AGRUCULTURAL SCIENCES P1
NOVEMBER 2013
MEMORANDUM

MARKS: 150

This memorandum consists of 10 pages.
SECTION A

QUESTION 1

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

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

1.3 1.3.1 Small intestine/jejunum/ileum/duodenum ✓✓
1.3.2 Carbohydrates/fats/lipids/oils ✓✓
1.3.3 Lobola ✓✓
1.3.4 Ovulation ✓✓
1.3.5 Quarantine ✓✓  (5 x 2) (10)

1.4 1.4.1 Amino acids/peptides ✓
1.4.2 Endothermic/homoeothermic/warm blooded ✓
1.4.3 Indigenous ✓
1.4.4 Feedlot ✓
1.4.5 Blowflies ✓  (5 x 1) (5)

TOTAL SECTION A: 45
SECTION B

QUESTION 2: ANIMAL NUTRITION

2.1 Digestive system of a farm animal

2.1.1 Labelled parts

(a) D ✓ (1)
(b) G ✓ (1)
(c) C ✓ (1)

2.1.2 THREE adaptations of part C for absorption.

• It is a long thin tube that allows more nutrients to have contact with the walls and makes absorption easier ✓
• It has numerous folds hence a large surface area and makes more absorption possible ✓
• It has finger-like projections that enlarge the surface area for absorption ✓
• Villi with blood vessels/micro villi allow for easier absorption of nutrients into the bloodstream ✓
• Slow movement of food/muscle movement allows for more contact time with nutrients that will be absorbed ✓
• The presence of a single layer of columnar epithelial cells makes it easier for rapid absorption of nutrients ✓

(Any 3)

2.1.3 Absorption of fat molecules

• The fat molecules are broken up into fatty acids and glycerol/enzyme lipase breaks up fat molecules into simpler and soluble substances ✓
• Short chain fatty acids/simpler soluble substances are directly absorbed ✓
• Passive absorption into the blood capillaries through diffusion ✓
• Fatty acids and glycerol are absorbed into the lacteal/lymph vessel ✓
• Long chain fatty acids are actively absorbed through carrier molecules ✓

(Any 2)
2.2 Digestibility of feed

2.2.1 Digestibility co-efficient

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

\[
= \frac{8.8 \text{ kg} - 2.7 \text{ kg} \times 100}{8.8 \text{ kg}}
\]

Or

\[
= \frac{6.1 \times 100}{8.8 \text{ kg}}
\]

Or

One mark for evidence of substitution of values into the formula
One mark for evidence of simplification of values

And

\[
= 69,32 \text{ or } 69 \%
\]

(5)

2.2.2 Implication of the value obtained in QUESTION 2.2.1

- 69,32 or 69% of the feed
- was digested and absorbed
- 30,68 or 31% of the feed
- was not digested and absorbed but excreted (Any 2)

(2)

2.3 Balancing rations

2.3.1 Feed A (Maize): 9

Feed B: (OCM)
(Oil cake meal) 38

Mix 20 parts of Feed A (Maize) with 9 parts of Feed B (OCM) Or 20:9

(4)

2.3.2 Percentage of maize

\[
20 + 9 = 29
\]

\[
= \frac{20 \times 100}{29}
\]

\[
= 68,97 \text{ or } 69\%
\]

(3)
2.4 Nutrient deficiencies

2.4.1 Phosphorus/P ✔️ (1)

2.4.2 Iron/Fe ✔️ (1)

2.4.3 Iodine/I ✔️ (1)

2.5 Comparing feeds

2.5.1 Nutritive ratio

Feed A:

\[
\text{TDN} = 8 + 50 + 22 = 80\% \quad \text{Or} \quad \text{DNNE} = 50 + 22 = 72\% ✔️
\]

\[
\frac{\text{NR}}{\text{DP}} = 1: \frac{\text{TDN} - \text{DP}}{\text{DP}} \quad \text{Or} \quad \frac{\text{DNNE}^\prime}{\text{DP}}
\]

\[
\frac{\text{NR}}{8} = 1: \frac{80 - 8}{8} \quad \text{Or} \quad \frac{72}{8}
\]

\[
\text{NR} = 1: 9 ✔️ (4)
\]

