MARKS: 150

These marking guidelines consist of 11 pages.
SECTION A

QUESTION 1

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

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

1.3 1.3.1 Feed/fodder flow ✓✓
     1.3.2 Lighting/bulb/lamp ✓✓
     1.3.3 Internal/endo ✓✓
     1.3.4 Hydrops/hydro/dropsy foetus/hydramnios ✓✓
     1.3.5 Oogenesis/ovigenesis ✓✓  (5 x 2)  (10)

1.4 1.4.1 Cafeteria style/free choice ✓
     1.4.2 Insulation ✓
     1.4.3 Progesterone ✓
     1.4.4 Abortion ✓
     1.4.5 Acrosome ✓  (5 x 1)  (5)

TOTAL SECTION A:  45
SECTION B

QUESTION 2: ANIMAL NUTRITION

2.1 Alimentary canals of farm animals

2.1.1 Classification of animals
DIAGRAM A - Ruminant/polygastric ✓
DIAGRAM B - Non-ruminant/monogastric ✓ (2)

2.1.2 TWO adaptation features of animal in DIAGRAM A
- Complex/compound/polygastric/fore stomach/reticulo-rumen ✓
- Large fermentation vessel/rumen ✓
- Presence of rumen micro-flora/organisms ✓ (Any 2) (2)

2.1.3 Reason for not feeding animal in DIAGRAM B with a ration high in crude fibre content
- It has a monogastric/simple stomach/no fore stomach ✓
- Absence of micro-flora/cannot digest crude fibre ✓ (Any 1) (1)

2.1.4 Explanation on how animal in DIAGRAM A benefits from non-protein nitrogenous substance
Secretion of urease that changes urea into ammonia ✓ which is used to synthesise microbial protein that is later broken into amino acids ✓ (2)

2.2 Composition of ration

2.2.1 Identification of the feed
(a) Carbohydrate-rich roughage: Oats hay ✓ (1)
(b) Protein-rich concentrate: Sunflower oil cake meal ✓ (1)

2.2.2 Explanation for not recommending the ration as the only source of food for lambs
- Rumen of the lamb is still underdeveloped/abomasum is the only functioning compartment that cannot digest crude fibre ✓
- Cannot digest feed with a high crude fibre content/roughage is too high/70% ✓ (2)

2.2.3 Importance of grass hay in rations for mature ewes
- Grass hay is cheap and available ✓
- To improve functioning of the digestive system ✓
- Prevents bloating ✓
- Supply the necessary bulkiness to the ration/main source of the ration ✓
- Source of energy ✓ (Any 1) (1)

2.3 Pearson square

2.3.1 Parts of the ration representing maize meal and sunflower oil cake meal
- Maize meal - 20 parts ✓ (1)
- Sunflower oil cake - 8 parts ✓ (1)
2.3.2 Calculation of the percentage of feed B in the mixture
- \( \frac{20 + 8}{28} = 71.43\% \) (3)

2.3.3 Calculation of the quantities of maize in a 250 kg mixture
- \( \frac{20 \times 250}{28} = 178.6\text{Kg} \) (2)

2.4 Nutritive Ratio

2.4.1 Calculation of the Nutritive ratio of FEED B with a formula
- \( NR = 1: \frac{\%TDN - \%DP}{\%DP} \) ✓
  - \( 1: \frac{80\% - 7\%}{7\%} \) ✓
  - \( NR = 1 : 10.4/10 \) ✓

OR
- \( NR = 1: \frac{\%DNNS/\%DNNS}{\%DP} \) ✓
  - \( 1:73 \) ✓
  - \( NR = 1 : 10.4/10 \) (3)

2.4.2 Justification of the suitability of FEED A and FEED B for growth
- **FEED A:** Suitable because it has a narrow nutritive ratio/more proteins/less carbohydrates ✓ (1)
- **FEED B:** Not suitable because it has a wide nutritive ratio/less proteins/more carbohydrates ✓ (1)

2.5 Energy value of the feeds

2.5.1 Calculation of the energy value represented by A
\[
ME = GE - \text{Energy lost through faeces} - \text{Energy lost through urine and gases}
\]
- \( ME = 19J - 7J - 4J \) OR \( 19 - (7+4) = 11J \) ✓
- \( ME = 8J \) ✓ (2)

2.5.2 Identification of the energy loss in B
- Energy lost through heat ✓ (1)
2.5.3 **TWO importance of energy in C for animals**
- For maintenance ✓
- For production ✓
- For reproduction ✓
- Physical work done ✓
- Growth ✓

(Any 2) (2)

2.6 **Bar graph of the different quantities of minerals in rations**

![Bar graph of minerals in rations]

**CRITERIA/RUBRIC/MARKING GUIDELINES**
- Correct heading ✓
- X axis: Correctly calibrated with label (Rations) ✓
- Y axis: Correctly calibrated with label (Quantities) ✓
- Correct units (mg/kg) ✓
- Bar graph ✓
- Accuracy ✓

(6) [35]

