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JUNE EXAMINATION GRADE 12

2026

MARKING GUIDELINES

AGRICULTURAL SCIENCES

(PAPER 1)

11 pages



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SECTION A

QUESTION 1

- 1.1 1.1.1 C ✓✓
- 1.1.2 B ✓✓
- 1.1.3 C ✓✓
- 1.1.4 A ✓✓
- 1.1.5 C ✓✓
- 1.1.6 C ✓✓
- 1.1.7 D ✓✓
- 1.1.8 B ✓✓
- 1.1.9 A ✓✓
- 1.1.10 D ✓✓ (10 x 2) (20)
- 1.2 1.2.1 A only ✓✓
- 1.2.2 A only ✓✓
- 1.2.3 None ✓✓
- 1.2.4 Both A and B ✓✓
- 1.2.5 B only ✓✓ (5 x 2) (10)
- 1.3 1.3.1 Salivary gland / Pancreas ✓✓
- 1.3.2 Biuret ✓✓
- 1.3.3 Notifiable disease ✓✓
- 1.3.4 Synchronisation of oestrus ✓✓
- 1.3.5 Anterior ✓✓ (5 x 2) (10)



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- 1.4 1.4.1 Lipase ✓
- 1.4.2 Papillae ✓
- 1.4.3 Tranquilisers ✓
- 1.4.4 Pheromones ✓
- 1.4.5 Progesterone ✓ (5 x 1) (5)

TOTAL SECTION B: 45

SECTION B

QUESTION 2: ANIMAL NUTRITION

2.1 The digestive system of a farm animal

- 2.1.1 **The type of farm animal that has the stomach in the diagram**
Ruminant. ✓ (1)
- 2.1.2 **Justification to the answer to QUESTION 2.1.1.**
- Complex stomach/four compartment stomach/ Polygastric ✓
 - Large fermentation vessel/rumen ✓
 - The animal regurgitates ✓ (Any 2) (2)
- 2.1.3 **TWO fluids that are secreted into the small intestines.**
- Bile
 - Pancreatic juice
 - Succus entericus/ Intestinal/ Duodenal juice (Any 2) (2)

2.2 The absorption of substances

- 2.2.1 **Indication of the process**
Active absorption ✓ (1)
- 2.2.2 **Description of the process/active absorption**
- Absorption of nutrients from a low to high concentration/against concentration gradient ✓ with the aid of ATP as a source of energy ✓ (2)



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2.3 An experimental trial with sheep to determine digestibility

2.3.1 Classification of lucerne hay as a feed

Protein-rich roughage ✓

(1)

2.3.2 Calculation of the co-efficient of digestibility

$$\text{Manure} = \frac{4}{100} \times \frac{2}{1} = 0,08$$

$$2 - 0,08 = 1,92 \text{ kg}$$

$$\text{Lucerne} = \frac{8}{100} \times \frac{7}{1} = 0,56$$

$$7 - 0,56 = 6,44 \text{ kg} \checkmark$$

$$\text{DC} = \frac{\text{Dry Matter Intake (kg)} - \text{Dry mass manure (kg)}}{\text{Dry Matter Intake (kg)}} \times \frac{100}{1} \checkmark$$

$$= \frac{6,44 \text{ kg} - 1,92 \text{ kg}}{6,44 \text{ kg}} \times \frac{100}{1} \checkmark$$

$$= 70,18 \checkmark \% \checkmark \text{ OR } 70,2 \checkmark \% \checkmark$$

(5)

2.3.3 Explanation of the difference in protein requirement between an older sheep and a lamb

Lambs/younger sheep need proteins mainly for growth. ✓

Older sheep need proteins for production and reproduction. ✓

(2)

2.3.4 THREE methods that can improve the digestibility of feeds

- Grinding/milling ✓
- Dry rolling/crackling ✓
- Popping/micronising ✓
- Roasting ✓
- Pelleting ✓
- Soaking ✓

(Any 3) (3)

