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SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS

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 B_1 ✓ (1)

2.3 Digestibility of feed

2.3.1 Calculation of the digestibility coefficient of feed in animal B

$$DC = \frac{\text{Dry material intake (kg)} - \text{Dry mass of manure (kg)}}{\text{Dry material intake (kg)}} \times 100 \checkmark$$

$$= \frac{12\text{ kg} - 7\text{ kg}}{12\text{ kg}} \times \frac{100}{1} \checkmark$$

= 41,6/42 ✓ % ✓ (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 **:** $\frac{\%TDN - \%DP}{\%DP}$ ✓ **OR** NR = 1 **:** $\frac{\%DNNS}{\%DP}$ ✓

= 1 **:** $\frac{50\% - 5\%}{5\%}$ ✓ = 1 **:** $\frac{45\%}{5\%}$ ✓

= 1 **:** 9 ✓ = 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 ✓

$= \frac{14\ 250\ kg}{1\ 000}$ ✓

= 14,25 tons ✓ (3)

2.5.2 **Deduction of the problem of fodder flow programme**
Shortage/deficit of feed during month 5/6 ✓ (1)

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 ✓ (1)
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QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

3.1 Production system in cattle

3.1.1 **Production system**
Extensive ✓ (1)

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 ✓ (2)

3.1.3 **Comparison between the TWO production systems**
(a) Production output per unit area
- **Intensive:** High ✓ (1)
- **Extensive:** Low ✓ (1)

(b) Disease transmission
- **Intensive:** High ✓ (1)
- **Extensive:** Less ✓ (1)

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 ✓ (1)
(b) D ✓ (1)
(c) A ✓ (1)
(d) E ✓ (1)
(e) B ✓ (1)

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 ✓ (1)
(b) Heat stress ✓ (1)
(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 ✓ (1)
(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 ✓ (1)
B - Protozoon ✓ (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 ✓ (1)

(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

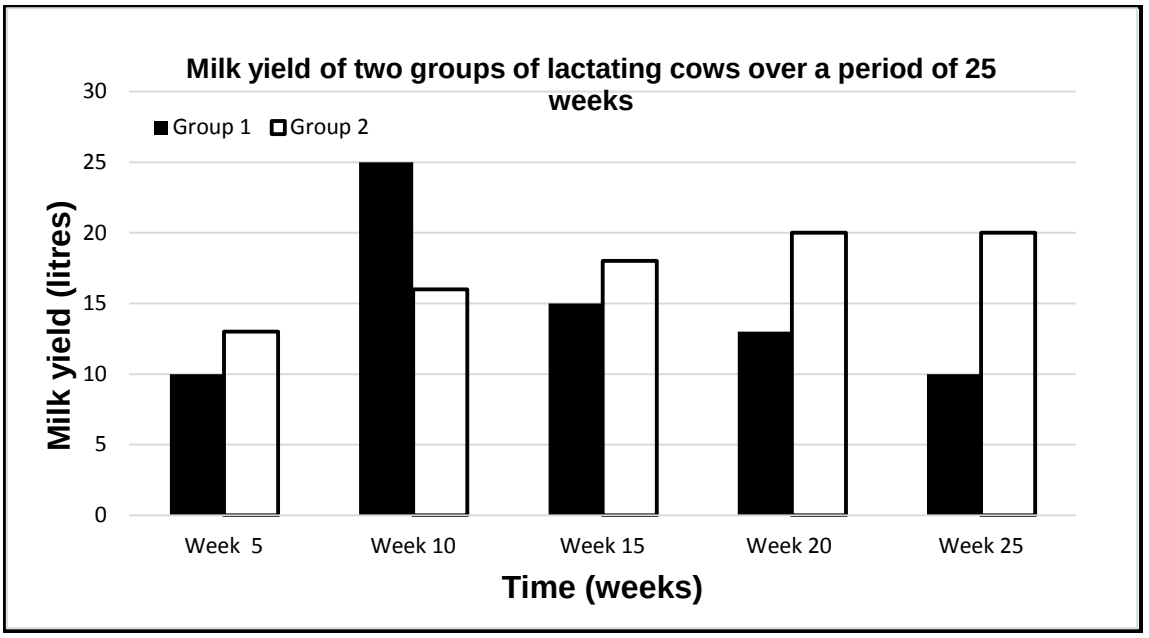
Oestrogen level dropped ✓ progesterone level is increasing and maintained ✓ (2)

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



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 ✓ (2)

4.5.2 Indication of where the equipment is placed during AI

Cervix/uterus ✓ (1)

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 ✓ (Any 2) (2)

4.5.4 TWO challenges of using the equipment

- Expensive ✓
- Needs expert knowledge on how to handle ✓
- Correct handling and maintenance ✓ (Any 2) (2)

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TOTAL SECTION B: 105
GRAND TOTAL: 150