AGRICULTURAL SCIENCES P1
2021
MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 10 pages.
SECTION A

QUESTION 1

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

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

1.3  1.3.1 Concentrate ✓✓
     1.3.2 Crush/crush pen/race ✓✓
     1.3.3 Milk let down/milk ejection ✓✓
     1.3.4 Sperm cell/spermatozoon/male gamete/male sex cell ✓✓
     1.3.5 Embryo transfer/transplant/ET ✓✓
(5 x 2) (10)

1.4  1.4.1 Thyroid regulators ✓
     1.4.2 Disinfecting/sanitising ✓
     1.4.3 Embryonic ✓
     1.4.4 Synchronisation of oestrus ✓
     1.4.5 Testis ✓
(5 x 1) (5)

TOTAL SECTION A: 45
SECTION B

QUESTION 2: ANIMAL NUTRITION

2.1 Alimentary canal of a farm animal

2.1.1 Name farm animal
Pig ✓ (1)

2.1.2 Motivation
The animal has a simple/single/monogastric stomach ✓ (1)

2.1.3 Justification of the digestion in the mouth of a pig
Physical - Food is broken down by the teeth into smaller particles ✓ (1)
Chemical - Salivary amylase in the mouth breaks down starch in food into maltose ✓ (1)

2.1.4 Identification of the part by indicating the letter
(a) B ✓ (1)
(b) D ✓ (1)
(c) A ✓ (1)

2.1.5 Indication of the part in ruminant animals corresponding to part D in terms of functioning
Abomasum ✓ (1)

2.2 Components of feed

2.2.1 TWO roles of water/moisture in digestion
- Acts as a solvent for dissolving substances in the body ✓
- Softens/moistens food ✓
- Facilitating enzymatic digestion ✓
- Medium through which waste products are excreted ✓
- Transports nutrients through the digestive tract ✓ (Any 2) (2)

2.2.2 Identification of the component
(a) Zinc ✓ (1)
(b) Vitamin K ✓ (1)
(c) Phosphorus ✓ (1)

2.2.3 Indication of the component that is
(a) Fat soluble - Vitamin K ✓ (1)
(b) Water soluble - Vitamin B₁ ✓ (1)

2.3 Digestibility of feed

2.3.1 Calculation of the digestibility coefficient of feed in animal B
\[
DC = \frac{\text{Dry material intake (kg)} - \text{Dry mass of manure (kg)} \times 100}{\text{Dry material intake (kg)}}
\]
\[
= \frac{12 \text{ kg} - 7 \text{ kg}}{12 \text{ kg}} \times 100 \checkmark
\]
\[
= 41,6/42 \checkmark \% \checkmark (4)
\]
2.3.2 **TWO** animal related factors having an influenced on the digestibility of the feed given to ANIMAL A and ANIMAL B

- Individuality ✓
- Age of animal ✓
- Production ✓

(Any 2) (2)

2.3.3 **TWO** methods to increase digestibility of feed in ANIMAL B

- Grinding/milling ✓
- Pelleting ✓
- Boiling ✓
- Crushing ✓
- Soaking ✓
- Popping and micronizing ✓
- Dry rolling and cracking ✓
- Roasting ✓
- Mixing with molasses ✓
- Cutting hay at an early stage ✓

(Any 2) (2)

2.4 **Nutritive ratio**

2.4.1 **Calculation of the Nutritive Ratio**

Nutritive ratio = $1 : \%TDN - \%DP$ ✓

OR NR = $1 : \%DNNS$ ✓

= $1 : 50\% - 5\% ✓$

= $1 : 45%$ ✓

= $1 : 9 ✓$

(3)

2.4.2 **The suitability of the feed**

Suitable for fattening/not suitable for growth/production ✓

(1)

2.4.3 **Reason**

- Less protein ✓
- NR is wide/more carbohydrates than protein ✓

(Any 1) (1)

2.4.4 **Classification of the feed**

Roughage ✓

(1)

2.4.5 **ONE** advantage of feeding the lamb with the feed

- To stimulate the development of the rumen ✓
- Adds volume required for ruminant digestion ✓

(Any 1) (1)