2.4 The table that indicates the nutritional information of selected feeds

2.4.1 Calculation of the Nutritive Ratio

$$\text{NR} = 1 : \% \frac{\text{DNNS}}{\% \text{DP}} \checkmark$$

$$\text{OR NR} = 1 : \% \frac{\text{TDN} - \text{DP}}{\% \text{DP}} \checkmark$$

$$= \frac{1 : 37\%}{25\%} \checkmark$$

$$= 1 : 1,48 / 1 : 1,5 \checkmark$$

$$1 : \frac{62\% - 25\%}{25\%} \checkmark$$

$$1 : 1,48 / 1 : 1,5 \checkmark$$

(3)

2.4.2 Justification of suitability of lucerne hay for fattening

- Not suitable for fattening. ✓
- It has more proteins. ✓
- A narrow ratio suited for growth/production/reproduction. ✓

(Any 2) (2)



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2.5 The schematic representation indicating energy loss

2.5.1 Labels for A and C

A – Digestible Energy/DE ✓

C – Energy lost in heat ✓

(2)

2.5.2 Importance of net energy

- Growth ✓
- Production ✓
- Reproduction ✓
- Maintenance ✓
- Work ✓

(Any 3) (3)

2.6 Different animal feeds

2.6.1 Finishing cattle for the abattoir – B ✓

(1)

2.6.2 To correct mineral deficiencies – D ✓

(1)

2.6.3 To improve fertility in male animals – A ✓

(1)

2.6.4 To supply bulkiness in rations of ruminant animals – C ✓

(1)

2.7 Feed Flow Programme

(1)

2.7.1 Description of the term

Feed/ fodder flow programme ✓

(1)

2.7.2 Principles of Feed Flow Programme

- Meet animal requirements ✓
- Safe use of resource ✓
- The margin over all feed costs should be positive ✓
- Management should be flexible. ✓

(Any 1) (1)

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QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

3.1 Farming system.

3.1.1 Identification of the farming system

Subsistence farming system ✓ (1)

3.1.2 Justification of the answer providing TWO reasons

- Fewer animals are used for ploughing ✓
- Produce to meet the needs for the family ✓
- No use of technology / use of traditional methods ✓ (Any 2) (2)

3.1.3 THREE factors that would increase animal production

- Nutrition/feeding ✓
- Environment ✓
- Breeding/reproduction ✓
- General management practices ✓ (Any 3) (3)

3.2 Two types of farmers

3.2.1 Identification of a farmer that operates on a small scale

Farmer A ✓ (1)

3.2.2 A reason that supports the answer in QUESTION 3.2.1

The enterprise is operated with 30 cows ✓ (1)

3.2.3 The production system practiced by Farmer B

Intensive farming system ✓ (1)

3.2.4 TWO reasons to justify question 3.2.3

- Cows are milked in a milking parlour ✓
- Presence of a housing facility ✓
- Use the latest technology ✓ (Any 2) (2)

3.2.5 Predict the effect of extreme temperatures (too high temperatures and too low temperatures) on feed intake

- Low temperatures will increase feed intake for animals to maintain constant body temperature (heat) ✓
- High temperature leads to lower feed intake/animal is uncomfortable and eats less ✓ (2)

3.2.6 TWO possible measures that are taken by Farmer B to control high temperatures in this dairy production unit

- Shelter/housing ✓
- Ventilation ✓ (2)



