



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATION

AGRICULTURAL SCIENCES P1

2015

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 the calculations, including formulae, where applicable, and round off the answers to TWO decimal places.
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 The part of the alimentary canal of the fowl that stores, soaks and moistens food:

- A Crop
- B Proventriculus
- C Ventriculus
- D Cloaca

1.1.2 ... is a solvent and transport medium during the absorption of food and minerals.

- A Bile
- B Bolus
- C Duodenal fluid
- D Water

1.1.3 The regurgitation of food from the reticulorumen into the buccal cavity is caused by ...

- A high acidity in the reticulorumen.
- B the presence of coarse material in the rumen.
- C an increase in the number of protozoa.
- D the accumulation of methane and carbon dioxide gas.

1.1.4 The following could be associated with a stressful condition experienced by pigs:

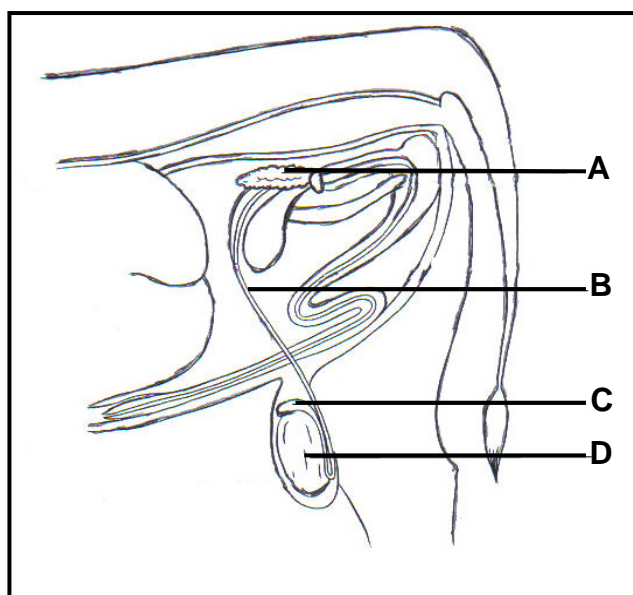
- A Eating hurriedly
- B Lying calmly
- C Belly nibbling
- D Wallowing in water

1.1.5 Tail docking in sheep is done to ...

- A make animals ready for agricultural shows.
- B improve wool and meat quality directly.
- C enhance effective mating and prevent blowfly infestation.
- D improve their ability to digest roughage.

- 1.1.6 The most recommended precautionary measure when transporting farm animals:
- A Transport male and female animals together
 - B Travel when the roads are not busy and you can travel fast
 - C Transport sheep, goats and cattle together
 - D Ensure the loading/unloading ramps are high and strong enough
- 1.1.7 The following are examples of bacterial diseases in farm animals:
- A Rabies, mastitis and coccidiosis
 - B Tuberculosis, anthrax and mastitis
 - C Swine flu, redwater and lumpy wool
 - D Ringworm, anaplasmosis and mastitis
- 1.1.8 The process of fertilisation of the ovum by the spermatozoon takes place in the ...
- A Fallopian tube.
 - B cervix.
 - C uterus.
 - D mammary glands.
- 1.1.9 Oogenesis in animals takes place in the ...
- A spermatogonium.
 - B corpus luteum.
 - C oviduct.
 - D ovary.

1.1.10 The organ labelled **D** in the diagram below contains Sertoli cells which produce ...



- A spermatozoa.
- B testosterone.
- C nutrients for the spermatozoa.
- D libido.

(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.

Example: 1.2.6

COLUMN A		COLUMN B
A:	Roughage	A feed with a high percentage of TDN
B:	Concentrate	

Answer: 1.2.6 B only

COLUMN A			COLUMN B
1.2.1	A:	Bone meal	Source of vitamin A
	B:	Green lucerne	
1.2.2	A:	Mites and blowflies	External parasites
	B:	Ticks and mites	
1.2.3	A:	Maize bulb	Poisonous plants
	B:	Thorn apple	
1.2.4	A:	Testosterone	Responsible for the development of secondary masculine sexual characteristics
	B:	Relaxin	
1.2.5	A:	Perimetrium	Embryonic membrane
	B:	Tunica albugenia	