2.5 **Fodder flow programme**

2.5.1 **Calculation of the total feed required by animals in month 6 (tons)**

Total feed required = 9,5 kg x 50 x 30 = 14 250 kg ✓

\[
\frac{14250 \text{ kg}}{1000} = 14,25 \text{ tons ✓}
\]

(3)
2.5.2 Deduction of the problem of fodder flow programme
Shortage/deficit of feed during month 5/6 ✓

2.5.3 Reason
Supply is 12 tons in month 5 and 4 tons in month 6 while the requirement is 13.5 and 14.25 tons respectively/feed available is less than feed required ✓

QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

3.1 Production system in cattle

3.1.1 Production system
Extensive ✓

3.1.2 TWO reasons to justify the answer in Question 3.1.1
- Kept on a natural veld ✓
- Unit area is vast per animal/large space fewer animals ✓
- Lack of shelter/protection ✓
- Animals fend for themselves ✓

3.1.3 Comparison between the TWO production systems
(a) Production output per unit area
- Intensive: High ✓
- Extensive: Low ✓

(b) Disease transmission
- Intensive: High ✓
- Extensive: Less ✓

3.2 Equipment and techniques in the handling of farm animals

3.2.1 Association of tools A - E with the techniques (a) – (e)
(a) C ✓
(b) D ✓
(c) A ✓
(d) E ✓
(e) B ✓
3.2.2 **TWO other reasons for handling animals**
- Transportation ✓
- General examination ✓
- Pregnancy diagnosis ✓
- Weighing ✓
- Control external parasites/dipping/foot bathing ✓
- Age determination ✓
- Dehorning ✓
- Hoof trimming ✓
- Artificial insemination ✓
- Production purposes ✓
- Slaughtering ✓
- Selection ✓
- Weaning ✓
- Feeding ✓
- Docking ✓
- Evaluation and classification ✓
- Generation of data ✓

(Any 2) (2)

3.3 **Farm animal behaviour**

3.3.1 **Identification of the behaviour by farm animals**
Fright/frightened/animals scared/aggression/pushing ✓

(1)

3.3.2 **Cause of the behaviour by animals**
(a) Poor depth perception ✓
(b) Heat stress ✓
(c) Flocking habit ✓

(1)

3.4 **Parasites in livestock**

3.4.1 **Classification of the type of parasite**
Ecto/external parasites ✓

(1)

3.4.2 **Month with the highest infestation**
September ✓

(1)

3.4.3 **Deduction on the rate of infestation by the blowfly on both ewes and lambs during**
(a) May - Ewes are more infested than lambs/
4 000 ewes and 1 000 lambs ✓
(b) August - Ewes are less infested than lambs/
6 000 ewes and 8 000 lambs ✓

(1)

3.4.4 **Financial implication to the farmer**
- Loss of production(stock ✓
- Loss of profit/income/high costs of treatment ✓

(Any 1) (1)
3.4.5 ONE preventative measure to reduce blowfly strike
- Shear whilst still cool for the blowfly not to survive/correct time of shearing ✓
- Docking of the tails ✓
- Treat diarrhoea ✓
- Avoid/treat open wounds ✓
- Separate rams to avoid fighting ✓
- Crouching of wet soiled areas ✓
- Controlling of flies ✓
- Breeding resistant animals ✓

(Any 1) (1)

3.5 Animal diseases

3.5.1 Identification of the pathogen A and B
A - Bacteria ✓
B - Protozoon ✓

(1) (1)

3.5.2 Transmission mode of the virus in D
Infected saliva through biting ✓

(1)

3.5.3 Vector for the viral disease in E
Mosquitoes ✓

(1)

3.5.4 Advice to the farmer to control the spread of the disease in E
- Destroy the vector at the breeding place/spraying/
- Destroy infected animals ✓
- Vaccination ✓
- Isolation ✓
- Awareness campaigns ✓

(Any 1) (1)

3.5.5 TWO control measures by the state
- Culling/killing of infected animals ✓
- Eradication programs set into place ✓
- Quarantining/isolation ✓
- Import and export bans ✓

(Any 2) (2)

3.6 Animal poisoning

3.6.1 Type of poisoning
Salt poisoning ✓

(1)