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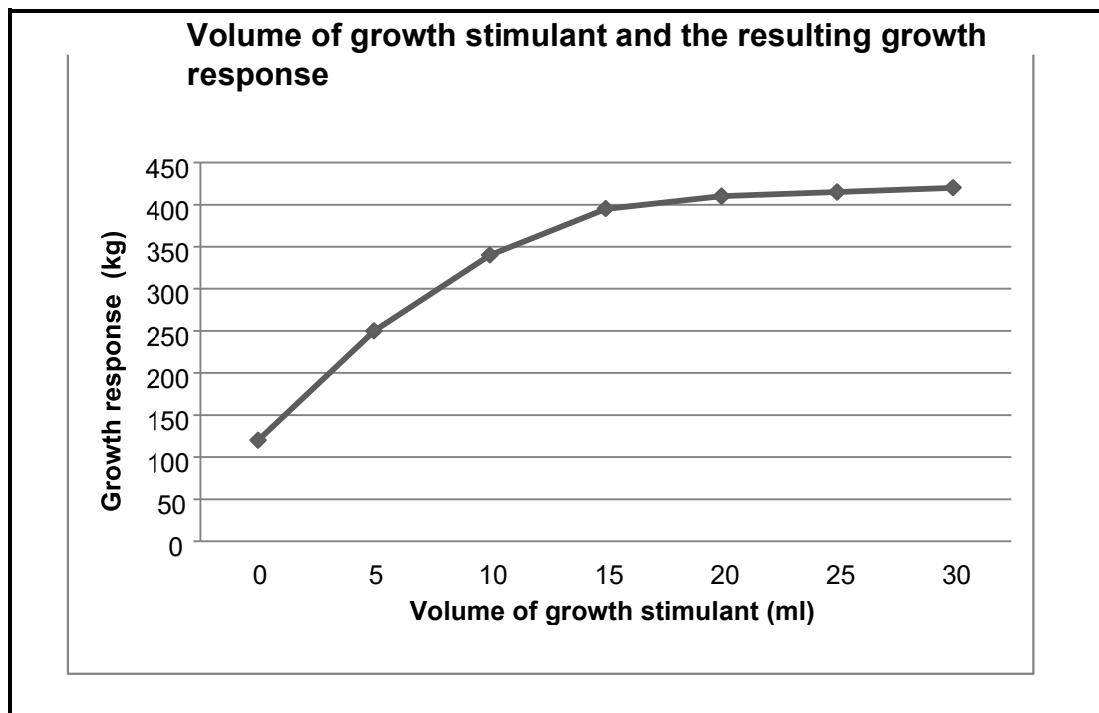
3.3 Common practice in a livestock production enterprise

THREE requirements for the movement or transport of animals on public roads

- Big and strong vehicles/adapted vehicles for transportation/strong sides ✓
- Enough space for animals ✓
- Correct documentation for the transport of livestock ✓
- Animals should be marked as prescribed by regulations ✓
- Animals of same sex and age transported together ✓
- Sufficient protection ✓
- Provision of drinking water/a calm area prior to departure ✓
- Use a red flag when moving animals on foot ✓

(Any 3) (3)

3.4 A line graph



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- Correct heading ✓
- Y-axis – correct labelling (growth response) ✓
- X-axis – correct labelling (volume of growth stimulants) ✓
- Correct units (kg & ml) ✓
- 80% correct plotting ✓
- Correct type of graph ✓

(6)



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3.5 Life cycle of a blowfly

- 3.5.1 **Identify the parasite in the diagram of a life cycle**
Blowfly ✓ (1)
- 3.5.2 **The most harmful stage in the life cycle of this parasite**
Larva stage ✓ (1)
- 3.5.3 **The condition caused by the stage in QUESTION 3.5.2 that occurs in the wounds of wounds of the farm animal**
Blowfly strike/attacks ✓ (1)
- 3.5.4 **The term used for the removal of the wool around the tail and near the leg areas**
Crutching ✓ (1)
- 3.5.5 **THREE non-chemical management practices used to control infestation by this parasite**
- Correct timing of shearing/crutching ✓
 - Clipping and cleaning wool ✓
 - Tail docking ✓
 - Lambing time after shearing ✓
 - Breeding/selection of resistant animals ✓
- (Any 3) (3)

3.6 A toxic plant that can affect the animals in different ways

- 3.6.1 **Identification of the plant shown in the picture**
Thorn apple/ Devil's apple ✓ (1)
- 3.6.2 **TWO measures the farmer can implement to treat animals suffering from plant poisoning**
- Keep affected animals away from drinking water ✓
 - Allow small quantities of water after two days ✓
 - Administer remedies that neutralise the plant poison/strong tea/activated charcoal/laxatives ✓
 - Provide large doses of purgatives to cause expulsion of the poison ✓
 - Dose with sugar/glucose ✓
 - Keep the animal calm in the shade ✓
- (Any 2) (2)
- 3.6.3 **ONE role that the state fulfils in animal health**
- Awareness campaigns ✓
 - Legislation/registration of medication ✓
 - Research ✓
 - Training/education ✓
 - Quarantine services ✓
 - Veterinarian services ✓
 - Import and export bans ✓
 - Importation/production of vaccines ✓
 - Movement control/permits ✓
- (Any 1) (1)

