SECTION A

QUESTION 1.1

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

(10 x 2) (20)

QUESTION 1.2

<table>
<thead>
<tr>
<th></th>
<th>A only</th>
<th>B only</th>
<th>A and B</th>
<th>None</th>
</tr>
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<td>✓</td>
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<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>1.2.3</td>
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<td>✓</td>
<td></td>
</tr>
<tr>
<td>1.2.4</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2.5</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(5 x 2) (10)

QUESTION 1.3

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.3.1</td>
<td>Vitamin D/Calciferol ✓ ✓</td>
</tr>
<tr>
<td>1.3.2</td>
<td>Papillae ✓ ✓</td>
</tr>
<tr>
<td>1.3.3</td>
<td>Pelleting/granulation ✓ ✓</td>
</tr>
<tr>
<td>1.3.4</td>
<td>Pistolette/insemination gun/pipette ✓ ✓</td>
</tr>
<tr>
<td>1.3.5</td>
<td>Isolation/quarantine/ separation/removal ✓ ✓</td>
</tr>
</tbody>
</table>

(5 x 2) (10)

QUESTION 1.4

<p>| | |</p>
<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4.1</td>
<td>rumen/fore stomachs/ reticulum/reticulo-rumen/large stomach ✓</td>
</tr>
<tr>
<td>1.4.2</td>
<td>maintenance ✓</td>
</tr>
<tr>
<td>1.4.3</td>
<td>di-oestrus ✓</td>
</tr>
<tr>
<td>1.4.4</td>
<td>antibodies/immunoglobulin ✓</td>
</tr>
<tr>
<td>1.4.5</td>
<td>anaemia ✓</td>
</tr>
</tbody>
</table>

(5 x 1) (5)

TOTAL SECTION A: 45
SECTION B

QUESTION 2: ANIMAL NUTRITION

2.1 The digestive system of ruminants

2.1.1 THREE labelled parts
A /reticulum/honeycomb/net stomach✓
B /rumen/large stomach✓
F/omasum/leaf stomach✓

2.1.2 TWO ideal conditions for microbial activity
• suitable/optimal/moderate/favourable temperature/ \( \leq 38 \, ^\circ \text{C to 42 \, ^\circ \text{C}} \)✓
• sufficient mineral nutrients/phosphorus/cobalt✓
• sufficient nitrogen✓
• easily digestible carbohydrates✓
• a slightly acid medium/suitable pH(5,5 to 6,5)✓
• moist✓
• anaerobic✓
• regular intake of food/nutrients✓
• removal of waste products✓
(Any 2)

2.1.3 TWO functions of micro-organisms in the digestive system of ruminants
• digest cellulose/crude fibre into volatile fatty acids and gases✓
• synthesise amino acids from any nitrogenous substances/source✓
• hydrolyse proteins from the feed to form amino acids✓
• synthesis of vitamins(vitamin K and B-complex)✓
(Any 2)

2.1.4 A reason for enzymatic digestion in stomach
Secretes digestive (gastric) juice✓
OR
Secretes enzymes responsible for enzymatic digestion✓

2.1.5 Adapted part in a fowl
Proventriculus/glandular stomach✓

2.2 Cross section of a villus

2.2.1 Small intestines/duodenum/ileum/jejunum✓

2.2.2 Main nutrients absorbed
A – absorption of digested carbohydrates/glucose/digested proteins/amino acids/vitamins/minerals✓
B – absorption of digested fats/fatty acids/glycerol✓
2.2.3 **Suitability of villus for its function**
- The villus has numerous microvilli that increase the absorption surface/large surface area.
- It also contains blood capillaries and the lacteal for absorption of digested nutrients.
- It allows constant mixing motion necessary for absorption.
- It has a single layer of epithelial tissue.

(Any 2)

(2)

2.3 **Supplements**
2.3.1 **Season for supplementing and reason**
- Winter/dry season.
- Green fodder (grass) that contain pigment (carotene) that can be transformed to vitamin A is not available in winter/dry season hence it is advisable to supplement this vitamin during winter.

(2)

2.3.2 **TWO methods of supplementing**
- Injection.
- Dosing/drenching.
- Feed concentrates/rations.
- Drinking water.
- Mineral licks.

