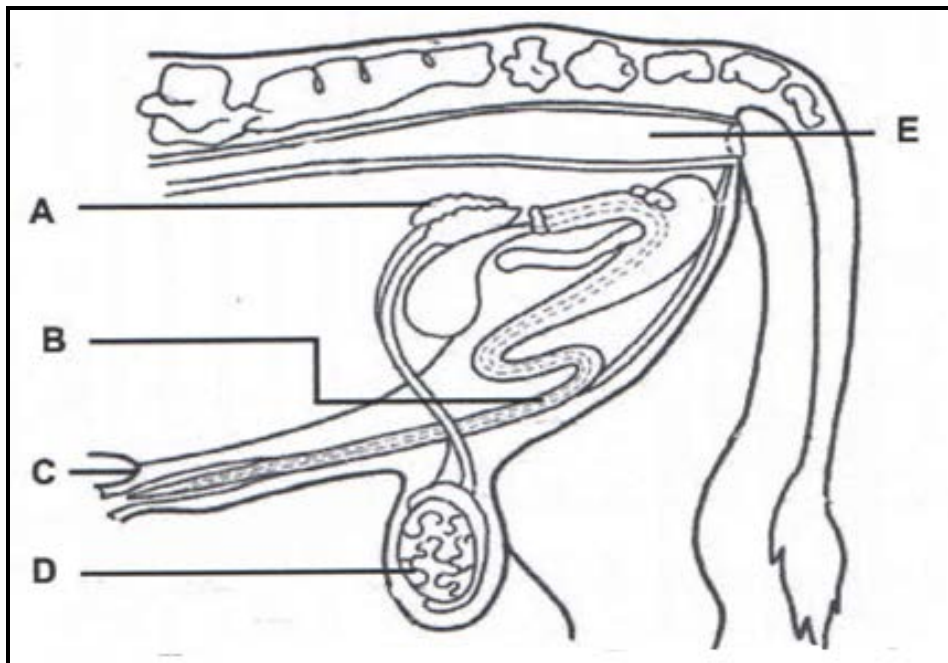
- 3.5.1 State a common name/phrase used to describe plants in the scenario above. (1)
- 3.5.2 Name the farm animal which is mainly affected by poison leaf ('gifblaar'). (1)
- 3.5.3 Give TWO examples of other plants in this category. (2)
- 3.5.4 Give examples of TWO types of sheep who are most susceptible to these types of plants. (2)
- 3.5.5 Name the white granular inorganic substance fed to ruminants as a protein substitute, which has the same effect as the plants mentioned above if it is fed in excess. (1)

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QUESTION 4: ANIMAL REPRODUCTION

Start this question on a NEW page.

4.1 The diagram below represents the reproductive organs of a bull.



4.1.1 Write down the letter (**A–E**) that represents the part where the following takes place:

- (a) A common excretory canal for urine and semen (1)
- (b) Produces the male sex hormone (1)
- (c) Secretes the liquid that serves as an energy source for sperm cells (1)

4.1.2 The bull may be sterile due to congenital defects in part **D**. Name TWO of these defects. (2)

4.1.3 State TWO functions of the hormone secreted by part **D**. (2)

4.2 A farmer can save time and labour cost by bringing all the cows on heat at approximately the same time.

4.2.1 Identify the process in the scenario above. (1)

4.2.2 Name ONE hormone that will induce the process identified in QUESTION 4.2.1. (1)

4.2.3 State TWO financial implications of the process identified in QUESTION 4.2.1. (2)

4.3 Re-arrange, in sequential order, the following statements (A–E) relating to the stages of mating. Write down only the letter of the statement.

- A Penetration of the vagina. (1)
- B Male animal jumps off. (1)
- C Bull shows interest in cows due to increased level of pheromones. (1)
- D Male animal stands on his hind legs with his chest on the female animal's rump. (1)
- E Bull releases sperm. (1)

4.4 Farm animals often have difficulty giving birth.

- 4.4.1 Write down the appropriate scientific term to describe difficulties in giving birth. (1)
- 4.4.2 Name THREE conditions that may interfere with normal parturition. (3)
- 4.4.3 Name the indigenous lubricant used by breeders to assist cows with the delivery of calves. (1)

4.5 The table below shows the percentage (%) of fat, protein and lactose in the milk of dairy cows during certain weeks of the year.

WEEKS	FAT (%)	PROTEIN (%)	LACTOSE (%)
5	4,0	3,0	5,0
10	4,1	3,2	4,9
15	4,2	3,5	4,8
20	4,3	3,6	4,8
25	4,4	3,7	4,6
30	4,5	3,8	4,4
35	4,1	4,0	4,3
40	4,5	4,1	4,2
45	4,6	4,2	4,1

- 4.5.1 Draw a line graph to represent the fat and lactose percentages during certain weeks of the year. (6)
- 4.5.2 What is the trend shown by the protein content of milk? (2)
- 4.5.3 Name TWO other constituents of the first milk produced after calving, except for those named in the table. (2)

4.6 Once semen has been collected it needs to be processed as quickly as possible. During processing semen is diluted with various substances to preserve it for artificial insemination later on.

4.6.1 Name TWO substances normally used as dilutants of semen. (2)

4.6.2 State TWO functions of the dilutants mentioned in QUESTION 4.6.1. (2)
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TOTAL SECTION B: 105
GRAND TOTAL: 150