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QUESTION 4: ANIMAL REPRODUCTION

4.1 The reproductive system of a farm animal

4.1.1 Identify the letter

- (a) **Transportation of sperm cells to the urethra – D ✓**
- (b) **Secretion of a sticky liquid that provides energy for the sperm cell – E ✓** (2)

4.1.2 The role played by part C

It deposits semen into the vagina during mating ✓ (1)

4.1.3 TWO congenital defects of part B that may cause a complete loss of fertility in bulls

- Cryptorchidism ✓
- Hypoplasia ✓
- Sperm defect / Azoospermia ✓ (Any 2) (2)

4.2 The development of twins in a cow

4.2.1 TWO types of multiple births illustrated in

DIAGRAM A – Monozygotic twins/identical twins ✓
DIAGRAM B – Dizygotic twins/non-identical twins ✓ (2)

4.2.2 Motivate the answer to QUESTION 4.2.1

A one egg fertilised to produce two similar offspring ✓
B two eggs fertilised to produce two different offspring ✓ (2)

4.2.3 TWO characteristics of the twins illustrated in DIAGRAM A with regards to:

- (a) **Physical appearance – they are identical ✓** (1)
- (b) **Gender – they are of the same sex ✓** (1)

4.3 Parturition stage

4.3.1 Identification of parturition stage

Preparatory stage ✓ (1)

4.3.2 The correct scientific name

Dystocia ✓ (1)

4.3.3 TWO actions that a farmer can take to save both the calf and the cow

- Call a veterinarian for a caesarean section ✓
- Redirect the calf into an anterior position ✓ (2)



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4.4 Oestrus cycles

- 4.4.1 **The average number of days for the oestrus cycle in a cow**
21 days ✓ (1)
- 4.4.2 **TWO devices a farmer may use to detect oestrus in a cow**
- Pedometer ✓
 - Chin-ball marker ✓
 - Tail-chalking ✓
 - Kamar heat mount detector ✓ (Any 2) (2)
- 4.4.3 **Give FOUR reproductive hormones, in sequential order:**
- Follicle Stimulating Hormone (FSH) ✓
 - Oestrogen ✓
 - Luteinising Hormone (LH) ✓
 - Progesterone ✓ (4)
- 4.4.4 **The importance of the relationship between the timing of insemination and ovulation**
- AI should be performed approximately 6 – 14 hours before ovulation ✓
 - That gives time for semen to move to the fallopian tube ✓
 - So that the ovum does not wait too long before fertilisation ✓ (3)

4.5 A technique used by farmers to improve their cattle herds.

- 4.5.1 **The technique in the diagram**
Artificial Insemination/AI ✓ (1)
- 4.5.2 **Name of the apparatus**
Pistolette/insemination gun ✓ (1)
- 4.5.3 **TWO characteristics of high-quality semen**
- Colour – whitish to yellowish/milky/opaque/ Sticky ✓
 - Less than 15 % dead sperm cells/less mortality rate ✓
 - 80% of sperm cells showing forward movement/mobility/motility/ viability ✓
 - Less than 20 % deformation/normal morphology ✓
 - Characteristic odour ✓
 - Healthy/disease free semen ✓
 - pH - 6,4 to 6,9/slightly acidic ✓
 - Concentration – 1,1 to 4,5 billion sperm cells per ml ✓
 - Volume – 4 to 8 ml ✓ (Any 2) (2)



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4.5.4 **The best time of the day for inseminating a cow that shows the first signs of oestrus in the morning**
 In the afternoon ✓ (1)

4.5.5 **ONE negative effect**

- Injury of the reproductive tract of the cow ✓
- Unexpected low pregnancy result ✓ (Any 1) (1)

4.6 Lactation

4.6.1 **Definition of the term**
 Lactation is the period ✓ during which a female mammal produces milk. ✓ (2)

4.6.2 **TWO stimuli initiated by the milker during the milking process**

- Washing of the udder ✓
- Massage of the udder ✓
- Appearance and sound of the milker ✓
- Milking action ✓ (Any 2) (2)

[35]

TOTAL SECTION B: 105

TOTAL: 150