(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) in the ANSWER BOOK.
- 1.3.1 A gutter-shaped structure which carries milk from the oesophagus directly into the abomasum in young lambs
- 1.3.2 The flora population in the reticulorumen responsible for the digestion of crude fibre
- 1.3.3 The colour of the flag or aid attached to a stick or pole to signal danger when moving animals by road
- 1.3.4 The process of cell division through which the primary spermatocytes divide into secondary spermatocytes
- 1.3.5 The condition whereby twins of the opposite sex develop in the same uterus of a cow and the female calf is sterile (5 x 2) (10)
- 1.4 Change the UNDERLINED WORD in each of the following statements to make the statements TRUE. Write only the answer next to the question number (1.4.1–1.4.5) in the ANSWER BOOK.
- 1.4.1 The enlargement of the thyroid gland in pigs is a result of selenium deficiency.
- 1.4.2 Pelleting is a process of heating grains to expand it and improve its palatability.
- 1.4.3 Prostaglandins are usually added to animal feeds to reduce stress and promote calmness for a greater feed intake.
- 1.4.4 Animals not depending on the environmental temperature are referred to as poikilothermic animals.
- 1.4.5 The hormone responsible for the release of milk from the udder is insulin. (5 x 1) (5)

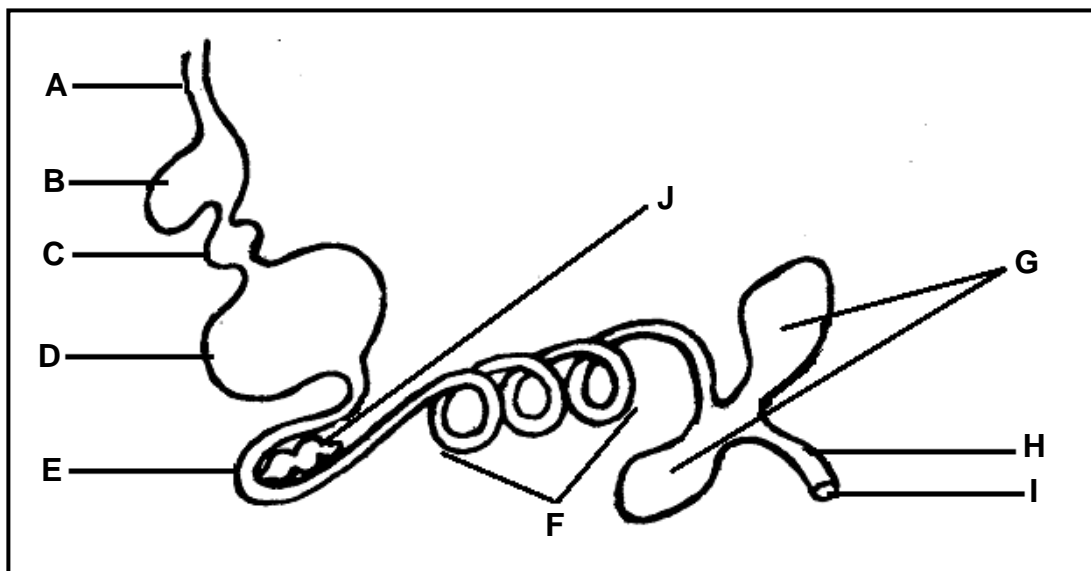
TOTAL SECTION A: 45

SECTION B

QUESTION 2: ANIMAL NUTRITION

Start this question on a NEW page.