2.5.2 Feed for fattening animals with reason

• Feed A ✔️ (1)

Reason

• NR is wide/(1:9) ✔️
• Higher ratio of carbohydrates to protein ✔️
• As carbohydrates are necessary for fattening ✔️ (Any 2) (2)

2.5.3 Feed suited for young growing animals

• Feed B ✔️ (1)

Reason

• NR is narrow/(1:5) ✔️
• Higher ratio protein to carbohydrates ✔️
• As protein is necessary for growth ✔️ (Any 2) (2) [35]

QUESTION 3: ANIMAL PRODUCTION

3.1 Animal behaviour

3.1.1 E ✔️ (1)

3.1.2 • D ✔️
• C ✔️ (Any 1) (1)

3.1.3 • B ✔️
• E ✔️ (Any 1) (1)

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Please turn over
3.1.4 • A ✓

3.1.5 • B ✓

3.2 Temperature requirements

3.2.1 Heat production
• Dairy cows/cattle. ✓
  Reason
• It has a value of 2500 kJ/h which is more than the others. ✓
• Millions/many micro-organisms in the stomach that produce heat through fermentation. ✓
(Any 1)

3.2.2 Reasons for intensive chicken production
• Heat production is the lowest ✓
• Optimal temperature is the highest ✓
• Lower critical temperature is the highest ✓
• Close range between critical and optimal temperature ✓
• Air movement to prevent respirational problems ✓
• Temperature control to prevent diseases ✓
(Any 2)

3.2.3 Definition of optimal temperature
• Ideal/best/most comfortable/most suitable /most favourable environmental temperature ✓
• The animal does not need to use its own energy to control body temperature/allows for the most cost effective production output/and conducive for production ✓
(2)

3.2.4 Reason for keeping pigs in an enclosed environment in winter
• Have a higher lower critical temperature compared to cows ✓
• And will need a warmer environment to survive/to produce ✓
• As they have a lower ability to produce heat ✓
(Any 2)
3.3 Adaptation of Mbuzi goat to harsh conditions

3.3.1 (a) Environmental conditions
- Pigmentation of the skin ✓
- protects it from radiation ✓
  or
- Legs adapted ✓
- to steeper slopes/to reach nutritious vegetation ✓
  or
- Horns ✓
- to protect from predators ✓
  or
- Good motherly instincts ✓
- supply it’s young with regular nutrition (sucking of milk) ✓

3.3.2 Management practices
- Dipping/pest control ✓
- Injection/Vaccination ✓
- Counting ✓
- Dosing/Deworming ✓
- Weaning/Kidding ✓
- Tagging/marking/identification ✓
- Castration ✓
- Weighting ✓
- Age determination ✓
- Artificial Insemination/AI ✓
- Hoof trimming ✓ (Any 3)

3.4 Feed utilisation and conversion

3.4.1 Calculation of feed for Animal A and B

Quantity of feed for Animal A: 48 kg – 6 kg = 42 kg ✓
Quantity of feed for Animal B: 56 kg – 6 kg = 50 kg ✓
3.4.2 Animal that used the ration more effectively
- Animal B ✓

Reason
- Higher production in proportion to feed ingested ✓
- Animal A: 42kg of feed to produce 12 litres of milk/3.5kg per litre
- Animal B: 50kg of feed to produce 43 litres of milk/1.2kg per litre ✓
- Better conversion rate ✓
- Better genetic material ✓

(Any 2) (1)

3.5 Broiler production unit
3.5.1 Equipment to be used (each equipment should be used once)
- Insulation material on the roof/foldable walls ✓
- Electric heaters/foldable walls ✓
- Fans on the roof and walls/foldable walls ✓
- Foot bath at all entrances ✓

(Any 2) (1)

3.5.2 Characteristics of an intensive animal production
- It is highly hygienic ✓
- Protection against extreme environmental conditions/shelter is provided ✓
- Regulation of optimal temperature for production ✓
- Fixed/regular supply of feed and water ✓
- Kept at high density/lots of animals in a small space ✓
- Capital intensive/expensive with high tech equipment/mechanized ✓