(Any 2)

(2)

2.4 **Digestibility coefficient**

2.4.1 \[
\text{Dry material intake (kg)} = \frac{\text{Dry material of manure (kg)}}{100} \times \frac{1}{1} \\
= (30 \text{ kg} - 10/100 \times 30 \text{ kg}) \times (16 \text{ kg} - 35/100 \times 16 \text{ kg}) \times \frac{100}{1} \\
= 27 \text{ kg} \times \frac{100}{1} \times \frac{1}{1} \\
= 16.6 \text{ kg} \times \frac{100}{1} \times \frac{1}{1} \\
= 61.48\% \text{ or } 61,5\% \text{ or } 61\% \text{ or } 61\% \% \text{ or } 61\% \%
\]

(Any 5)

(5)

2.4.2 **Factor determining digestibility**
The higher the quantity/volume of feed taken in, the lesser the time for digestion/the lower the digestibility/less time of contact with digestive enzymes.

(2)

2.5 **Nutritive ratio**

2.5.1 \[75\% - 20\% = 55\%\]

(1)
2.5.2 NR = \( \frac{1: \% \text{ digestible non-nitrogen substances}}{\% \text{ digestible protein}} \)

or

\[ \begin{align*}
1: & \quad 75\% - 20\% \checkmark \\
& \quad 20\% \\
\text{or} \\
1: & \quad 55\% \checkmark \\
& \quad 20\%
\end{align*} \]

1 : 2,75 or 1 : 3 \( \checkmark \) (2)

2.6 Pearson square

2.6.1

Feed A: 14 \( \checkmark \) 5

\[ \begin{array}{c}
\text{Feed B:} \\
21 \quad 2 \checkmark
\end{array} \]

Mix 5 parts of feed A with 2 parts of feed B or 5 : 2 \( \checkmark \) (3)

2.6.2

\[ \text{Feed B} = \frac{2 \times 100 \checkmark}{7 \checkmark 1} = 28.57\% \text{ or } 28.6\% \text{ or } 29\% \checkmark \]

(3) [35]

**QUESTION 3: ANIMAL PRODUCTION**

3.1 Animal shelter

3.1.1 Production system

- Extensive farming \( \checkmark \checkmark \)

**Reason**

- Exposure to adverse weather conditions (cold, wet and windy) \( \checkmark \)

OR

- Farmers did not have shelter for Angora goats and were subsidised to build one \( \checkmark \) (3)

3.1.2 Reasons for the recommendations by the extension officer for the production system

(a) Shelter

- Has sides \( \checkmark \) for protection against cold winds/will reduce the wind chill \( \checkmark \)

- Has a roof \( \checkmark \) for protection against rain

- Has an enclosed area \( \checkmark \) that keeps heat within/insulation \( \checkmark \) (Any 1) (2)
(b) Insulation material
- Heat can be retained/protection against bitter cold ✓ for a longer period of time ✓ (2)

(c) Heaters
Assist in increasing ✓ and maintaining/regulating temperature/reduce temperature fluctuations ✓ (2)

3.1.3 Reasons for the government grant/funding
- Help the farmers to build/purchase high tech equipment ✓
- To prevent job losses on the farms ✓
- To ensure that foreign exchange is earned/economic stability ✓
- To prevent shortage/losses of meat and mohair/to ensure sustainability ✓ (Any 2) (2)

3.2 Farm animals and products

3.2.1 TWO primary products of farm animals
- Milk ✓
- Meat (beef/fish/pork/bacon/chicken/mutton) ✓
- Eggs ✓
- Honey ✓
- Wool ✓
- Hides ✓ (Any 2) (2)

3.2.2 Optimising poultry production
(a) Space requirements
- Not overcrowded/enough space/eliminate competition ✓
- Housing/production system ✓
- Sufficient light ✓
- Fresh air/good ventilation ✓
- Cleanliness ✓
- Constant optimal temperature ✓ (Any 2) (2)

(b) Feeding facilities
- Functional feeding facility/allows for easy feeding/refilling ✓
- Provision of clean water and feeds/access to water ✓
- Feed accessible to animal/easy for animal to reach feed ✓
- Limits wastage ✓ (Any 2) (2)

3.2.3 Handling
- Farm animal B – Bigger/higher gates and fences/sides ✓
- These facilities are more expensive ✓
- More sophisticated handling facilities required/stronger structures needed (cables/bigger poles/pipes) ✓ (Any 2)
- Farm animal D – small/less structures needed/easier to handle ✓
  Structures not so high/not so strong/normal fences ✓
- These facilities are less expensive ✓ (Any 2) (4)
3.3 Animal behaviour

3.3.1 TWO behavioural patterns of cattle
- Nervous
- Wild/aggressive
- Stressed

(Any 2) (2)

3.3.2 TWO economic benefits of good cattle management
- Better performance/production (better feed conversion ratio)
- Improved reproduction rate
- Improved health condition
- Improved growth rate
- Good quality carcass/milk/hides

