Province of the
EASTERN CAPE
EDUCATION

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NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2026

AGRICULTURAL SCIENCES P1 MARKING GUIDELINE

MARKS: 150

This marking guideline consists of 12 pages.

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SECTION A

QUESTION 1

1.1	1.1.1	A ✓✓		
	1.1.2	C ✓✓		
	1.1.3	C ✓✓		
	1.1.4	B ✓✓		
	1.1.5	D ✓✓		
	1.1.6	B ✓✓		
	1.1.7	D ✓✓		
	1.1.8	A ✓✓		
	1.1.9	C ✓✓		
	1.1.10	B ✓✓	(10 x 2)	(20)
1.2	1.2.1	A only ✓✓		
	1.2.2	None ✓✓		
	1.2.3	A only ✓✓		
	1.2.4	B only ✓✓		
	1.2.5	Both A and B ✓✓	(5 x 2)	(10)
1.3	1.3.1	Trypsin ✓✓		
	1.3.2	Zoonotic ✓✓		
	1.3.3	Superovulation ✓✓		
	1.3.4	Colostrum/ Beestings ✓✓		
	1.3.5	Identical twins/ Monozygotic twins ✓✓	(5 x 2)	(10)
1.4	1.4.1	Molasses ✓		
	1.4.2	Mites ✓		
	1.4.3	Morula ✓		
	1.4.4	Cloning/ Nuclear transfer ✓		
	1.4.5	Allantois ✓	(5 x 1)	(5)

TOTAL SECTION A: 45

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SECTION B

QUESTION 2: ANIMAL NUTRITION

2.1 Path of food in a farm animal

2.1.1 Classification of the farm animal illustrated
Ruminant ✓ (1)

2.1.2 Parts labelled A and E
A – Rumen/Reticulo rumen ✓ (1)
E – Abomasum ✓ (1)

2.1.3 Explanation of the process in B
Rumination is the action of bringing swallowed food up again to the mouth ✓ through regurgitation where it is chewed thoroughly. ✓ (2)

2.1.4 LETTERS of the parts in the illustration

(a) **Grinding of food**
D ✓ (1)

(c) **Absorption of digested food particles**
F ✓ (1)

2.2 Rumen microbes

2.2.1 TWO rumen microbes in the passage above
- Cellulytic bacteria ✓ (1)
- Amylolytic bacteria ✓ (1)

2.2.2 Requirements for the normal functioning of rumen microbes under the following:

(a) **Temperatures**
Ranges between 38 - 42 °C ✓ (1)

(b) **pH**
Slightly acidic or between 5,5 - 6,5 ✓ (1)

2.2.3 TWO functions of rumen microbes in a ruminant stomach
- Digestion of cellulose ✓
- Hydrolysis of proteins ✓
- Synthesis of vitamins ✓
- Synthesis of amino acids ✓ (Any 2 x 1) (2)

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2.3 Minerals and vitamins in livestock

2.3.1 Diseases labelled A and B

A – Curled toe paralysis ✓ (1)
B – Pica ✓ (1)

2.3.2 Mineral imbalances leading to animal's behaviour in B

- Phosphorus ✓
- Sodium ✓
- Iron ✓
- Copper ✓
- Cobalt ✓ (Any 1 x 1) (1)

2.4 Biological value of feeds

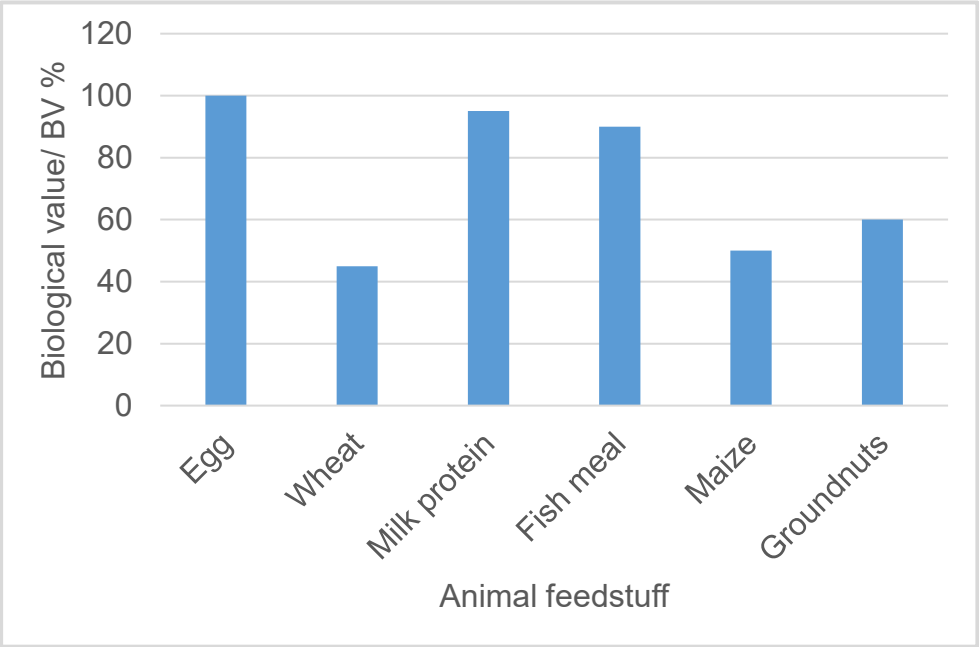
2.4.1 Name the type of protein accepted as a comparative protein.

