This memorandum consists of 9 pages.
SECTION A

QUESTION 1

1.1
1.1.1 A ✓✓
1.1.2 A ✓✓
1.1.3 C ✓✓
1.1.4 D ✓✓
1.1.5 C ✓✓
1.1.6 B ✓✓
1.1.7 B ✓✓
1.1.8 C ✓✓
1.1.9 B ✓✓
1.1.10 C/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 B only ✓✓
1.2.5 None ✓✓ (5 x 2) (10)

1.3
1.3.1 Bile ✓✓
1.3.2 Insulation/ventilation ✓✓
1.3.3 Vector ✓✓
1.3.4 Dystocia ✓✓
1.3.5 Impotence ✓✓ (5 x 2) (10)

1.4
1.4.1 Fodder flow/feed flow ✓
1.4.2 Free-range/semi intensive/backyard ✓
1.4.3 Per acute/acute ✓
1.4.4 Layers ✓
1.4.5 Mesoderm ✓ (5 x 1) (5)

TOTAL SECTION A: 45
SECTION B

QUESTION 2: ANIMAL NUTRITION

2.1 Diagram of a digestive system

2.1.1 Identify the type of farm animal
Monogastric animal/non-ruminant animal ✓ (1)

2.1.2 Motivation for QUESTION 2.1.1
Monogastric/simple stomach ✓ (1)

2.1.3 Identification of the letters
(a) E ✓
(b) C ✓
(c) D ✓ (3)

2.1.4 Reasons for NOT feeding roughage
- Monogastric/simple stomach ✓
- No cellulose-digesting microbes/flora ✓
- Cannot digest roughage ✓ (Any 2) (2)

2.2 Water, vitamins and minerals

2.2.1 Functions of water
- Acts as a solvent/assists in the absorption of nutrients ✓
- Protects some sensitive tissue/serves as a lubricant ✓
- Moisturising the swallowed food/feed ✓
- Provides a suitable environment for microbes/flora ✓
- Mechanical digestion in mouth/swallowing ✓
- Prevents constipation ✓
- Assists in the transportation of nutrients ✓
- Excretion of waste products ✓ (Any 3) (3)

2.2.2 Vitamin/mineral deficiencies
(a) Vitamin D/Calcium/Ca/Phosphorus/P/Copper/Cu ✓
(b) Vitamin A/retinol ✓
(c) Iodine/I ✓
(d) Iron/Fe/Vitamin B₆/B₁₂/Copper/Cu/Cobalt/Co ✓ (4)
2.3 Digestibility co-efficiency

2.3.1 Calculation:  

\[
8\% \times 30 \text{ kg} = 2.4 \text{ kg} \\
30 \text{ kg} - 2.4 \text{ kg} = 27.6 \text{ kg}
\]

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

\[
= \frac{27.6 \text{ kg} - 12 \text{ kg}}{27.6 \text{ kg}} \times 100
\]

\[
= 56.57 \%
\]

(5)

2.3.2 Processes to improve digestibility of feeds

• Mechanical processes/grinding/milling/crushing/rolling
• Pelleting
• Heating/roasting/boiling/cooking/steaming
• Additives/supplementing with NPN/molasses/treating feed with dilute caustic soda (NaOH) solution
• Soaking
• Popping and micronising
• Mixing of complementary feeds (Any 3)

(3)

2.4 Pearson square

2.4.1 Calculation:  

Maize 9%  

\[
\frac{27}{27} \text{ parts}
\]

Peanut oilcake 44%  

\[
\frac{8}{8} \text{ parts}
\]

(3)

2.4.2 Maize percentage to be included in the ration

\[
\frac{27}{35} \times 100
\]

\[
= 77.14/77\%
\]

(2)
2.5 Feed and supplement supply

2.5.1 Months when there was sufficient veld fodder
- December ✓
- January ✓

2.5.2 Justification
- No supplementation during the two months ✓
- Only veld fodder was used during the two months ✓ (Any 1) (1)

2.5.3 Reasons for introducing a concentrate
- Animals are prepared/fattened/rounding off for the market ✓✓
- Getting animals ready for breeding ✓✓
- For the lambing season ✓✓
- Insufficient veld fodder ✓✓ (Any 1) (2)

2.5.4 Calculation of the fodder for January:
(a) 3,4 tons x 1 000 = 3 400 kg ✓
(b) 50 sheep x 2 kg intake per sheep x 31 days ✓
= 3 100 kg ✓

QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

3.1 Production systems

3.1.1 Production systems
A - Extensive ✓
B - Intensive ✓

3.1.2 Comparison of the two systems

<table>
<thead>
<tr>
<th></th>
<th>Extensive/A</th>
<th>Intensive/B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment</td>
<td>No/limited/less control ✓</td>
<td>Environment is modified or controlled for production purposes ✓</td>
</tr>
<tr>
<td>Productivity</td>
<td>Low/less productivity ✓</td>
<td>High/more productivity ✓</td>
</tr>
<tr>
<td>Human input</td>
<td>Low/minimal/less ✓</td>
<td>High/more ✓</td>
</tr>
</tbody>
</table>

3.1.3 Reason for keeping cattle in the facility
- Higher productivity/output/efficiency ✓
- An environment for feeding/nutrition/protection/control ✓ (Any 1) (1)
3.2 Farm animals loosing heat

3.2.1 Ways in which animals lose heat
A - Radiation/evaporation/perspiration ✓
B - Conduction ✓
C - Excretion/defecation ✓ (3)

