AGRICULTURAL SCIENCES P1

NOVEMBER 2011

MEMORANDUM

MARKS: 150

This memorandum consists of 11 pages.
SECTION A

QUESTION 1.1

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<th>B</th>
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(SUM: 10 x 2 = 20)

QUESTION 1.2

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(SUM: 5 x 2 = 10)

QUESTION 1.3

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<td>Digestible energy ✓✓</td>
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<tr>
<td>1.3.3</td>
<td>Pistolette/pipette/insemination rod/syringe ✓✓</td>
</tr>
<tr>
<td>1.3.4</td>
<td>Spermatogenesis/Sperm formation ✓✓</td>
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<tr>
<td>1.3.5</td>
<td>Injection/Vaccination/ immunization ✓✓</td>
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(SUM: 5 x 1 = 5)

QUESTION 1.4

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<td>Optimal/Maximal/best ✓</td>
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<td>1.4.3</td>
<td>Ovulation/ fertility ✓</td>
</tr>
<tr>
<td>1.4.4</td>
<td>Red ✓</td>
</tr>
<tr>
<td>1.4.5</td>
<td>Pathogenic /Disease causing / harmful ✓</td>
</tr>
</tbody>
</table>

(SUM: 5 x 1 = 5)
SECTION B

QUESTION 2: ANIMAL NUTRITION

2.1 Compound stomach

2.1.1 Farm animals with compound stomach
- Goat ✓
- Cattle ✓

(Any 1) (1)

2.1.2 Rumen/ large stomach ✓

(1)

2.1.3 • young suckling animals feed only on milk /milk moves straight to the abomasum /presence of esophageal groove/only abomasum functional ✓
- and no need for rumination/ fermentation at this stage ✓
- young suckling animals do not ingest crude fibre ✓

(Any 2) (2)

2.1.4 Supplementing with non-protein nitrogen substances
- these types of animals have a rumen that contains micro flora and fauna ✓
- that can utilise and change non-protein nitrogenous (NPN) substances into microbial protein ✓
- which is further digested and absorbed by the digestive system ✓

(Any 2) (2)

2.2 Nutritive ratio of oatmeal

2.2.1 Concentrate ✓

(1)

2.2.2 Oatmeal as a concentrate
It contains 71% of total digestible nutrients (TDN) ✓

(1)

2.2.3 Calculation of a nutritive ratio

\[
NR = 1 : \frac{\%TDN - \%DP}{\%DP} \text{ or } 1 : \frac{\text{carbohydrates} + \text{fats}}{\text{protein}} \text{ or } 1 : \frac{\text{non-nitrogenous substances}}{\text{digestible protein}}
\]

\[
= 1 : \frac{71\% - 9\%}{9\%} \text{✓}
\]

\[
= 1 : 62\% \text{✓}
\]

\[
= 1 : 6,8 \text{ or } 1 : 7 \text{✓}
\]

(4)
2.2.4 Production purpose of oatmeal in animal nutrition
- For energy purposes/fattening/maintenance/production when supplemented✓
- It has a wide nutritive ratio/ratio greater than 1:6 ✓
- More carbohydrates and fats compared to proteins/low percentage of proteins/carbohydrate-rich concentrate✓
  (Any 2) (2)

2.2.5 Oatmeal (DP) 9%

![Diagram showing the ratio of oatmeal to peanut oilcake meal]

Peanut Oilcake meal 32%

Ratio: 16 parts of oatmeal ✓ and 7 parts of Peanut oilcake meal ✓
or

16 ✓ : 7 ✓ (5)

2.3 Feedlot industries

2.3.1 Zero grazing/no grazing ✓ (1)

2.3.2 Protein requirements for mature animals
Require less proteins for maintenance and growth ✓

Protein requirements of young animals
Growing animals need more protein ✓ (2)

2.3.3 Improving digestibility
- Boiling/soaking ✓
- Roasting ✓
- Pelleting / rolling ✓
- Grinding and milling ✓
- Cutting of plants for making hay (time & physiological stage) ✓
- Supplementing with molasses ✓
- Supplementing with non-protein nitrogen ✓
- Supplementing with protein ✓ (Any 1) (1)
2.3.4 **Important functions of carbohydrates**
- Serve to supply energy for metabolic processes✓
- During combustion of carbohydrates heat is produced – body heat✓
- Glycogen is stored in the liver as reserve source of energy✓
- Some carbohydrates combine with protein (glycoprotein) structural components of cells/Component of RNA/DNA controlling the functioning of the cell ✓
- Used for fattening/ finishing✓
- Normal functioning of the digestive system /provides bulkiness of the ration ✓

(Any 2)  (2)