2.1 The diagram below represents the alimentary canal of a farm animal.



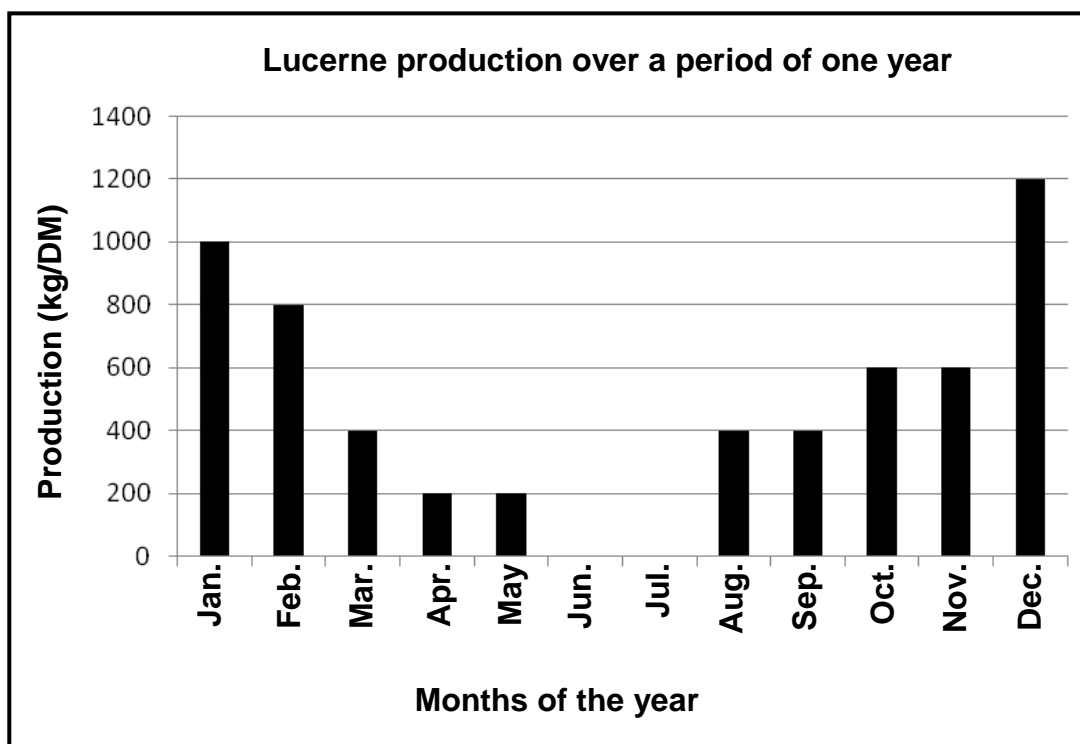
- 2.1.1 Identify the type of farm animal represented in the diagram above. (1)
- 2.1.2 Motivate the answer to QUESTION 2.1.1 by naming THREE structures in the diagram above. (3)
- 2.1.3 Write down the letter (A–J) of the part where each of the following occurs:
 - (a) Excretion (1)
 - (b) Microbial fermentation (1)
 - (c) Mechanical digestion (1)

2.2 The data below is available to a farmer to formulate a ration for dairy cows in early lactation.

REQUIRED DIGESTIBLE PROTEIN VALUE (DP)	FEED	DIGESTIBLE PROTEIN VALUE (DP) (%)
17%	Maize	9%
	Soya oilcake	44%

- 2.2.1 Use the Pearson square method to balance this ration. (3)
- 2.2.2 Calculate the percentage of maize and soya oilcake that is required in the ration. Show ALL calculations. (5)

- 2.3 The graph below illustrates the production of lucerne over a period of one year.



- 2.3.1 Calculate the total quantity of lucerne (kg/DM) required per year if 600 kg of lucerne is required per month. (2)
- 2.3.2 Determine from the graph if there will be enough feed for the animals for a period of one year. Give a reason for the answer. (2)
- 2.3.3 Deduce from the graph the month with the highest level of production. (1)
- 2.3.4 Indicate TWO alternative feeds to fulfil the feed requirements of the animals without selling some of them, in case the farmer does not produce enough lucerne. (2)

- 2.4 A sow farrowed ten piglets in a concrete pen. After the piglets were weaned, it was observed that the piglets suffer from iron deficiency.

- 2.4.1 What is the appropriate term for an *iron deficiency*? (1)
- 2.4.2 List THREE visible signs associated with the condition named in QUESTION 2.4.1. (3)
- 2.4.3 State TWO precautionary measures that could be taken to avoid this condition in piglets. (2)

- 2.5 A concentrate ration was formulated and analysed for dairy cows. This ration had a composition as indicated in the table below.

DIGESTIBLE PROTEIN (%)	TOTAL DIGESTIBLE NUTRIENTS (%)
10	80

- 2.5.1 Calculate the nutritive ratio of this ration. Show ALL calculations. (4)
- 2.5.2 Indicate the suitability of this ration to dairy cows. (1)
- 2.5.3 Give TWO reasons to support the answer to QUESTION 2.5.2. (2)
- [35]**

QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

Start this question on a NEW page.

- 3.1 Two farmers, FARMER A and FARMER B, have each started an intensive production venture with young lambs. The lambs are housed in different housing layouts as indicated in the table below.

