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NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P1

NOVEMBER 2019

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 11 pages.

SECTION A**QUESTION 1**

1.1	1.1.1	A ✓✓	(10 x 2)	(20)
	1.1.2	B ✓✓		
	1.1.3	C ✓✓		
	1.1.4	D ✓✓		
	1.1.5	C ✓✓		
	1.1.6	D ✓✓		
	1.1.7	B ✓✓		
	1.1.8	A ✓✓		
	1.1.9	C ✓✓		
	1.1.10	D ✓✓		
1.2	1.2.1	B only ✓✓	(5 x 2)	(10)
	1.2.2	A only ✓✓		
	1.2.3	Both A and B ✓✓		
	1.2.4	None ✓✓		
	1.2.5	A only ✓✓		
1.3	1.3.1	Feed/fodder flow ✓✓	(5 x 2)	(10)
	1.3.2	Lighting/bulb/lamp ✓✓		
	1.3.3	Internal/endo ✓✓		
	1.3.4	Hydrops/hydro/dropsy foetus/hydramnios ✓✓		
	1.3.5	Oogenesis/ovigenesis ✓✓		
1.4	1.4.1	Cafeteria style/free choice ✓	(5 x 1)	(5)
	1.4.2	Insulation ✓		
	1.4.3	Progesterone ✓		
	1.4.4	Abortion ✓		
	1.4.5	Acrosome ✓		

TOTAL SECTION A: 45

SECTION B**QUESTION 2: ANIMAL NUTRITION****2.1 Alimentary canals of farm animals****2.1.1 Classification of animals****DIAGRAM A** - Ruminant/polygastric ✓**DIAGRAM B** - Non-ruminant/monogastric ✓ (2)**2.1.2 TWO adaptation features of animal in DIAGRAM A**

- Complex/compound/polygastric/fore stomach/reticulo-rumen ✓
- Large fermentation vessel/rumen ✓
- Presence of rumen micro-flora/organisms ✓ (Any 2) (2)

2.1.3 Reason for not feeding animal in DIAGRAM B with a ration high in crude fibre content

- It has a monogastric/simple stomach/no fore stomach ✓
- Absence of micro-flora/cannot digest crude fibre ✓ (Any 1) (1)

2.1.4 Explanation on how animal in DIAGRAM A benefits from non-protein nitrogenous substance

Secretion of urease that changes urea into ammonia ✓ which is used to synthesise microbial protein that is later broken into amino acids ✓ (2)

2.2 Composition of ration**2.2.1 Identification of the feed****(a) Carbohydrate-rich roughage:** Oats hay ✓ (1)**(b) Protein-rich concentrate:** Sunflower oil cake meal ✓ (1)**2.2.2 Explanation for not recommending the ration as the only source of food for lambs**

- Rumen of the lamb is still underdeveloped/abomasum is the only functioning compartment that cannot digest crude fibre ✓
- Cannot digest feed with a high crude fibre content/roughage is too high/70% ✓ (2)

2.2.3 Importance of grass hay in rations for mature ewes

- Grass hay is cheap and available ✓
- To improve functioning of the digestive system ✓
- Prevents bloating ✓
- Supply the necessary bulkiness to the ration/main source of the ration ✓
- Source of energy ✓ (Any 1) (1)

2.3 Pearson square**2.3.1 Parts of the ration representing maize meal and sunflower oil cake meal**

- **Maize meal** - 20 parts ✓ (1)
- **Sunflower oil cake** - 8 parts ✓ (1)

2.3.2 Calculation of the percentage of feed B in the mixture

- $20 + 8 = 28$ ✓
- Feed B = $\frac{20}{28} \times 100$ ✓
- = 71,43% ✓ (3)

2.3.3 Calculation of the quantities of maize in a 250 kg mixture

- $\frac{20}{28} \times 250\text{kg}$ ✓
- = 178,6Kg ✓

OR

- $\frac{71,43 \times 250\text{kg}}{100}$ ✓
- = 178,6kg ✓ (2)

2.4 Nutritive Ratio**2.4.1 Calculation of the Nutritive ratio of FEED B with a formula**

- $\text{NR} = 1: \frac{\% \text{TDN} - \% \text{DP}}{\% \text{DP}}$ ✓
- $1: \frac{80\% - 7\%}{7\%}$ ✓
- $\text{NR} = 1 : 10,4/10$ ✓

OR

- $\text{NR} = 1: \frac{\% \text{DNNN/DNNS}}{\% \text{DP}}$ ✓
- $1: \frac{73}{7}$ ✓
- $\text{NR} = 1: 10,4/10$ ✓ (3)