2.3.5 **Quality of proteins**
- Ruminants contain microorganisms that are able to synthesize microbe/microbial protein✓
- From Non Protein Nitrogen (NPN) sources✓
- The microbial protein can then be further digested✓
- Non-ruminants do not have any micro-organisms that can synthesize microbial proteins✓ and
- is dependent on the protein sources in the feed ✓

(Any 2)  (2)

2.4 **Growth stimulants**

2.4.1 Sedative/tranquiliser/stress packs/depressant medication✓  (1)

2.4.2 Thyroid regulator/ iodine ✓  (1)

2.4.3 Ear/under the skin/sub-caneous✓  (1)

2.5 **The table on BV of high and low quality proteins**

2.5.1 **Definition of biological value**
BV = is the index/measure✓ of the quality✓ of the protein of the feed based on the amino-acid content✓  OR  ( Any 2)

The efficiency ✓ with which a protein supplies nitrogen/amino-acid requirement of an animal✓  (2)

2.5.2 Egg protein/albumin ✓  (1)

2.5.3 **Judgement of the suitability of fishmeal as a protein source**
- Animal proteins like fish meal have higher biological values than plant proteins✓
- High biological value (90%) indicates a good quality protein source✓.
- Suitable✓ / Suited for production ration✓

(Any 2)  (2)
QUESTION 3: ANIMAL PRODUCTION

3.1 Effect of environmental conditions on production

3.1.1 Relationship between the production and temperature
- An increase in temperature leads to an increase in production output ✓
- Until at a maximum point and thereafter production decreases as the temperature is still rising ✓ (2)

3.1.2 TWO reasons for lower optimum temperature in dairy cows
- Micro-organisms produce extra heat in the rumen ✓
- Stratified epithelium – heating rods in the stomach area (fermentation vessel) ✓
- Dairy cow has a lower optimum temperature (10-15°C) ✓
- Dairy cow has the ability to produce more heat (2 500kJ/hour) ✓ (Any 2) (2)

3.1.3 Measures taken by a farmer against extreme temperatures
Hot conditions:
- Provide well ventilated shelter, fans, sprinklers, foggers misters, showers, large industrial fans, air conditioners ✓
- Hosepipes to spray water over animals can be used or a combination to bring down the effect of the extreme temperatures on the animals ✓

Cold conditions:
- Natural or artificial shelter/housing (e.g. barns) ✓ with
- Heating units, infra red lights can be used to protect the animals when it is too cold ✓

NB: One measure 1 mark; & explanation 1 mark (Any 2x2) (4)

3.2 Handling and behaviour of farm animals.

3.2.1 Basic aspects to be considered when transporting beef cattle.
- Plan for journey and avoid peak hours/have resting periods during the journey ✓
- Movement permit with driver/marking of animals ✓
- Fit and healthy animals are selected to travel ✓
- Do not mix young and old animals together/same sex/age ✓
- The floor of the truck must not be slippery/any hazards ✓
- Air /ventilation and light must be able to enter the truck where the animals are kept/ventilation ✓
- Provide enough space to prevent stampede ✓
- Prepare animals for journey ✓
- suitable loading/off-loading/ proper supervision ✓ (Any 5) (5)
3.2.2 **Tools used when animals are moving alongside the road**
- Red flags /sign boards ✓
- Truck with hazards on ✓
- Whips / stick/halter ✓
- Harness/bridle ✓
- Whistle ✓

(Any 2) (2)

3.3 **Case study**

3.3.1 **System of production**
Intensive system ✓ (1)

3.3.2 **Factors that influence growth rate of pigs**
- Supply clean water ✓
- Good quality rations /food ✓
- Good quality systems (intensive)/ shelter ✓
- Temperature ✓
- Health situation/hygiene/social-environmental comfort / disease ✓

(Any 2) (2)

3.3.3 **Equipment used**
**Protection against rain**
(a) Temperature control:
   tin roof ✓ (1)
(b) Protection of litter:
   farrowing rail/ pig sty ✓ (1)

3.3.4 **Calculation of average daily gain**
Weight gain – weaning mass/days of monitoring
**Pig A:** \((78000 - 46000)/35 ✓\)
\[= 914\text{g/day} ✓\] (2)

**Pig B:** \((75000 - 48000)/35 ✓\)
\[= 771\text{g/day} ✓\] (2)

3.3.5 **Pig that will give more profit**
A ✓ (1)
3.4 Dairy industry

Bar graph check list

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<tr>
<td>Bar graph: production</td>
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</tbody>
</table>

(6)

3.4.2 Deduction from the data above

- The milk production increase from 2005-2008✓
- from 2008-2009 it stabilises ✓ (2)

3.4.3 TWO factors causing dairy farmers to quit

- Drought✓
- Low producer/milk prices/not profitable business✓ (2) [35]

