These marking guidelines consist of 10 pages.
### SECTION A

#### QUESTION 1

<p>| | | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>1.1.1</td>
<td>D ✓ ✓</td>
<td>1.1.2</td>
<td>D ✓ ✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.1.3</td>
<td>C ✓ ✓</td>
<td>1.1.4</td>
<td>B ✓ ✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.1.5</td>
<td>C ✓ ✓</td>
<td>1.1.6</td>
<td>C ✓ ✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.1.7</td>
<td>A ✓ ✓</td>
<td>1.1.8</td>
<td>A ✓ ✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.1.9</td>
<td>B ✓ ✓</td>
<td>1.1.10</td>
<td>A/B ✓ ✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(10 x 2) (20)

<p>| | | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
<td>1.2.1</td>
<td>B only ✓ ✓</td>
<td>1.2.2</td>
<td>Both A and B ✓ ✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.2.3</td>
<td>A only ✓ ✓</td>
<td>1.2.4</td>
<td>None ✓ ✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.2.5</td>
<td>A only ✓ ✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(5 x 2) (10)

<p>| | | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.3</td>
<td>1.3.1</td>
<td>Ptyalin/amylase ✓ ✓</td>
<td>1.3.2</td>
<td>External/ecto- parasites ✓ ✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.3.3</td>
<td>Bedding/litter ✓ ✓</td>
<td>1.3.4</td>
<td>Superovulation ✓ ✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.3.5</td>
<td>Mitochondria ✓ ✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(5 x 2) (10)

<p>| | | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4</td>
<td>1.4.1</td>
<td>Nitrogen/Protein ✓</td>
<td>1.4.2</td>
<td>Removal Certificate/Permit ✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.4.3</td>
<td>Splitting ✓</td>
<td>1.4.4</td>
<td>Mesoderm ✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.4.5</td>
<td>Testosterone ✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(5 x 1) (5)

**TOTAL SECTION A:** 45
SECTION B

QUESTION 2: ANIMAL NUTRITION

2.1 Alimentary canal of a farm animal

2.1.1 Letter of the structure of cellulose digestion
A ✓ (1)

2.1.2 Cellulose digesting enzyme
Cellulase ✓ (1)

2.1.3 TWO requirements of the organisms in the part A
- Easily digestible carbohydrates ✓
- Regular intake of food for fermentation ✓
- Sufficient mineral nutrients (Na/Cu/Co/P) ✓
- Anaerobic/oxygen free environment ✓
- Presence of CO₂ ✓
- Sufficient nitrogen ✓
- Suitable pH/slightly acidic pH/pH of 5.5 to 6.5 ✓
- Warm environment/temperature of 38-42°C ✓
- Continual elimination of end products ✓
- Osmotic condition/moist environment ✓ (Any 2) (2)

2.1.4 The type of digestion in part D
Chemical/enzymatic digestion ✓ (1)

2.1.5 Reason for the answer
Part D secretes digestive juices/enzymes ✓ (1)

2.2 Available animal feeds

2.2.1 Classification of FEED A and FEED C
Feed A - Concentrate ✓ (1)
Feed C - Roughage ✓ (1)

2.2.2 Letters recommended for each situation
(a) B ✓ (1)
(b) D ✓ (1)
(c) A ✓ (1)
(d) C ✓ (1)

2.2.3 Justification of better digestion of feed B when ground
- Ground feed/maize has smaller particles with an increased surface area ✓
- for more exposure to enzymes and better digestion ✓ (2)
2.3 Feed trial

2.3.1 Calculation of the digestibility co-efficient of hay
\[ \frac{11.5 \text{ kg}}{24 \text{ kg}} \times 100 \% = 47.9 \% \] (3)

2.3.2 Stage the hay was cut
It was cut later in the season when it was old/matured (1)

2.3.3 Reason based on the calculated value
- Only 47.9% of the hay was digested and absorbed (✓)
- The hay was hard/lignified/with a high crude fibre content/less/poorly/difficult to digest (✓) (2)

2.3.4 TWO supplementary substances to improve digestibility of hay
- Non-protein nitrogen/NPN/urea/biuret (✓)
- Molasses (✓)
- Caustic soda (✓) (Any 2) (2)

2.4 Fodder flow plan

2.4.1 TWO months when feed was insufficient
- April (✓)
- May (✓)
- June (✓) (Any 2) (2)

2.4.2 TWO reasons
- The need is higher than the supply/there is a shortage (✓)
- Supplementary feeding is provided (✓) (2)