3.2.2 Other ways of heat loss
• Convection ✓
• Movement/work ✓
• Production level ✓
• Urination ✓
• Breathing ✓ (Any 2) (2)

3.2.3 Signs of heat stress in animals
• Excessive salivation/drooling ✓
• Drop/decrease in production ✓
• Excessive panting/high respiratory rate/sweating ✓
• Open mouth breathing with tongue hanging out ✓
• Loss of appetite ✓
• Cattle move away from each other ✓
• Restlessness ✓ (Any 2) (2)

3.2.4 Management practice to reduce heat in A
• Provision of shelter/shade/cool area ✓
• Breeding of heat adapting animals ✓
• Use of mechanical cooling systems ✓
• Work calmly with animals ✓
• Access to drinking water ✓ (Any 2) (2)

3.3 Pulse and respiratory rate of farm animals

Line graph of the pulse and respiratory rate of farm animals

The average pulse and respiratory rate of farm animals

<table>
<thead>
<tr>
<th>Farm animals</th>
<th>Pulse and respiratory rate (per min.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td></td>
</tr>
<tr>
<td>Horse</td>
<td></td>
</tr>
<tr>
<td>Sheep</td>
<td></td>
</tr>
<tr>
<td>Goat</td>
<td></td>
</tr>
<tr>
<td>Pig</td>
<td></td>
</tr>
</tbody>
</table>

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Mark allocations
- Correct heading ✓
- Line graph ✓
- X-axis correctly calibrated/labelled (Species of farm animals) ✓
- Y-axis correctly calibrated/labelled (Pulse and respiratory rates) ✓
- Accuracy/correct values/plotting/both graphs must be correct ✓
- Correct units (per min.) ✓

3.4 Vaccination plan

3.4.1 Appropriate words/terms for letters A to G
- A Anthrax ✓
- B Cattle/sheep/goats ✓
- C Protozoa ✓
- D Cattle/sheep/goats ✓
- E Blisters on the tongue/nose/lips/mouth/teats/udder/between the toes/around hooves ✓
- F Annually/once a year ✓
- G Virus ✓

3.4.2 Vector for redwater
- Ticks ✓

3.5 Control of parasites

Appropriate method used to administer remedies

3.5.1 Dosing/drenching/injecting/provision of licks ✓

3.5.2 Dipping/spraying/spot treatment/injecting ✓

3.5.3 Cleaning/apply ointments/medication/apply insecticides/dipping ✓

QUESTION 4: ANIMAL REPRODUCTION

4.1 Embryo development

4.1.1 Stages of parturition as in pictures A and B
- A - Ejection/expulsion ✓
- B - Preparatory ✓

4.1.2 Incorrect posture of the calf
- Picture B/B ✓

Reason
- Retention of one leg towards the vulva/second leg is folded back ✓
4.1.3 Letter that corresponds with the following activities
(a) B ✓
(b) A ✓
(c) A ✓

4.1.4 Behavioural changes
- Restlessness/walks around/in pain and discomfort ✓
- Loss of appetite ✓
- Isolation/nesting behaviour ✓
- Tail raising ✓
- Lows often/bellowing noises ✓
- Frequent urination ✓
(Any 3)

4.2 Graph that represents hormones in the oestrus cycle of a cow

4.2.1 Definition of oestrus cycle
- Hormonally-controlled cycle of activity ✓
- of the female reproductive organs ✓
  OR
- Recurring periods of oestrus ✓
- alternating with sexual rest in the matured female ✓ (Any 1)

4.2.2 Range of days in which progesterone level is the highest
- From day 9/10 to day 15/16 (indicate any two days within the range) ✓

4.2.3 Reason for the drop in the level of FSH between days 2 and 3
- Oestrogen levels is at its peak/high/went up ✓

4.2.4 Reason for the increased progesterone levels on days 3 and 4
- Fertilisation has taken place ✓✓
  OR
- Corpus luteum has been formed ✓✓ (Any 1)

4.2.5 Influence of oestrogen on LH
- Oestrogen stimulates the release of LH ✓

4.2.6 The structure where prolactin is produced
- Pituitary gland/Hypophysis ✓

4.3 Detection of oestrus

The device to which each of the following statements apply:

4.3.1 Pedometer ✓
4.3.2 Chin-ball markers ✓
4.3.3 Tail-chalking ✓
4.4 **Diagrams that represents a reproductive process**

4.4.1 **Reproductive process**
- Cloning/nuclear transfer ✓ (1)

4.4.2 **Definition of cloning**
- A process through which an identical copy of the donor animal is produced ✓
- from its nucleus ✓ (2)

4.4.3 **Description of stage B**
- Removal of the nucleus ✓ (1)

4.4.4 **Aims of cloning**
- Produce large numbers of genetically identical animals ✓
- Production of offspring from a higher quality animal ✓
- Preservation of superior genetics/characteristics ✓
- Increase the population size of endangered species ✓
- Achieve high quality meat and dairy products ✓
- For medical purposes ✓ (Any 3) (3)

4.5 **Diagram on oogenesis**

4.5.1 **Type of process**
Oogenesis/ovigenesis ✓ (1)

4.5.2 **Type of cell division**
Mitosis ✓ (1)

4.5.3 **Explanation for meiotic division**
To form haploid cells/gametes ✓ (1)

4.5.4 **End products of division of oogenesis and spermatogenesis**
(a) Ova/egg cells ✓ (1)
(b) Spermatozoa/sperm cells ✓ (1)

4.5.5 **The organ where the following are found**
(a) Testis ✓ (1)
(b) Ovary ✓ (1)

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