NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P1

NOVEMBER 2018

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 9 pages.
# SECTION A

## QUESTION 1

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

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

1.3  
1.3.1  Parakeratosis ✓✓
1.3.2  Nipple/nipple drinker ✓✓
1.3.3  Ejaculation ✓✓
1.3.4  Meiosis ✓✓
1.3.5  Spermatozoon/sperm cell ✓✓  (5 x 2)  (10)

1.4  
1.4.1  Pearson ✓
1.4.2  Free range/back yard/semi intensive ✓
1.4.3  Infectious/contagious/pathogenic ✓
1.4.4  Dystocia ✓
1.4.5  Mesoderm ✓  (5 x 1)  (5)

**TOTAL SECTION A:**  45
SECTION B

QUESTION 2: ANIMAL NUTRITION

2.1 Schematic images of the internal parts in the alimentary canal of ruminants

2.1.1 Identification of parts
   B Omasum ✓
   C Reticulum ✓

2.1.2 The function of PART B
   • Traps hard and indigestible substances/separate coarse and fine food materials ✓
   • Grinding of food particles ✓
   • Sends large substances back to the rumen ✓
   • Absorption of water ✓
   • Absorption of some volatile fatty acids ✓

2.1.3 Structures in Part A responsible for the production of heat
   Heating rods/papillae ✓

2.1.4 ONE requirement of rumen microbes in ruminants
   • Easily digestible carbohydrates/regular intake of feed ✓
   • Sufficient mineral nutrients ✓
   • Sufficient nitrogen ✓
   • Anaerobic/oxygen free conditions ✓
   • Neutral environment/suitable pH/slightly acidic/pH 5.5 - 6.5 ✓
   • Presence of carbon dioxide/CO₂ ✓
   • Temperature of 38 - 42 °C/warm conditions ✓
   • Continual removal of waste ✓
   • Presence of volatile fatty acids ✓
   • Adequate moisture conditions ✓

2.2 Digestibility trial with ruminant animals

2.2.1 The digestibility coefficient
   \[
   \text{Dry matter intake (kg)} - \text{Dry mass of manure (kg)} \times 100 \ \checkmark \\
   \text{Dry matter intake (kg)}
   \]
   DM = \(\frac{10}{100}\) \times 12kg = 1.2kg (moisture content)
   OR
   DM = \(\frac{90}{100}\) \times 12kg = 10.8kg (dry matter) ✓

   = \(\frac{(12kg - 1.2kg) - 7kg \times 100}{10,8kg}\)
   OR
   = \(\frac{10.8 - 7kg \times 100}{10.8kg}\)
   = \(\frac{35,19/35,2}{\%}\) ✓

(Any 1)
2.2.2 Implication of calculated DC
- More (64.8%) of the feed was excreted ✓
- Less (35.2%) of the feed was digested and absorbed ✓
- High crude fibre content ✓

(Any 1) (1)

2.2.3 Classification of the feed
Roughage ✓

(1)

2.3 Animal feeds

2.3.1 Feed suitable for young growing animals
Feed A ✓

(1)

2.3.2 Reason for the answer in QUESTION 2.3.1
- It has a narrow nutritive ratio/NR of 1:3.4 ✓
- High protein content/DP of 18% ✓

(Any 1) (1)

2.3.3 FEED B not recommended as a main feed for non-ruminants
It has a high crude fibre content/CF of 17% ✓ and a resultant low TDN/55% which is less than 60% ✓

(2)

2.3.4 Relationship between total digestible nutrient and crude fibre content of FEED A.
The lower the crude fibre content ✓ the higher the total digestible nutrients ✓

(2)

2.4 Energy value and the energy losses (per kg)

2.4.1 Energy loss in manure if the farm animal consuming 5kg of feed
42.5J ✓

(1)

2.4.2 Identification of the gas with the highest energy loss
Methane ✓

(1)

2.4.3 Calculation of the energy available for growth and production
NE = GE – (energy lost in manure + in urine + as heat + methane)
= 18.5J – 14J/(8.5J + 1.2J + 1.8J + 2.5J) ✓
NE = 4.5 ✓ J ✓