2.4.3 Total quantity of the supplementary feed in May
Supplementary feed(kg/animal) \times \text{number of days in May} \times \text{number of animals}
\[ = 2 \text{ kg} \times 31 \times 50 \times 1000 \]
\[ = 3100 \text{ kg} \times 50 \times 1000 \]
\[ = 3,1 \text{ tons} \] (3)
2.5 Bar graph showing the crude fibre and crude protein of the different feeds

![Bar graph showing the crude fibre and crude protein of the different feeds](image)

Criteria/rubric/marking guidelines
- Correct heading ✓
- Y axis - correctly calibrated and labelled (Quantities) ✓
- X axis - correctly calibrated and labelled (Feed) ✓
- Correct unit (%) ✓
- Bar graph ✓
- Accuracy ✓

QUESTION 3 ANIMAL PRODUCTION, PROTECTION AND CONTROL

3.1 Production systems

3.1.1 Identification of the TWO production systems represented by A and B
A - Intensive production system ✓
B - Extensive production system ✓

3.1.2 Comparison of the TWO production systems
(a) Method of feeding
   - Intensive production system - feed is provided to animals ✓
   - Extensive production system - animals graze/look for food ✓

(b) Space per production output
   - Intensive production system - more production per area ✓
   - Extensive production system - less production per area ✓
3.2  The feeding and temperature requirements at different stages

3.2.1 Main nutrient for broilers
Proteins ✓ (1)

3.2.2 Importance of the nutrient element
- Need protein for muscle and tissue growth ✓
- Act as antibodies that provide immunity ✓
- Collagens support tendons, ligaments and a beak ✓
- Controls body fluid balance and muscle contraction ✓
- Repair worn out tissues ✓ (Any 1) (1)

3.2.3 Reason for the inclusion of carbohydrates in a finisher mash
Need carbohydrates for fattening/rounding off ✓ (1)

3.2.4 The relationship between protein level, temperature requirements and the age
The younger the broilers ✓ the higher the protein level of the feed ✓ and the higher the temperature requirement ✓
OR
The older the broilers ✓ the lower the protein level of the feed ✓ and the lower the temperature requirement ✓ (3)

3.3 Tools used for animal identification purposes

3.3.1 Branding iron ✓ (1)
3.3.2 Ear tag ✓ (1)
3.3.3 Smart neck band ✓ (1)
3.3.4 Tattoo pliers ✓ (1)

3.4 Handling facilities for specified operations

3.4.1 Identification of the facility
Loading/off-loading ramp ✓ (1)

3.4.2 Use of the facility
For loading/off-loading animals ✓ (1)

3.4.3 TWO design features of the facility
- High and strong walls ✓
- Width according to the type of animal ✓
- Angle not too steep ✓
- Not slippery ✓ (Any 2) (2)

3.4.4 TWO forms of harm to an animal during the handling process
- Physical/injuries ✓
- Stress/emotional ✓ (2)
3.5 Parasites in farm animals

3.5.1 The TWO parasites
A - External parasite/ecto-parasite ✓
B - Internal/endo-parasite ✓

(1) (1)

3.5.2 Motivation from the diagram
A - Larvae attaches itself onto the skin ✓
B - Worms are swallowed and bore through the intestines into the liver ✓

(1) (1)

3.5.3 Preventative measure against parasite B
- Avoid grazing in swampy areas/fencing off affected areas/removal of dung ✓
- Drinking spots should be kept dry ✓
- Rotational grazing ✓
- Breeding genetically resistant animals ✓
- Treat affected areas ✓
- Veld burning ✓
- Use of feeders ✓
- Provision of clean drinking water ✓
- Provision of good nutrition ✓
- Proper management of the breeding season/calving ✓

(Any 1) (1)

3.6 Animal diseases

3.6.1 Scientific term for animal health conditions
(a) Contagious/infectious diseases ✓
(b) Vector ✓

(1) (1)

3.6.2 ONE bacterial disease that can be transmitted to the next animal
- Tuberculosis ✓
- Anthrax ✓

(Any 1) (1)

3.6.3 Role of the farmer
- Quarantine/isolation of sick animals ✓
- Regular inspections/monitoring for the presence of disease
- Vaccination/inoculation ✓
- Treatment of sick animals ✓
- Burning/burying carcass of infected animals ✓
- Report to the authorities ✓

(Any 1) (1)