(Any 4) (4)

3.5.3 Possible health risks
- Disease ✓
- The outbreak of an infectious disease may be transmitted quickly amongst poultry ✓

(2)

QUEST/STION 4: ANIMAL REPRODUCTION, PROTECTION AND CONTROL

4.1 Pregnancy testing
4.1.1 Labelled parts
- A - Caruncles/uterus wall/placenta ✓
- B - Uterus/womb ✓
- C - Cervix ✓

(3)

4.1.2 TWO advantages of early pregnancy testing
- For proper feeding ✓
- For proper management of diseases and parasites ✓
- For proper management of breeding cycles/records/calving date ✓

(Any 2) (2)

4.1.3 Role of the mucus plug
- Protects animal ✓
- Against external diseases and infections ✓

(2)

4.1.4 Conditions that could occur
- Maceration ✓
- Mummification ✓

(1)

(1)
4.1.5 Condition and TWO possible causes for the termination of pregnancy

- Abortion/miscarriage ✓
  Reason
- Diseases ✓
- Injuries/maltreatment ✓
- Infection ✓
- Laxatives/wrong medication ✓
- Toxins/poisons ✓
- Fever reaction ✓
- Malnutrition ✓
- Stress ✓
- Hormonal imbalances ✓

(Any 2) (1)

4.2 Structures in reproduction

4.2.1 Names represented by letters

A - Ovary ✓
B - Graafian follicle ✓
E - Infundibulum ✓

(2)

4.2.2 Hormones

(a) Follicle stimulating hormone/FSH ✓
(b) Oestrogen/LH (Luteinising hormone) ✓
(c) Oestrogen ✓
(d) Progesterone ✓

(3)

4.2.3 Adaptability of infundibulum

- Contains hair-like structures/cilia ✓
  or
- for movement of the ova ✓
- Wider at the edge/bell shaped/ funnel shape ✓
  adapted for holding/capturing the ova ✓

(2)

4.3 Indigenous methods of controlling diseases

4.3.1 Herbs/concoctions/mixtures ✓

(1)

4.3.2 TWO most common methods

- Gall smearing ✓
- Self diagnosis ✓

(2)

4.3.3 Ways in which bush burning control the ticks

- Destroy eggs/larva/nymph ✓
- Kills adult ticks ✓
- Host in the life cycle for 2 and 3 host ticks is killed ✓

(2)
4.3.4 Bar graph on indigenous control methods

The frequency of using indigenous methods to control diseases

<table>
<thead>
<tr>
<th>Indigenous control methods</th>
<th>Frequency of use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gall smearing</td>
<td>80</td>
</tr>
<tr>
<td>Herbs</td>
<td>70</td>
</tr>
<tr>
<td>Self diagnosis</td>
<td>60</td>
</tr>
<tr>
<td>Bush burning</td>
<td>50</td>
</tr>
<tr>
<td>Herd isolation</td>
<td>40</td>
</tr>
<tr>
<td>Local mixtures</td>
<td>30</td>
</tr>
</tbody>
</table>

Marking graph with the following checklist:

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<thead>
<tr>
<th>Criteria</th>
<th>Yes: 1 Mark</th>
<th>No: 0 Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bar graph</td>
<td>1 ✓</td>
<td></td>
</tr>
<tr>
<td>2. X axis labelled</td>
<td>1 ✓</td>
<td></td>
</tr>
<tr>
<td>3. Y axis 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. Correct subheadings for X-axis</td>
<td>1 ✓</td>
<td></td>
</tr>
</tbody>
</table>

4.3.5 THREE measures to restrict infectious diseases

- Vaccination/inoculation ✓
- Injections ✓
- Bio-security/sanitation/proper handling of manure ✓
- Sufficient space/ good ventilation ✓
- Isolation/quarantine/separation ✓
- Controlling pests and parasites / dipping/ dosing ✓
- Good nutrition and supplements ✓
- Breeding of resistant animals ✓

(Any 3)

TOTAL SECTION B: 105
GRAND TOTAL: 150