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

3.1 The lowest critical temperature and heat production of different farm animals

3.1.1 **Identification of TWO animals that need to be kept under intensive production system**
- Piglets ✓
- Day old chickens ✓

(2)

3.1.2 **Reason**
The lowest critical temperature is the highest/lowest heat produced ✓

(1)

3.1.3 **Animal that would be most economical to keep without facilities**
- Dairy cattle ✓

(1)
3.1.4 **TWO reasons from the graph**
- Their lowest critical temperature is the lowest ✓
- They can generate more heat to keep warm ✓ (2)

3.1.5 **The impact of decrease in temperature below 25°C on feed intake**
Piglets will eat more ✓ (1)

3.2 **Production system**

3.2.1 **Identification of the production system in picture C**
Backyard system/free range/semi-intensive ✓ (1)

3.2.2 **Reason**
- Chickens move freely around the house during the day ✓
- Are kept inside the shelter ✓
- Feed is provided ✓ (Any 2) (2)

3.2.3 **Indication of the letter of the picture**
(a) Picture B ✓ (1)
(b) Picture A ✓ (1)

3.2.4 **Differentiation between facility in terms of their purpose**
- **Facility in A** - Animals are kept for handling/management practices/auction/temporarily ✓ (1)
- **Facility in D** - Animals are kept for housing/feeding/growing/permanently ✓ (1)

3.2.5 **Role of equipment labelled E in picture D**
For automatic dispensing of animal feed ✓ (1)

3.3 **TWO basic guidelines for handling large farm animals**
- Announce your approach through touch from the front/side ✓
- Avoid the blind spot ✓
- Avoid the kicking region when approaching animals ✓
- Use proper handling facilities/special facilities for male animals ✓
- Always leave yourself an escape way ✓
- Avoid entering small area enclosed with large animals ✓
- Never poke/prod/throw objects to animals ✓
- Give animals time to adjust before working with them ✓
- Take special care when working with cows that have calves ✓
- Avoid children/visitors/non-workers approaching animals ✓
- Limit/reduce noise levels ✓
- Handle animals in a group/ herd ✓ (Any 2) (2)

3.4 **Parasites**

3.4.1 **Classification of PARASITE A according to its life cycle**
One/single-host tick ✓ (1)

3.4.2 **Protozoan disease transmitted by the parasite**
- Red water ✓
- Anaplasmosis/gall sickness ✓ (Any 1) (1)
3.4.3 **Indication of the letter of the parasite**
- (a) Parasite C ✓
- (b) Parasite B ✓

3.4.4 **TWO requirements of the use of medication**
- Medicine must be safe for the specific animal ✓
- Check expiry date ✓
- Correct dosage according to weight and age ✓
- Correct method of administering the medicine ✓
- Correct period of application/correct intervals between administering medication ✓
- Proper storage according to instructions ✓
- Use registered medicine ✓
- Use sterilized equipment ✓

(Any 2)

3.5 **Animal diseases**

3.5.1 **Disease affecting**
- Animal 1 - Anthrax ✓
- Animal 2 - Lumpy wool ✓
- Animal 3 - Rabies ✓

(Any 1)

3.5.2 **Indication of the animal suffering from a deadly bacterial disease**
Animal 1 ✓

(Any 1)

3.5.3 **Pathogen causing disease in ANIMAL 2**
Fungus ✓

(Any 1)

3.5.4 **ONE precautionary measure to prevent the spread of disease in ANIMAL 3**
- Vaccination/inoculation/immunisation ✓
- Awareness/education/notify authorities ✓
- Isolation ✓

(Any 1)

3.5.5 **TWO roles of the state in controlling the spread of the disease in ANIMAL 1**
- Establish quarantine zone ✓
- Restricted movement from/to infected areas/import/export bans ✓
- Destroying/correct disposal of infested carcasses/materials ✓
- Inoculation/vaccination/immunisation of healthy stock/veterinarian services ✓
- Public awareness ✓

(Any 2)
3.6 Salt poisoning

3.6.1 TWO symptoms of salt poisoning in animals
- Excessive salivation ✓
- Increased thirst ✓
- Vomiting ✓
- Constipation ✓
- Wobbling/circling/seizures/blindness/partial paralysis ✓
- Dragging of the hind legs/knuckling of the fetlock ✓
- Mucous membranes of the mouth are red and dry ✓
- Hypersensitivity to touch ✓
- Frequent urination ✓
- Inflammation of the stomach and intestines ✓
- Aggressiveness ✓
- Diarrhoea ✓

(Any 2) (2) [35]

3.6.2 TWO measures to treat an animal with salt poisoning
- Provision of fresh water in small amounts at short intervals ✓
- Small animals can be given a hypertonic dextrose/isotonic saline solution ✓
- Removal of the source ✓

(Any 2) (2) [35]

QUESTION 4: ANIMAL REPRODUCTION

4.1 Reproductive cycle in farm animals

4.1.1 Hormones initiating mating in ANIMAL A and ANIMAL B
- ANIMAL A - Oestrogen ✓
- ANIMAL B - Testosterone ✓

(1) (1)