2.4.2 Justification of the suitability of FEED A and FEED B for growth

- **FEED A:** Suitable because it has a narrow nutritive ratio/more proteins/less carbohydrates ✓ (1)
- **FEED B:** Not suitable because it has a wide nutritive ratio/less proteins/more carbohydrates ✓ (1)

2.5 Energy value of the feeds**2.5.1 Calculation of the energy value represented by A**

ME = GE – Energy lost through faeces – Energy lost through urine and gases

$$\text{ME} = 19\text{J} - 7\text{J} - 4\text{J} \quad \text{OR} \quad 19 - (7+4) \quad 11\text{J} \quad \checkmark$$

$$\text{ME} = 8\text{J} \quad \checkmark \quad (2)$$

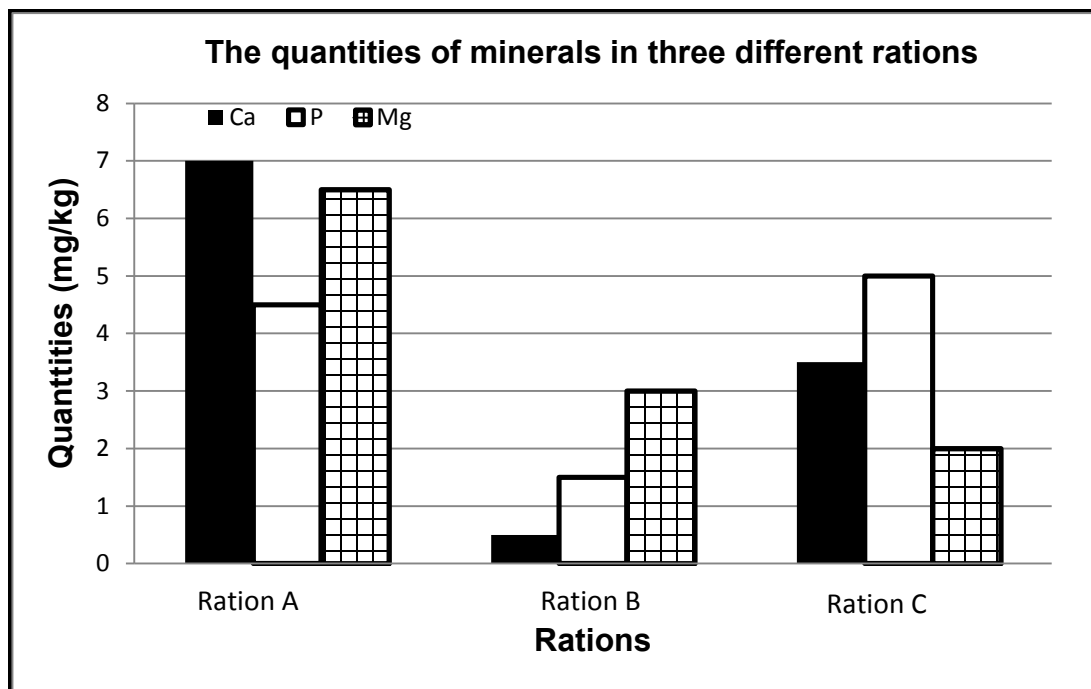
2.5.2 Identification of the energy loss in B

Energy lost through heat ✓ (1)

2.5.3 TWO importance of energy in C for animals

- For maintenance ✓
- For production ✓
- For reproduction ✓
- Physical work done ✓
- Growth ✓

(Any 2) (2)

2.6 Bar graph of the different quantities of minerals in rations**CRITERIA/RUBRIC/MARKING GUIDELINES**

- Correct heading ✓
- X axis: Correctly calibrated with label (Rations) ✓
- Y axis: Correctly calibrated with label (Quantities) ✓
- Correct units (mg/kg) ✓
- Bar graph ✓
- Accuracy ✓

(6)
[35]**QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL****3.1 The lowest critical temperature and heat production of different farm animals****3.1.1 Identification of TWO animals that need to be kept under intensive production system**

- Piglets ✓
- Day old chickens ✓

(2)

3.1.2 Reason

The lowest critical temperature is the highest/lowest heat produced ✓

(1)

3.1.3 Animal that would be most economical to keep without facilities

Dairy cattle ✓

(1)

3.1.4 TWO reasons from the graph

- Their lowest critical temperature is the lowest ✓
- They can generate more heat to keep warm ✓ (2)

3.1.5 The impact of decrease in temperature below 25°C on feed intake

Piglets will eat more ✓ (1)

3.2 Production system**3.2.1 Identification of the production system in picture C**

Backyard system/free range/semi-intensive ✓ (1)

3.2.2 Reason

- Chickens move freely around the house during the day ✓
- Are kept inside the shelter ✓
- Feed is provided ✓ (Any 2) (2)