3.6.4 TWO measures how farm workers can be exposed to animal diseases
- Exposure to/contact with infected animals ✓
- Use of unsterilized equipment ✓

(2)
3.6.5 **TWO roles of the state in controlling the spread of infectious diseases**
- Production of vaccines ✓
- Setting up quarantine areas/zones ✓
- Research ✓
- Publications ✓
- Import/export bans/control measures/movement permits ✓
- Veterinary services ✓

(Any 2) [2]

**QUESTION 4: ANIMAL REPRODUCTION**

4.1 **The diagram of a sperm cell**

4.1.1 **Identification of part A**
Acrosome ✓

(1)

4.1.2 **The function of the part**
(a) A - Facilitate penetration of the sperm cell into the ovum/protects the head of the sperm cell ✓

(1)

(b) B - Transmission of DNA/genetic material/information ✓

(1)

(c) D - Mobility/movement of the sperm cell ✓

(1)

4.1.3 **Distinction between sperm cell and semen**
Sperm cell - Male gamete/reproductive cell for fertilisation ✓

(1)

Semen - Mixture of sperm cells and the fluids from the accessory glands ✓

(1)

4.1.4 **The female reproductive cell**
Ovum/egg cell/female gamete ✓

(1)

4.2 **Foetus development in cattle**

4.2.1 **Identification of parts B and F**
B - Allantois ✓

(1)

F - Umbilical cord ✓

(1)

4.2.2 **The function of part D**
- Protection for the foetus/shock absorber ✓
- Lubricates the birth canal ✓
- Regulates temperature around foetus ✓
- Prevents dehydration ✓

(Any 1) [1]

4.2.3 **Conditions associated with pregnancy**
(a) Mummification ✓

(1)

(b) Maceration ✓

(1)

(c) Abortion ✓

(1)

(d) Placenta retention ✓

(1)
4.3 Dairy farmer with 100 cows and one bull

4.3.1 Identification of the problem in this enterprise
- Bull: cow ratio not proportional/1 bull to 100 cows ✓
- The calving percentage is too low/conception rate problems ✓
  (Any 1) (1)

4.3.2 Scientific technique that will result in a higher calving percentage
Artificial insemination/AI ✓ (1)

4.3.3 Other method to improve the calving percentage
Make use of more bulls/3–5 bulls ✓ (1)

4.3.4 Impact of nutrition on the fertility of bulls
- Underfeeding impacts negatively on spermatogenesis/sperm formation/volume/quality of semen ✓
- Overfeeding causes bulls to become fat/heavy/lazy reducing the ability to service cows (libido) ✓ (2)
4.3.5 **TWO other reasons for this bull performing poorly**
- Over exertion/exhaustion ✓
- Old age ✓
- Lack of libido ✓
- Conformational abnormalities ✓
- Inability to fertilise/low sperm count ✓ (Any 2) (2)

4.4 **Milk production of a dairy cow for one year**

4.4.1 **Term for the graph illustrated**
Lactation curve ✓ (1)

4.4.2 **Indication of the letter**
(a) H ✓ (1)
(b) A ✓ (1)
(c) B ✓ (1)
(d) D ✓ (1)

4.4.3 **Reasons for the drop in the milk production between point F and point G**
- Illness/the cow was sick/disease ✓
- Injury ✓
- Adverse/bad environmental conditions ✓
- Malnutrition/over/under feeding ✓
- The cow is about to dry off ✓ (Any 2) (2)

4.5 **Oestrus in dairy cows**

4.5.1 **Definition of oestrus in dairy cows**
- Period when non-pregnant cows show visible signs of oestrus ✓
- and will allow mating to take place ✓ (2)

4.5.2 **Visible signs of oestrus in dairy cattle**
- Mucus discharge from the vulva ✓
- Vulva is red/moist/swollen ✓
- Restless/bellows/excited ✓
- Feed/saliva on the back/hair is fluffed up ✓
- Feed intake decreases/loss of appetite ✓
- Milk production decreases ✓
- Sniffs the genitalia of other cows ✓
- Raises her head and curls her lips ✓
- Cows goes to the bull and allows mating ✓ (Any 2) (2)

4.5.3 **Cow in oestrus**
Cow A/B ✓ (1)

4.5.4 **Oestrus**
(a) Oestrogen ✓ (1)
(b) 21 days ✓ (1) [35]

**TOTAL SECTION B:** 105
**GRAND TOTAL:** 150