4.1.2 Function for each hormone
- Oestrogen - Makes cow to come into oestrus/allow mating ✓
- Testosterone - Stimulates mating behaviour in the bull ✓

(1) (1)

4.1.3 Identification of the reproductive processes
(a) Fertilization/pregnancy/gestation ✓
(b) Parturition/birth giving/calving ✓

(1) (1)

4.1.4 Hormone initiating milk let-down
Oxytocin ✓

(1)

4.1.5 The function of oxytocin in milk let-down
It causes contraction of the myoepithelial cells surrounding the alveoli to release the milk ✓

(1)

4.2 Sperm morphology

4.2.1 Process during which the sperm cells above are formed
Spermatogenesis ✓

(1)
4.2.2 Identification of the sperm cell that can constituting good quality semen
Sperm cell A ✓

4.2.3 Instrument to evaluate sperm cells
Microscope ✓

4.2.4 Explanation of how sperm cell in B and C affect the ability of the bull to fertilize
SPERM CELL B - It cannot fuse with the egg cell because it does not have an acrosome/no head ✓
SPERM CELL C - It cannot move towards the point of fertilization since it does not have a tail ✓

4.3 Correct technique for AI

4.3.1 Re-arranging the steps during AI
- A cow is sheltered and kept calm ✓
- Excess faecal matter is removed ✓
- Inseminator checks abnormalities and whether the cow is not pregnant by inserting the hand through the rectum ✓
- The pistolette is guided through the vulva, vagina to the cervix ✓

4.3.2 TWO disadvantages of AI for the farmer
- Disease transmission can affect large number of cows ✓
- Infections can occur/venereal diseases can spread quickly ✓
- Genetic abnormalities can occur ✓
- Inexperienced operator can damage the reproductive organs ✓
- Low success rate when using inexperienced technician ✓
- Labour intensive ✓
- Expensive ✓
- More time consuming ✓
- Not always successful ✓
- Does not necessarily improve the genetics of the herd ✓
- Genetic variability can decrease ✓
- If records are not kept carefully, inbreeding can occur ✓
- Undesirable traits can be transferred to more offspring ✓

4.4 Foetal membranes

4.4.1 Stage of pregnancy
Foetal stage ✓

4.4.2 Indication of the letter of the membrane
(a) A ✓
(b) B ✓
(c) C ✓
4.5 Parturition

4.5.1 TWO behavioural signs of an animal that is about to give birth
- Isolates herself from the herd ✓
- Loss of appetite ✓
- Show signs of distress and discomfort ✓
- Restlessness ✓
- Nesting behaviour/circles searching for a hiding place ✓
- Frequent urination ✓
- Bellowing noises ✓

(Any 2) (2)

4.5.2 TWO causes of problems during birth in heifers
- Large foetus/small sized heifer ✓
- Multiple births ✓
- Inexperienced ✓
- Incorrect presentation ✓
- Malformed foetus/hydrocephalus ✓
- Size of the pelvic area ✓
- Incomplete/failure of the cervix to dilate ✓
- Prolonged parturition/ineffective/weak labour ✓
- Inertia of the uterus ✓
- Torsion of the uterus ✓
- Length of the gestation period ✓
- Poor body conformation ✓
- Malnutrition ✓
- Diseases ✓

(Any 2) (2)

4.6 The importance of the aspects of embryo transfer

4.6.1 Superovulation
For the production of more genetically superior ova ✓

(1)

4.6.2 Embryo flushing
For the harvest of more embryos from superior/donor cows ✓

(1)

4.6.3 Donor cow
For the production of superior embryo’s ✓

(1)

4.6.4 Recipient cow
For implantation of the harvested embryo’s ✓

(1)

4.7 Nuclear transfer

4.7.1 Importance of nuclear transfer
(a) Farmer
- Animals with desirable traits can be produced to meet the specific production needs ✓
- Preserve superior genes/animals ✓
- Farmers can produce high-quality safe and healthy food ✓
- Animals can be bred that is more resistant to diseases ✓
- Frozen cloned embryos can be transported worldwide ✓
- Many clones can be obtained from one female ✓ (Any 1)

(1)
(b) Veterinarian services
- Production of stem cells to find cures for diseases ✓
- Research ✓
- Valuable medicines can be produced in the milk of cows/sheep/goats ✓
- Animals with a slightly modified genetic make-up can be produced for transplantation into humans ✓
- Preserve rare/endangered species ✓

4.7.2 TWO disadvantages of a nuclear transfer
- Cloned animals have a shorter lifespan ✓
- Genetic abnormalities of a cloned animal can be transmitted to the offspring ✓
- It is expensive ✓
- Cloned animals have a low immune system ✓
- Offspring are large causing problems during parturition ✓
- Genetic diversity deteriorates/reduces variation ✓
- Premature aging of cloned animals resulting in early death ✓
- Offspring of cloned animals encounter problems with vital organs such as lungs, heart and kidneys ✓
- Requires specific skills ✓

(Total 105)

GRAND TOTAL: 150