3.2.3 Indication of the letter of the picture

- (a) Picture B ✓ (1)
(b) Picture A ✓ (1)

3.2.4 Differentiation between facility in terms of their purpose

- **Facility in A** - Animals are kept for handling/management practices/auction/temporarily ✓ (1)
- **Facility in D** - Animals are kept for housing/feeding/growing/permanently ✓ (1)

3.2.5 Role of equipment labelled E in picture D

For automatic dispensing of animal feed ✓ (1)

3.3 TWO basic guidelines for handling large farm animals

- Announce your approach through touch from the front/side ✓
- Avoid the blind spot ✓
- Avoid the kicking region when approaching animals ✓
- Use proper handling facilities/special facilities for male animals ✓
- Always leave yourself an escape way ✓
- Avoid entering small area enclosed with large animals ✓
- Never poke/prod/throw objects to animals ✓
- Give animals time to adjust before working with them ✓
- Take special care when working with cows that have calves ✓
- Avoid children/visitors/non-workers approaching animals ✓
- Limit/reduce noise levels ✓
- Handle animals in a group/herd ✓ (Any 2) (2)

3.4 Parasites**3.4.1 Classification of PARASITE A according to its life cycle**

One/single-host tick ✓ (1)

3.4.2 Protozoan disease transmitted by the parasite

- Red water ✓
- Anaplasmosis/gall sickness ✓ (Any 1) (1)

3.4.3 Indication of the letter of the parasite**(a) Parasite C ✓****(1)****(b) Parasite B ✓****(1)****3.4.4 TWO requirements of the use of medication**

- Medicine must be safe for the specific animal ✓
- Check expiry date ✓
- Correct dosage according to weight and age ✓
- Correct method of administering the medicine ✓
- Correct period of application/
correct intervals between administering medication ✓
- Proper storage according to instructions ✓
- Use registered medicine ✓
- Use sterilized equipment ✓

(Any 2) (2)**3.5 Animal diseases****3.5.1 Disease affecting**

- **Animal 1** - Anthrax ✓

(1)

- **Animal 2** - Lumpy wool ✓

(1)

- **Animal 3** - Rabies ✓

(1)**3.5.2 Indication of the animal suffering from a deadly bacterial disease****Animal 1 ✓****(1)****3.5.3 Pathogen causing disease in ANIMAL 2****Fungus ✓****(1)****3.5.4 ONE precautionary measure to prevent the spread of disease in ANIMAL 3**

- Vaccination/inoculation/immunisation ✓
- Awareness/education/notify authorities ✓
- Isolation ✓

(Any 1) (1)**3.5.5 TWO roles of the state in controlling the spread of the disease in ANIMAL 1**

- Establish quarantine zone ✓
- Restricted movement from/to infected areas/import/export bans ✓
- Destroying/correct disposal of infested carcasses/materials ✓
- Inoculation/vaccination/immunisation of healthy stock/veterinarian services ✓
- Public awareness ✓

(Any 2) (2)

3.6 Salt poisoning**3.6.1 TWO symptoms of salt poisoning in animals**

- Excessive salivation ✓
- Increased thirst ✓
- Vomiting ✓
- Constipation ✓
- Wobbling/circling/seizures/blindness/partial paralysis ✓
- Dragging of the hind legs/knuckling of the fetlock ✓
- Mucous membranes of the mouth are red and dry ✓
- Hypersensitivity to touch ✓
- Frequent urination ✓
- Inflammation of the stomach and intestines ✓
- Aggressiveness ✓
- Diarrhoea ✓

(Any 2) (2)

3.6.2 TWO measures to treat an animal with salt poisoning

- Provision of fresh water in small amounts at short intervals ✓
- Small animals can be given a hypertonic dextrose/isotonic saline solution ✓
- Removal of the source ✓

(Any 2) (2)
[35]**QUESTION 4: ANIMAL REPRODUCTION****4.1 Reproductive cycle in farm animals****4.1.1 Hormones initiating mating in ANIMAL A and ANIMAL B**

- **ANIMAL A** - Oestrogen ✓ (1)
- **ANIMAL B** - Testosterone ✓ (1)

4.1.2 Function for each hormone

- **Oestrogen** - Makes cow to come into oestrus/allow mating ✓ (1)
- **Testosterone** - Stimulates mating behaviour in the bull ✓ (1)

4.1.3 Identification of the reproductive processes

- (a) Fertilization/pregnancy/gestation ✓ (1)
- (b) Parturition/birth giving/calving ✓ (1)

4.1.4 Hormone initiating milk let-down

Oxytocin ✓ (1)

4.1.5 The function of oxytocin in milk let-down

It causes contraction of the myoepithelial cells surrounding the alveoli to release the milk ✓ (1)