(3)

2.5 Feed flow programme

2.5.1 Calculation of deficit for September
(66 – 55) tons ✓
= 11 tons ✓

(2)
2.5.2 Bar graph of the available feed and the requirement of animals for a year

![Bar graph of the available feed and the required feed for a year](chart)

**CRITERIA/RUBRIC/MARKING GUIDELINES**
- Correct heading ✓
- X axis: Correctly calibrated with label (Months of the year) ✓
- Y axis: Correctly calibrated with label (Total feed available and required) ✓
- Correct units (ton) ✓
- Bar graph ✓
- Accuracy ✓ (6)

2.6 Ways of supplementing feeds

2.6.1 Soil sods ✓ (1)
2.6.2 Urea ✓ (1)
2.6.3 Implants ✓ (1)
2.6.4 Drinking troughs ✓ (1)

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**QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL**

3.1 Animal production systems

3.1.1 Identification of production systems
- A Extensive production system ✓ (1)
- B Intensive production system ✓ (1)
3.1.2 Comparison of the two production systems with reference to capital investment
A Less capital invested ✓ (1)
B More capital invested ✓ (1)

3.2 Feeding programme for broiler production
3.2.1 Comparison of the nutritional requirement of broilers in growth stages
A Broilers need a high protein diet ✓ (1)
B Broilers need a high energy diet ✓ (1)

3.2.2 Reason for nutritional requirements for growth stage A
For growth ✓ (1)

3.2.3 TWO other factors to increase production in broilers
• Controlled environment/proper housing ✓
• Breeding ✓
• Good health/hygienic conditions ✓
• General enterprise management
• Enterprise technical skills/skilled labour ✓ (Any 2) (2)

3.3 Housing facilities for breeding pigs
3.3.1 Indication of facility
Farrowing pen/crate ✓ (1)

3.3.2 Design feature of the facility
Partitioned to accommodate the sow to lay on her side/structured to separate the sow from the piglets ✓ (1)

3.3.3 Equipment/material found in the facility, to regulate temperature
(a) Air conditioners/heaters/infra-red lamps/heated flooring ✓ (1)
(b) Bedding/litter materials ✓ (1)

3.4 Farm animal productivity
3.4.1 Key condition that impacts negatively to production
Adverse weather conditions/excessive hot/cold conditions ✓ (1)

3.4.2 TWO economic impacts of this condition to the farmer
• More money spent on feeding during cold weather ✓
• Loss of production/income due to uncontrolled conditions ✓ (2)

3.4.3 Measures the farmer can take to reduce the impact of varying temperatures in
(a) Provision of shade/cooling/provide enough water ✓ (1)
(b) Provision of shelter/move livestock closer to home ✓ (1)

3.5 Handling facilities in an intensive production system
3.5.1 Identification of the facilities
A Holding pen ✓ (1)
C Crush ✓ (1)
3.5.2 Main purpose of a head clamp
To restrain/contain animals to stand still ✓ (1)

3.5.3 TWO design features of a crush
- Must be strong/durable ✓
- High/wide enough for specific type of animal ✓
- No sharp curves ✓
- Safe for animals/handlers ✓
- Clean ✓ (Any 2) (2)

3.6 Diseases in farm animals

The missing information
A Rabies ✓ (1)
B Biting by infected animals/Saliva/Body fluids ✓ (1)
C Bacteria ✓ (1)
D Red water ✓ (1)
E Blue tick bite ✓ (1)
F Hair loss/scally/itchy ring like lesions/crusty grey/white scabs ✓ (1)

3.7 Life cycle of a parasite in farm animals

3.7.1 The parasite
Tape worm ✓ (1)

3.7.2 Indication of hosts
Two hosts ✓ (1)

3.7.3 TWO economic implications of the parasite to farmers
- Loss of production ✓
- Infected carcasses are degraded at the abattoir ✓
- Loss of income/profit ✓
- High cost of treatment ✓ (Any 2) (2)

