NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P1
FEBRUARY/MARCH 2015
MEMORANDUM

MARKS: 150

This memorandum consists of 9 pages.
SECTION A

QUESTION 1

1.1  1.1.1  D ✓✓  
     1.1.2  B ✓✓  
     1.1.3  D ✓✓  
     1.1.4  A ✓✓  
     1.1.5  A ✓✓  
     1.1.6  D ✓✓  
     1.1.7  B ✓✓  
     1.1.8  C ✓✓  
     1.1.9  A ✓✓  
     1.1.10 D ✓✓  
(10 x 2)  (20)

1.2  1.2.1  Both A and B ✓✓  
     1.2.2  B only ✓✓  
     1.2.3  A only ✓✓  
     1.2.4  None ✓✓  
     1.2.5  B only ✓✓  
(5 x 2)  (10)

1.3  1.3.1  Biological value/BV ✓✓  
     1.3.2  Zinc/Zn ✓✓  
     1.3.3  Plywood ✓✓  
     1.3.4  Oogenesis/ovigenesis ✓✓  
     1.3.5  Reproductive ✓✓  
(5 x 2)  (10)

1.4  1.4.1  Pearson ✓  
     1.4.2  Maintenance ✓  
     1.4.3  Rectum ✓  
     1.4.4  Acrosome ✓  
     1.4.5  Embryo transfer ✓  
(5 x 1)  (5)

TOTAL SECTION A:  45
SECTION B

QUESTION 2: ANIMAL NUTRITION

2.1 Alimentary canals of two farm animals

2.1.1 Type of digestive systems represented by:
   (a) Ruminant ✓
   (b) Cattle/cows/sheep/goat/game ✓
   (c) Non-ruminant/monogastric animal ✓
   (d) Pig ✓

2.1.2 Letter and name where hydrochloric acid is secreted in diagram A
   • D ✓
   • Abomasum/true stomach/milk stomach ✓

2.2 Planning fodder flow feed flow and fodder flow production

2.2.1 Definition of fodder flow
   • A strategic plan ✓
   • To ensure enough fodder ✓
   • To meet the requirements of all the animals ✓
   • Throughout the year ✓
   • In terms of quality and quantity ✓

2.2.2 Aspects in planning for a fodder flow
   (a) Economic viability:
      • The farmer to take measures of ensuring that the fodder ✓ is cost effective/cheap ✓
   (b) Sustainability:
      • Planning to ensure that the fodder ✓ is always available to livestock ✓

2.3 Digestibility co-efficiency

2.3.1 Calculation of digestibility co-efficiency

\[
DC = \frac{\text{Dry matter intake (kg)} - \text{dry mass of manure (kg)} \times 100}{\text{Dry matter intake (kg)}}
\]

\[
= \frac{25 \text{ kg} \times \frac{15}{100}}{25 \text{ kg} - 3,75 \text{ kg}} = 21,25 \text{ kg} \times 100
\]

\[
= \frac{21,25 \text{ kg} - 8 \text{ kg} \times 100}{21,25 \text{ kg}} = 1
\]

\[
= 62,35 \text{ OR } 62,4\% ✓
\]
2.3.2 **Implication of the answer in QUESTION 2.3.1**
- The bulk of the feed (62.35%) ✓ is digested and absorbed by the heifer ✓

OR
- The lesser percentage of the feed (37.65%) ✓ was not digested hence not absorbed by the heifer ✓

2.4 **A table on the nutritive ratio (NR)**

2.4.1 **The ration most suitable for the following:**
(a) Fattening of old ewes – A ✓
(b) Ewes in the last 4 weeks of pregnancy – B ✓
(c) Young growing animals – B ✓

2.4.2 **Reason for the ration in 2.4.1(a)**
- Ratio is wide ✓
- Feed has higher lipid/carbohydrate/energy content ✓
- Feed has lower protein content ✓
- Ewes need more energy than protein ✓

(Any 1)

2.4.3 **Ration with high levels of:**
(a) Maize – A ✓
(b) Fish meal – B ✓

2.4.4 **The implication of the nutritive ratio of ration B**
- Ration has higher protein content ✓
- Recommended for growth, production and reproduction ✓
- Ration has lower lipid/carbohydrate/energy content ✓

(Any 2)

2.5 **Diagram on mineral supplements**

2.5.1 **Method of mineral supplement**
- Mineral lick ✓

(1)

2.5.2 **TWO minerals that could be supplemented**
- Calcium ✓
- Sodium ✓
- Phosphorus ✓
- Nitrogen ✓

(Any 2)

2.5.3 **The partial protein substitute**
- Non-protein nitrogenous substance (NPN)/biuret/urea ✓

(1)

2.5.4 **Role of growth regulators**
(a) Hormones – will stimulate metabolic reactions ✓ that will lead in increased growth rate ✓
(b) Antibiotics – will provide immunity ✓ thereby increasing resistance to diseases ✓

(4)
QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

3.1 Animal production systems

3.1.1 Identification of animal production systems.
A: Extensive production system ✓
B: Intensive production system ✓

3.1.2 Comparison of the TWO production systems
(a) Capital investment – Low capital/technology input in extensive production system ✓ and large capital/technology input in intensive production system ✓
(b) Area/space of land occupied – Low animal concentration in a large area in extensive production system ✓ and high animal concentration in a small area in intensive production system ✓

