AGRICULTURAL SCIENCES P1

NOVEMBER 2011

POSSIBLE ANSWERS

MARKS: 150

This memorandum consists of 11 pages.
### SECTION A

#### QUESTION 1.1

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(10 x 2) (20)

#### QUESTION 1.2

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<td>1.2.5</td>
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</table>

(5 x 2) (10)

#### QUESTION 1.3

1.3.1 Proventriculus ✓✓
1.3.2 Digestible energy ✓✓
1.3.3 Pistolette/pipette/insemination rod/syringe ✓✓
1.3.4 Spermatogenesis/Sperm formation ✓✓
1.3.5 Injection/Vaccination/immunization ✓✓

#### QUESTION 1.4

1.4.1 Reticulo-rumen ✓
1.4.2 Optimal/Maximal/best ✓
1.4.3 Ovulation/ fertility ✓
1.4.4 Red ✓
1.4.5 Pathogenic /Disease causing / harmful ✓

(5 x 1) (5)
SECTION B

QUESTION 2: ANIMAL NUTRITION

2.1 Compound stomach

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

2.1.2 Rumen/large stomach ✓

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 ✓

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

2.2.3 Calculation of a nutritive ratio
   
   \[
   \text{NR} = \frac{\% \text{TDN} - \% \text{DP}}{\% \text{DP}} \quad \text{or} \quad 1: \frac{\text{carbohydrates} + \text{fats}}{\text{protein}} \quad \text{or} \quad 1: \frac{\text{non-nitrogenous substances}}{\text{digestible protein}}
   \]

   \[
   = 1: 71\% - 9\% ✓
   \]

   \[
   = 1: 62\% ✓
   \]

   \[
   = 1:6.8 \text{ or } 1:7 ✓
   \]
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%

16 parts ✓

Peanut Oilcake meal 32%

7 parts ✓

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-cateneous✓

(1)

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

2.5.1 **Definition of biological value**
BV = 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)

[35]
QUESTION 3: ANIMAL PRODUCTION

3.1 Effect of enivromental conditions on production

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

(Total 2 marks)

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 ability to produce more heat (2 500kJ/hour) ✓

(Any 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 marks)

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 marks)

(5 marks)
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 ✓
  = 914g/day ✓  (2)

Pig B: (75000 – 48000)/35 ✓
  = 771g/day ✓  (2)

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

3.4.1 The production of milk and prices of milk (2005 – 2010)

Bar graph check list

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<td>Y axis labelled both (production &amp; price)</td>
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<tr>
<td>Bar graph : production</td>
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</tbody>
</table>

3.4.2 Deduction from the data above
- The milk production increase from 2005-2008 ✓
- from 2008-2009 it stabilises ✓

3.4.3 TWO factors causing dairy farmers to quit
- Drought ✓
- Low producer/milk prices/not profitable business ✓

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)
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 graaffian 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
Progesterone 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 ✓

(1)

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)

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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✓ (1)

4.5.2 Two non ruminant affected by mites
- horses✓
- pigs✓ (2)

4.5.3 Proclaimed disease
- Spreads very rapidly✓
- Great losses in production (skin & wool) can be experienced✓
- Not easily controlled✓ (Any 1) (1)

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 2) (2)

[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150