FARMER A	FARMER B
Houses are long and narrow	Houses are wide
Oriented from east to west	Faces north
Built on a slight slope	Built on level ground
Cement floors	Soil on the floor
Dry bedding	Becomes muddy when wet

- 3.1.1 Give a reason why FARMER A used the following housing layouts for his lambs:

- (a) Building on a slight slope (1)
- (b) Dry bedding (1)
- (c) Cement floor (1)
- (d) Long narrow houses orientated from east to west (1)

- 3.1.2 Explain the impact of the following conditions on FARMER B's production:

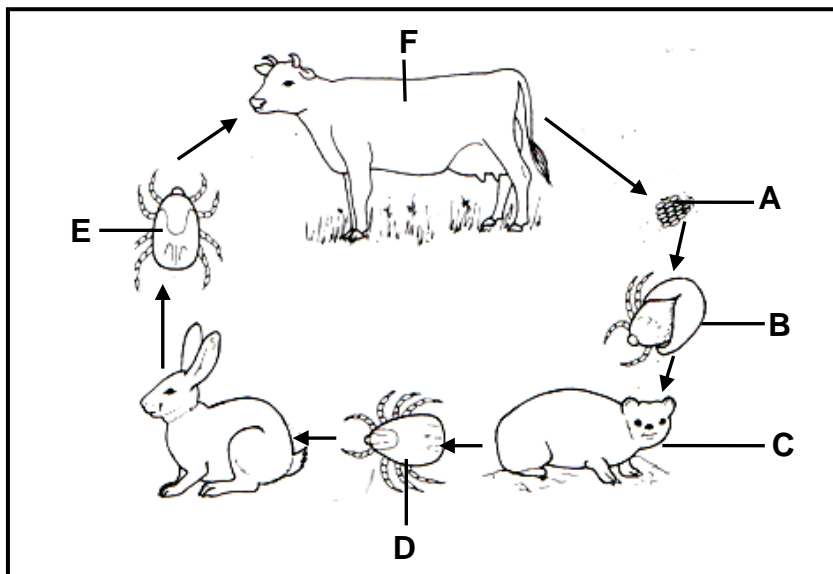
- (a) Housing facing north (2)
- (b) Muddy floor (2)
- (c) Build on level ground (2)

- 3.2 The table below indicates the feed consumption and average weight gain for beef cattle.

AVERAGE FEED CONSUMPTION (KILOGRAMS PER DAY)	AVERAGE WEIGHT GAIN (GRAMS PER DAY)
1	80
2	160
3	240
4	320
5	400
6	475

- 3.2.1 Use the data in the table and draw a line graph to indicate the average feed consumption and average weight gain for beef cattle. (6)
- 3.2.2 Deduce from the graph the relationship between feed consumption and weight gain. (2)

3.3 The diagram below indicates various stages of the life cycle of a parasite.



- 3.3.1 Give the name and indicate the type of parasite represented above. (2)
- 3.3.2 Classify the parasite according to its life cycle as indicated in the diagram above. (1)
- 3.3.3 Write down the letter (A–F) that represents each of the following stages in the life cycle of the parasite in the diagram above:
- (a) The larvae that hatches from the eggs (1)
 - (b) The nymph that will feed on the second host (1)
 - (c) The tick that will feed on the third host (1)
 - (d) The first host (1)
- 3.3.4 Name TWO damaging effects this parasite could have on livestock. (2)

3.4

The arable land on a certain farm is normally used for various crops and planted pastures, some under irrigation. The irrigated pasture crops are used for dairy cattle and sheep in a feedlot.

On the natural pastures, trees are planted and a rotational grazing system with the correct stocking rate is practised with commercial Nguni cattle.

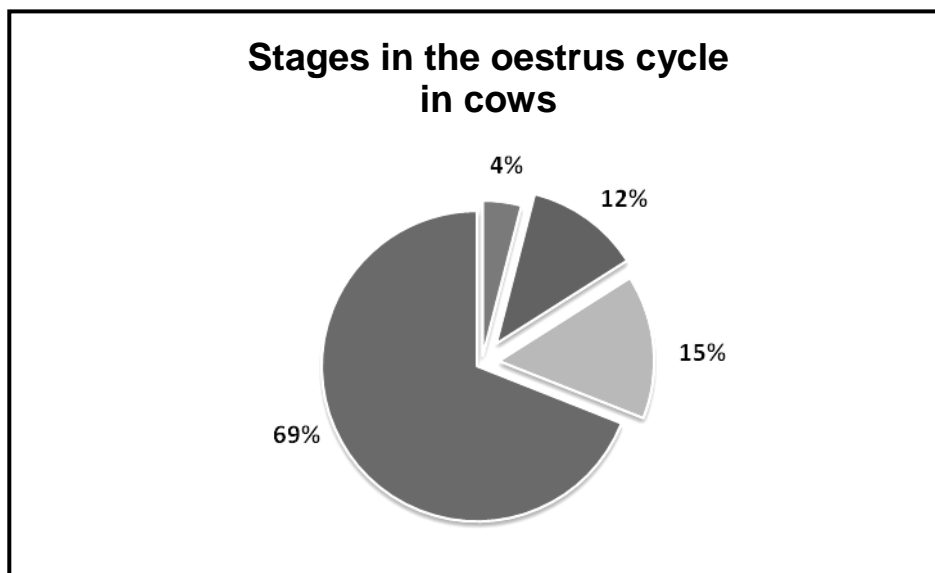
- 3.4.1 Define the term *intensive production system*. (2)
- 3.4.2 Give evidence of TWO intensive production systems in the scenario above. (2)
- 3.4.3 Give TWO reasons for planting trees on natural pastures. (2)
- 3.4.4 State the scientific term for the farming system practised with the commercial Nguni cattle. (1)
- 3.4.5 Indicate how the feedlot can influence the stock density on the farm. (1)