3.1.3 TWO examples of intensive production system
• Cage ✓
• Battery (layers/broilers) ✓
• Deep litter system ✓ (Any 2)

3.2 Structures/practices for handling animals

3.2.1 A single strand of movable electrical wire ✓

3.2.2 A rope with a halter to tie animals to a pole ✓

3.2.3 A separate crush ✓

3.2.4 Single strand of movable electric wire ✓

3.3 Scenario on solar radiation

3.3.1 THREE measures to reduce heat stress under intensive conditions
• Spray/Fogger with water ✓
• Insulation ✓
• Fans/conditioners/ventilators ✓
• Housing systems/orientation ✓ (Any 3)

3.3.2 Correlation between high environmental temperature and feed consumption
• The higher the temperature ✓
• the less the feed intake ✓
3.4 Data on average body temperature and pulse rate in dairy cows

3.4.1 Line graph on the volume of stimulant and the growth response

![Line graph of growth stimulants against growth response](image)

**Criteria/marking guidelines**
- Correct heading ✓
- Y-axis – correct labelling (growth response) ✓
- X-axis – correct labelling (volume of growth stimulants) ✓
- Correct units ✓
- Accuracy/correct plotting ✓
- Line graph ✓

(6)

3.4.2 TWO growth stimulants used in animal production systems
- Thyroid regulators ✓
- Hormones ✓
- Antibiotics ✓
- Tranquilisers ✓

(Any 2)

(2)

3.4.3 Growth response of the heifers at a volume of 15 ml
- 395 kg ✓

(1)
3.5 **Internal parasites**

3.5.1 **Identification of the type of a parasite**
- Internal parasite

3.5.2 **TWO negative impacts of an internal parasite**
- Depriving host of nutrients
- Sucks host’s blood/causes anaemia
- Lesions/cysts inside host
- Decreases host’s productivity
- Progressive weakness
- Death

(Any 2)

3.5.3 **How the animal is infected**
- The animal will ingest
- Metacercaria through grazing

(2)

3.5.4 **Intermediate host**
- Snail

(1)

3.5.5 **THREE pasture management measures of controlling Internal parasite**
- Rotational grazing
- Resting of infected pastures
- Allowing animals that are resistant to specific internal parasites
- Avoid wet places
- Use of zero grazing
- Removal of manure/hygienic measures

(Any 3)

[35]

**QUESTION 4: ANIMAL REPRODUCTION**

4.1 **The diagram below represents the reproductive canal of a farm animal**

4.1.1 **Process in part D**
- Spermatogenesis

(1)

4.1.2 **Identify parts A, B and E**
- **Label A** – Seminal vesicles/vesicular glands
- **Label B** – Vas deferens/sperm duct
- **Label E** – Scrotum/scrotal sac

(3)
4.1.3 **TWO congenital defects of part D**
- **Cryptorchidism** – the condition whereby the testes remain in the abdominal cavity and do not descend into the scrotum
- **Hypoplasia** – the condition whereby the testes are underdeveloped (4)

4.1.4 **TWO functions of the part C**
- Storage of semen
- Maturation of sperms
- Secretion of buffer
- Transportation of semen
- Concentration of semen (Any 2) (2)

4.2 **Oestrus**

4.2.1 **Oestrus**
- It is a period when non pregnant female animals are receptive to male animals/allow mating (2)

4.2.2 **THREE signs of oestrus**
- Vulva is swollen/reddish
- Mucous discharge
- Cow is restless and bellows often
- Mounting other cows
- Isolation
- Decrease in food intake/loss of appetite
- Legs and flanks are muddy
- Allows mating (Any 3) (3)

4.2.3 **THREE practical methods to identify cows on heat**
- Observation of animal behaviour
- Place a bull in pen near the cows
- Bulls marked with a chin ball marker
- Tail paint on tail head/tail paint markers
- Heat mount detectors (Any 3) (3)

4.3 **Graph of Oestrogen/Progesterone levels in a cow over 22 days**

4.3.1 **Day cow will mate with a bull**
- Day 4–6 (1)

4.3.2 **Motivation**
- Highest level of oestrogen
- Cow will be on heat (2)

4.3.3 **Day of ovulation**
- Day 4–5 (1)
4.3.4 **Stage when progesterone is highest**
- Met-oestrus ✓

4.3.5 **Whether cow became pregnant**
- Cow did not become pregnant ✓

**Motivation**
- Progesterone levels declined/decreased ✓ after day 16 ✓

4.4 **Modern technologies: artificial insemination (AI), synchronization, etc.**

4.4.1 **Description of synchronisation of oestrus**
- Making the oestrus cycle of a number of female animals ✓
- to occur approximately at the same time ✓

4.4.2 **THREE advantages of AI in dairy cows**
- Improving the genetic quality of the offspring ✓
- No need to buy/manage expensive bulls ✓
- Can use semen of one bull to inseminate many cows ✓
- Prevents the spread of sexually transmitted diseases ✓
- Inferior sires can be detected ✓
- Can use semen from a bull after injury or death ✓
- Animals of different size can be mated without injury ✓
- Semen can be frozen for many years ✓
- Semen can be transported and used worldwide ✓
- An ejaculation of one bull can be used for many cows ✓
- Higher conception rate can be achieved ✓ (Any 3)

4.4.3 **FOUR sequential stages used in ET**
- Synchronisation of oestrus in donor and recipient cows ✓
- Superovulation of donor cows ✓
- Insemination of donor cows ✓
- Washing of the embryo from the uterus ✓
- Transfer embryo into the uterus of recipient cows ✓ (Any 4)

[35]