(Any 2) (2)

3.4 Animal fat content research

3.4.1
- Improve the carcass quality
- Higher prices for their product/higher income
- Meat becomes lean/most consumers prefer lean meat (lean meat is healthier)

(Any 2) (2)

3.4.2 Total fat content over a period of 50 years

![Graph showing the decrease in total fat content over 50 years]

Marking graph with the following checklist:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Yes: 1 Mark</th>
<th>No: 0 Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Line graph</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2. X-axis correctly labelled</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3. Y-axis correctly labelled</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4. Points are plotted correctly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5. Correct heading</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6. Units are indicated on both axes</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

(6)

3.4.3
- Fat content decreased
- Fat content changed from 30 g/100 g to 5 g/100 g
- An even decrease/rate of decrease was constant

(Any 1) (2) [35]
QUESTION 4: ANIMAL REPRODUCTION, PROTECTION AND CONTROL

4.1 Reproductive organs of a bull

4.1.1 Reproductive parts
A – Seminal vesicle/vesicular gland ✓
B – Prostate gland ✓
C – Cowper/bulbo-urethral gland ✓
H – Testis ✓

4.1.2 Process that occurs in K
Spermatogenesis/ sperm formation/gametogenesis ✓

4.1.3 Functions
D - Transports spermatozoa/enhances ejaculation ✓
L - Facilitates penetration of ovum/releases an enzyme (hyaluronidase) that allows spermatozoa to penetrate the ovum/acrosome reaction ✓

4.1.4 Influence of congenital defects
- Negatively affects sperm formation/spermatogenesis/will not allow optimum spermatogenesis to take place/sperm defects ✓ ✓

4.1.5 Reason for part H to be situated outside the abdominal cavity
Sperm production occurs at the temperature slightly (1 to 3°C) lower than that of the body/to regulate the temperature for more effective spermatogenesis ✓

4.2 Progesterone and oestrogen

4.2.1 Day 7 ✓ & day 17 ✓

4.2.2 30 – 33 units ✓

4.2.3 Progesterone
Sharp increase in the level of progesterone ✓
Sharp decrease in levels of oestrogen ✓
4.2.4 **TWO effects of oestrogen on the animal at peak period**
- Thickens the lining of the uterus prepares the uterus for the implantation of the fertilised ovum/increases blood supply to the uterus ✓
- Relaxes the muscles of the cervix ✓
- Delays the secretion of FSH at the end of oestrus ✓
- Stimulates the gland in the brain to release LH ✓
- Stimulates the process of ovulation through the release of LH ✓
- Leads to the display of signs of oestrus ✓
- Prevents bacterial infection of the uterus ✓

(Any 2) (2)

4.2.5 The corpus luteum will degenerate/burst/be resorbed/be broken down ✓

(1)

4.3 **Ticks as animal parasites**

4.3.1 **TWO economic significance of ticks**
- Transmit diseases/entry point of pathogens ✓
- Production losses/skin damage ✓
- Underperformance of farm animals ✓
- Loss of teat function/ear lobes/tail tips ✓
- Death of farm animals ✓

(Any 2) (2)

4.3.2 Three-host tick ✓
Reason: Completes every stage of its life cycle on three different hosts ✓

(2)

4.3.3 **Reason for tick outbreak in the coastal region**
Humid ✓ and favourable climatic conditions ✓

(2)

4.3.4 **Fly specie attacking sheep**
- Blowfly ✓

(1)

4.3.5 **Biological ways of controlling ticks**
- Providing herbs ✓
- Use of natural enemies/predators (ox-pecker) ✓
- Breeding adaptable animals ✓

(Any 2) (2)

4.4 **Sheep vaccination plan**

4.4.1 Weaners ✓

(1)

4.4.2 3–5 months ✓

(1)

4.4.3 Protects the ewes at critical and delicate stage of gestation ✓ against the enzootic abortion ✓

(2)
4.4.4 Role of the state

(a) Quarantine services:

- To prevent diseases or pests being brought into the country ✓
- Strict import control measures are adopted/impose control measures on proclaimed diseases/ use law enforcement agencies (statutory measures, state vets stock inspectors) to control the movement of animals ✓

(b) Veterinary research:

- To develop better methods to diagnose and control diseases ✓
- Train veterinarians ✓
- Operate research stations ✓
- Stock inspectors ✓
- Extension services ✓

(Any 2) (2) [35]

TOTAL SECTION B: 105
GRAND TOTAL: 150