QUESTION 4: ANIMAL REPRODUCTION, PROTECTION AND CONTROL

4.1 The process or events that take place during reproduction

4.1.1 Secondary sex organs

- C/Uterus horn/uterus✓
- B/Fallopian tubes/oviduct/egg tube✓
- D/Cervix/cervical canal/uterus neck✓
- E/Vagina✓ (Any 2) (2)
4.1.2 **Labelled parts**

(a) **B** fallopian tube/oviduct/ampulla ✓
(b) **D** plug at the mouth of the cervix ✓

4.1.3 **Functions**

Protection/closing of the foetus/uterus during pregnancy/canal for entry of sperm/mucous plug ✓

4.1.4 **Part responsible for catching ovum**

Infundibulum/finger-like projections/ fimbria /funnel shaped structure ✓

**Adaptation of the fallopian tube**

- Positions itself around the ovary to ensure ova does not fall/funnel shaped ✓
- Guides ovulated ova into the oviduct ✓
- Vibrating cilia allow movement ✓
- Ensuring that the ova moves in the right direction ✓ (Any 2)

4.2 **Hormonal changes in the oestrus cycle**

4.2.1 **Start of ovulation**

Values between **day 20 and 21 ✓**

4.2.2 **Hormones responsible for ovulation**

- Oestrogen ✓
- Luteinizing hormone (LH) ✓

4.2.3 **Hormone responsible**

(a) **Luteinizing hormone**

- LH released by the brain causes the ovary to release the ova ✓
- Together with oestrogen causes the follicles to burst to release the ova ✓
- Responsible of the formation of corpus luteum ✓
- Tightens infundibulum around ovary ✓ (Any 2)

(b) **Oestrogen**

- Thickens/preparation the lining of the uterus for the fertilized egg/enhances the thickness of the uterus wall ✓
- Responsible for heat symptoms ✓
- Stimulates the graafian follicle to release the ovum/ovulation ✓
- Stimulates brain to release LH ✓
- Delays the secretion of FSH ✓
- Increases blood supply to uterus ✓
- Prevents bacterial infection of the uterus when cervix is open ✓
- Relaxes the walls of the uterus ✓ (Any 2)
4.2.4 **Changes in progesterone levels**

Progestrone levels increase/becomes higher ✔

**Effects:**

- Prepares the uterine wall (thickens) for the implantation of the fertilized ovum/maintaining pregnancy ✔
- Delays the secretion of FSH ✔
- Inhibits the maturation of the graafian follicle ✔
- Prevents oestrus/ovulation ✔

(Any 2) (2)

4.3 **Lactation**

4.3.1 **First milk released**

Colostrum/beestings ✔

**Differences**

- More yellow in colour than normal milk ✔
- Higher fat content/ creamier/ more concentrated/nutritious/thicker ✔
- Contains anti-diseases substances/anti-bodies ✔

(Any 2) (2)

4.3.2 **Negative impacts of no colostrum**

- Energy loss ✔
- Susceptible to diseases/low resistance ✔
- Stunted/slow growth ✔
- Uncleansed system/malfunctioning of alimentary canal ✔
- Insufficient nutrients ✔

(Any 2) (2)

4.4 **Rift Valley Fever: case study**

4.4.1 **Virus** ✔
4.4.2 **mosquito** ✔

4.4.3 **Reasons that support the statement on epidemic diseases**

- This is a wide spread occurrence of a disease that spreads rapidly through an area/country ✔
- It kills animals that may be counted in thousands ✔
- Humans can also be affected ✔

(Any 2) (2)

4.4.4 **Preventative measures for the spread of Rift Valley fever**

- Limiting the movement of animals/quarantine ✔
- avoid wet areas ✔
- Regular dipping of animals with super methionine-based substance against mosquitoes ✔
- Vaccinations against this disease ✔
- Avoid handling products of infected animals ✔
- Report/inform relevant authorities ✔

(Any 2) (2)
4.5 Infestation by mites

4.5.1 Reason to proof that mites are external parasites
- Mites are found on less hairy parts of the body of cattle, sheep, goats, pigs and horses/Mites related to ticks ✓

4.5.2 Two non ruminant affected by mites
- horses ✓
- pigs ✓

4.5.3 Proclaimed disease
- Spreads very rapidly ✓
- Great losses in production (skin & wool) can be experienced ✓
- Not easily controlled ✓

Farmers’ responsibility
- The farmer should immediately report to the relevant authorities ✓
- The farmer must adhere to quarantine measures that are imposed ✓
- The farmer needs to dip the sheep regularly (at least twice)/disinfect pens ✓

(Any 1) (1)
(Any 2) (2)

[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150