3.6.2 Identification of the source of poisoning
Sodium chloride/NaCl ✓

(1)

3.6.3 ONE treatment measure if animals get the form of poisoning
- Removal of the source of salts ✓
- Provision of fresh clean water in smaller quantities ✓
- Supplying water through a stomach tube for severe cases ✓
- Treating animals with hypertonic dextrose/isotonic/saline solution ✓

(Any 1) (1)
3.6.4 Preventative measure of this form of poisoning
- Supply clean fresh water ✓
- Do not deprive animals of salt for too long/ avoid craving for salt ✓
- Supply acceptable quantities of salt/ no free access to abundant supply of salt ✓
(Any 1) [35]

QUESTION 4: ANIMAL REPRODUCTION

4.1 Reproductive systems of animals

4.1.1 Identification of the diagram
Diagram A ✓ (1)

4.1.2 ONE reason visible from the DIAGRAM A
- Presence of an ovary ✓
- Presence of uterus ✓
- Presence of Cervix ✓
- Presence of vagina ✓
- Presence of fallopian tube ✓ (Any 1) (1)

4.1.3 Naming of the parts
C - Cervix ✓ (1)
G - Cowper’s/bulbo-urethral glands ✓ (1)

4.1.4 Function of part B and F
B - Where the zygote is implanted and develops ✓ (1)
F -
- Fluid provides nutrients to the sperm cells ✓
- Protect semen against pH changes ✓
- Helps to keep semen fertile and healthy ✓
- Improves mobility of the spermatozoa ✓ (Any 1) (1)

4.1.5 Identification of part where gametes are formed in diagram B
E ✓ (1)

4.2 Mating

4.2.1 Stages of mating in their chronological order
- A bull shows interest in cow ✓
- Bull stands on his rear leg, rests on the rear end of the cow ✓
- A bull gains intromission into the vagina ✓
- Semen is released into the vagina ✓ (4)

4.2.2 Indication of the stage not listed
Dismounting ✓ (1)

4.2.3 Hormone regulating mating behaviour in bulls
Testosterone ✓ (1)
4.3 Levels of hormones in a pregnant cow

4.3.1 Identification of the letter representing hormones
   (a) B ✓ (1)
   (b) A ✓ (1)

4.3.2 Indication of oestrus stage
   (a) Between day 2 and 6 - Pro-oestrus ✓ (1)
   (b) At day 14 - Oestrus ✓ (1)

4.3.3 Reason to justify that the cow is pregnant
   Oestrogen level dropped ✓ progesterone level is increasing and maintained ✓ (2)

4.3.4 Stage in the reproductive cycle after 282 days after insemination
   Parturition/calving ✓ (1)

4.4 Milk yield in lactating cows

4.4.1 Bar graph on milk yield in lactating cows

![Milk yield graph]

Criteria/rubric/marking guidelines
- Correct heading ✓
- X-axis: Correctly calibrated with label (Time) ✓
- Y-axis: Correctly calibrated with label (Milk yield) ✓
- Correct units (litres and weeks) ✓
- Combined bar graph ✓
- Accuracy ✓ (6)

4.4.2 Comparison of the milk yield in both groups over the weeks
- Group 1 - Milk yield increased and then it decreased ✓ (1)
- Group 2 - Milk yield increased and then it stabilised ✓ (1)
4.5 Artificial Insemination

4.5.1 Indication of the function of the equipment
- **Picture A** - Depositing semen into the reproductive tracts of a cow ✓
- **Picture B** - Storage of semen ✓

4.5.2 Indication of where the equipment is placed during Al
- Cervix/uterus ✓

4.5.3 TWO basic requirements for storage of semen
- Semen be stored at 5 °C for shorter periods ✓
- Semen stored for longer periods must be frozen in liquid nitrogen at −196 °C ✓
- Semen must be stored in polyvinyl straws ✓
- End of straws be sealed to prevent entering of liquid nitrogen ✓
- Straws be labelled for identification ✓

4.5.4 TWO challenges of using the equipment
- Expensive ✓
- Needs expert knowledge on how to handle ✓
- Correct handling and maintenance ✓

TOTAL SECTION B: 105
GRAND TOTAL: 150