3.7.4 TWO roles of the state in controlling the spread of internal parasites
- Meat testing/inspection/hygiene ✓
- Research/outreach to farmers ✓
- Legislation on the duties/roles/responsibilities of owners ✓
- Impose product bans ✓ (Any 2) (2)

QUESTION 4: ANIMAL REPRODUCTION

4.1 The male reproductive system

4.1.1 Identification of parts
A Vas deferens/ampulla ✓ (1)
B Urethra ✓ (1)
4.1.2 **TWO functions of the secretion of vesicular gland**
- Provide nutrition/nourishing/energy to the sperm cells ✓
- Transportation of sperm cells ✓
- Protects the sperm cells against changes in pH/buffer ✓ (Any 2) (2)

4.1.3 **Congenital defect of part D**
- Under-development/hypoplasia ✓
- Penis too short/too long ✓
- Abnormal openings ✓
- Short retractor penis muscle ✓ (Any 1) (1)

4.1.4 **Indication of the effect on the fertility of the bull**
(a) Affects spermatogenesis/low sperm count/sperm denaturing/infertility ✓ (1)
(b) No sperm will be produced/sterile ✓ (1)

4.2 **Hormonal control during the oestrus cycle**

4.2.1 **Identification of the hormones**
- Oestrogen ✓
- Progesterone ✓ (2)

4.2.2 **Explanation of the process in B**
Release of the ovum/egg cell ✓ from a mature Graafian follicle ✓ (2)

4.2.3 **TWO visible signs displayed when oestrus is in its peak**
- Mounts other cows ✓
- Restlessness ✓
- Swelling of the vulva ✓
- Excessive mucus secretion from the vulva ✓
- Mucus membranes of the vagina appears red and moist ✓
-Scratches, manure and mud on the rear end ✓
- Allows mating ✓
- Tail head is in a raised position ✓
- Tail head and hair is fluffed up ✓ (Any 2) (2)

4.2.4 **Function of FSH**
- Stimulates the formation of follicles ✓
- Facilitates/stimulates growth/development and function of the Graafian follicle ✓ (Any 1) (1)

4.3 **Reproductive processes in sheep**

4.3.1 **The correct chronological order**
- C ✓ (1)
- A ✓ (1)
- D ✓ (1)
- E ✓ (1)
- B ✓ (1)

4.3.2 **Definition of synchronisation**
Changing the oestrus cycle in a group of ewes/female animals ✓ so that they come to oestrus approximately at the same time ✓ (2)
4.4 **The reproduction cycle of a dairy cow**

4.4.1 **A month in which artificial insemination should take place**

May ✓

4.4.2 **TWO possible causes for the cow not conceiving**

- Improper handling of semen/poor quality semen ✓
- Use of inexperienced technician ✓
- Diseases/infections ✓
- Malnutrition ✓
- Congenital factors ✓
- Incorrect timing ✓

(Any 2)

4.4.3 **THREE causes of abortion in dairy cows**

- Infections/diseases ✓
- Malnutrition ✓
- Injuries ✓
- Maltreatment/stress ✓
- Environmental factors ✓
- Genetic/congenital factors ✓
- Strong laxatives ✓
- Toxic elements in feed ✓
- Vaccination/immunisation ✓
- Twinning ✓

(Any 3)

4.4.4 **The last process coming just before the start of milk production**

Calving/parturition/giving birth ✓

4.5 **The graph indicating milk production, fat content and crude fibre content of a dairy cow for 10 months**

4.5.1 **Month 6 ✓**

4.5.2 **45 litres ✓**

4.5.3 **THREE reasons for the drop in milk production**

- Illness/sickness/diseases ✓
- Malnutrition/improper feeding ✓
- Extreme environmental conditions ✓

(3)

4.5.4 **Relationship between crude fibre and fat content from month 6 to 10**

As the crude fibre content increases ✓ the fat content will also increase ✓

(2)

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**TOTAL SECTION B:** 105

**GRAND TOTAL:** 150