4.2 Sperm morphology**4.2.1 Process during which the sperm cells above are formed**

Spermatogenesis ✓ (1)

- 4.2.2 **Identification of the sperm cell that can constituting good quality semen**
Sperm cell A ✓ (1)
- 4.2.3 **Instrument to evaluate sperm cells**
Microscope ✓ (1)
- 4.2.4 **Explanation of how sperm cell in B and C affect the ability of the bull to fertilize**
SPERM CELL B - It cannot fuse with the egg cell because it does not have an acrosome/no head ✓ (1)
SPERM CELL C - It cannot move towards the point of fertilization since it does not have a tail ✓ (1)
- 4.3 **Correct technique for AI**
- 4.3.1 **Re-arranging the steps during AI**
- A cow is sheltered and kept calm ✓
 - Excess faecal matter is removed ✓
 - Inseminator checks abnormalities and whether the cow is not pregnant by inserting the hand through the rectum ✓
 - The pistolette is guided through the vulva, vagina to the cervix ✓ (4)
- 4.3.2 **TWO disadvantages of AI for the farmer**
- Disease transmission can affect large number of cows ✓
 - Infections can occur/venereal diseases can spread quickly ✓
 - Genetic abnormalities can occur ✓
 - Inexperienced operator can damage the reproductive organs ✓
 - Low success rate when using inexperienced technician ✓
 - Labour intensive ✓
 - Expensive ✓
 - More time consuming ✓
 - Not always successful ✓
 - Does not necessarily improve the genetics of the herd ✓
 - Genetic variability can decrease ✓
 - If records are not kept carefully, inbreeding can occur ✓
 - Undesirable traits can be transferred to more offspring ✓ (Any 2) (2)
- 4.4 **Foetal membranes**
- 4.4.1 **Stage of pregnancy**
Foetal stage ✓ (1)
- 4.4.2 **Indication of the letter of the membrane**
- (a) A ✓ (1)
 - (b) B ✓ (1)
 - (c) C ✓ (1)

4.5 Parturition**4.5.1 TWO behavioural signs of an animal that is about to give birth**

- Isolates herself from the herd ✓
- Loss of appetite ✓
- Show signs of distress and discomfort ✓
- Restlessness ✓
- Nesting behaviour/circles searching for a hiding place ✓
- Frequent urination ✓
- Bellowing noises ✓

(Any 2) (2)

4.5.2 TWO causes of problems during birth in heifers

- Large foetus/small sized heifer ✓
- Multiple births ✓
- Inexperience ✓
- Incorrect presentation ✓
- Malformed foetus/hydrocephalous ✓
- Size of the pelvic area ✓
- Incomplete/failure of the cervix to dilate ✓
- Prolonged parturition/ineffective/weak labour ✓
- Inertia of the uterus ✓
- Torsion of the uterus ✓
- Length of the gestation period ✓
- Poor body conformation ✓
- Malnutrition ✓
- Diseases ✓

(Any 2) (2)

4.6 The importance of the aspects of embryo transfer**4.6.1 Superovulation**

For the production of more genetically superior ova ✓

(1)

4.6.2 Embryo flushing

For the harvest of more embryos from superior/donor cows ✓

(1)

4.6.3 Donor cow

For the production of superior embryo's ✓

(1)

4.6.4 Recipient cow

For implantation of the harvested embryo's ✓

(1)

4.7 Nuclear transfer**4.7.1 Importance of nuclear transfer****(a) Farmer**

- Animals with desirable traits can be produced to meet the specific production needs ✓
- Preserve superior genes/animals ✓
- Farmers can produce high-quality safe and healthy food ✓
- Animals can be bred that is more resistant to diseases ✓
- Frozen cloned embryos can be transported worldwide ✓
- Many clones can be obtained from one female ✓ (Any 1)

(1)

(b) Veterinarian services

- Production of stem cells to find cures for diseases ✓
- Research ✓
- Valuable medicines can be produced in the milk of cows/sheep/goats ✓
- Animals with a slightly modified genetic make-up can be produced for transplantation into humans ✓
- Preserve rare/endangered species ✓ (Any 1) (1)

4.7.2 TWO disadvantages of a nuclear transfer

- Cloned animals have a shorter lifespan ✓
 - Genetic abnormalities of a cloned animal can be transmitted to the offspring ✓
 - It is expensive ✓
 - Cloned animals have a low immune system ✓
 - Offspring are large causing problems during parturition ✓
 - Genetic diversity deteriorates/reduces variation ✓
 - Premature aging of cloned animals resulting in early death ✓
 - Offspring of cloned animals encounter problems with vital organs such as lungs, heart and kidneys ✓
 - Requires specific skills ✓ (Any 2) (2)
- [35]**

TOTAL SECTION B: 105
GRAND TOTAL: 150