[35]

QUESTION 4: ANIMAL REPRODUCTION

Start this question on a NEW page.

4.1 The pie chart below represents the oestrus cycle in cows.



- 4.1.1 Indicate the duration (in days) of the oestrus cycle in non-pregnant cows. (1)
- 4.1.2 Which percentage in the pie chart corresponds with the stage at which the cow will allow mating with a bull? (1)
- 4.1.3 Name the stage and hormone responsible for the condition in QUESTION 4.1.2. (2)
- 4.1.4 Indicate the hormone responsible for each of the following percentages as represented in the pie chart:
- (a) 4% (1)
 - (b) 12% (1)
 - (c) 15% (1)
 - (d) 69% (1)

4.2 A farmer had four bulls and 100 dairy cows on a farm. Mysteriously, all the bulls were stolen. The farmer had no money to replace the bulls and therefore started looking for other options. The farmer was advised by an agricultural extension officer to consider using artificial insemination (AI).

4.2.1 Define the term *artificial insemination*. (3)

4.2.2 State TWO prerequisites for the successful administration of artificial insemination. (2)

4.2.3 List THREE dilutants commonly used to dilute semen. (3)

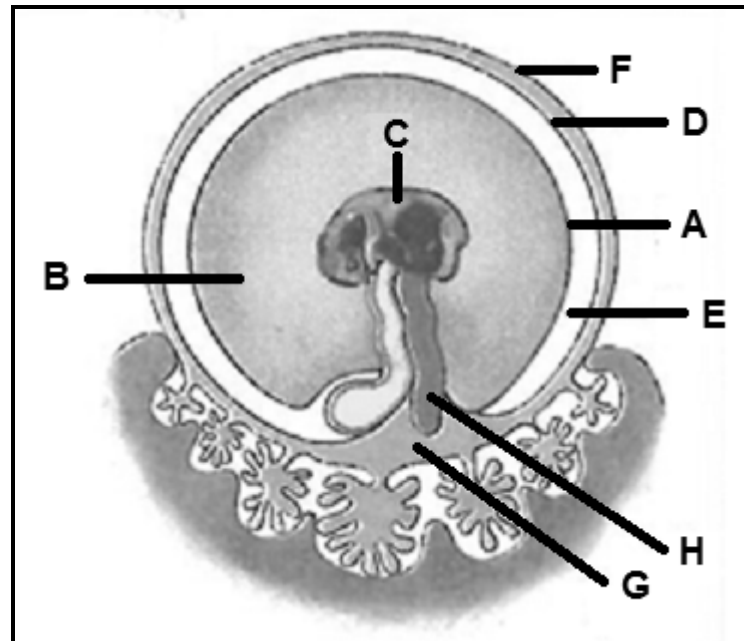
4.2.4 Suggest ONE method a farmer may adopt in order for the cows to produce offspring without administering AI. (1)

4.3 Farm animals should be sexually mature and produce healthy and viable gametes. This should be followed up with the process of mating when the female animals are on heat.

4.3.1 State the FIVE stages of mating in sequential order. (5)

4.3.2 List THREE factors which regulate the mating behaviour of bulls. (3)

4.4 The illustration below shows the developing embryo in the uterus of a cow.



4.4.1 Write down the letter (A–H) and the name of the structure in the illustration above that matches each of the following descriptions:

- (a) The structure that brings blood of the mother and the foetus in close contact without mixing it (2)
- (b) The membrane that protects the embryo from shocks and injuries (2)
- (c) The membrane surrounding the foetus closest to the uterus of the mother (2)

4.4.2 Name THREE functions of the part labelled **B**. (3)

4.4.3 Name the substance that is enclosed by the membrane labelled **A**. (1)
[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150