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 ✓ (Any 2)

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

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

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

\[
= \frac{21,25 \text{ kg} - 8 \text{ kg} \times 100}{21,25 \text{ kg}} = 62,35 \text{ OR } 62,4\%.
\]
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)

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 ✓ (3)

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) (1)

2.4.3 Ration with high levels of:
(a) Maize – A ✓
(b) Fish meal – B ✓ (2)

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)

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)

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)
[35]
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 ✓
   (2)✓
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

![Graph: Volume of growth stimulant against the growth response]

**Line graph of growth stimulants against growth response**

**Criteria/markig 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✓

3.5.4 **Intermediate host**
- Snail✓

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)

**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✓

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✓
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

4.1.4 TWO functions of the part C
- Storage of semen
- Maturation of sperms
- Secretion of buffer
- Transportation of semen
- Concentration of semen

4.2 Oestrus
4.2.1 Oestrus
- It is a period when non pregnant female animals are receptive to male animals/allow mating

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

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

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

4.3.2 Motivation
- Highest level of oestrogen
- Cow will be on heat

4.3.3 Day of ovulation
- Day 4–5
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

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

TOTAL SECTION B: 105
GRAND TOTAL: 150