Egg protein/albumin ✓ (1)

2.4.2 Explanation of why the BV of maize is so low compared to that of milk protein.

- Maize is a plant protein ✓ and therefore does not contain all essential amino acids. ✓
- Plant proteins are incomplete proteins ✓ that do not contain all the essential amino acids. ✓
- Low BV of 50% ✓ indicates low quality protein. ✓ (Any 1 x 2) (2)

2.4.3 A bar graph comparing the biological values of protein in animal feedstuff



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Criteria/ rubric for marking the graph

- Correct heading ✓
- X axis – correctly calibrated and labelled (Animal feedstuff) ✓
- Y axis – correctly calibrated and labelled (Biological value/ BV) ✓
- Correct units (%) ✓
- Bar graph ✓
- Accuracy 80% + correct plotting ✓ (6)

2.4.4 **Trend of biological values in the feedstuff shown**

Animal origin protein feeds have higher biological value ✓ than plant origin protein feeds. ✓

OR

Plant origin protein feeds have lower biological value ✓ than animal origin protein feeds. ✓ (2)

2.5 **Lactating dairy cow**

2.5.1 **Nett energy (NE) calculation**

Energy losses = 41% + 2,5% + 8% + 15% = 66,5%

= 66,5% ÷100 x 19,2 MJ/kg = 12,76 MJ/kg ✓

NE = GE – (energy lost in faeces + urine + fermentation gases + body heat) ✓

= 19,2 MJ/kg – 12,6 MJ/kg ✓

= 6,44 MJ/kg ✓ (4)

2.5.2 **Interpretation of the calculation above**

- In a ration with a potential energy value of 19,2 MJ only 6,44 MJ ✓ of it is available to the animal after all the losses occur during digestion. ✓
- Only 33,5 % ✓ is available for maintenance and production. ✓
- Almost 66,5 % ✓ of the potential energy of that ration for the use for maintenance and production was lost. ✓ (Any 1 x 2) (2)

2.6 **TWO factors in which the coefficient of digestibility is expressed**

- Percentage ✓ (1)
- Dry matter ✓ (1)

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QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

3.1 Farm animals in two different production systems

3.1.1 Production systems in PICTURES A and B

PICTURE A – Intensive production system ✓ (1)
PICTURE B – Extensive production system ✓ (1)

3.1.2 Justification in QUESTION 3.1.1

PICTURE A – Animals are provided feed in a restricted environment ✓ (1)
PICTURE B – Animals are grazing on their own in the veld ✓ (1)

3.1.3 Name of the structure in PICTURE A

Feed lot ✓ (1)

3.1.4 Explanation of the relationship between extreme temperatures and feed intake of animals in PICTURE B

- In extremely high temperature animals will reduce feed intake and drink more water ✓ to keep their body temperature constant. ✓
- In extremely cold temperature animals will eat more ✓ to keep their body temperature constant. ✓ (Any 1 x 2) (2)

3.2 Equipment in housing systems

3.2.1 Equipment in the housing system in PICTURE A

Drinker ✓ (1)

3.2.2 Material on the floor of a poultry production

- Straws ✓
- Pine/ wood shaving ✓
- Sawdust ✓ (Any 1 x 1) (1)

3.2.3 TWO importance of the material in QUESTION 3.2.2

- It is used to absorb moisture to prevent infections ✓
- It cushions joints to reduce injuries ✓
- Proper bedding also reduces stress ✓
- Encourages resting behaviour ✓
- Provides thermal insulation, which boosts productivity ✓

(Any 2 x 1) (2)

3.2.4 TWO abnormal behaviours that animals in PICTURE B display under stress

- Tail biting ✓
- Ear biting ✓
- Cannibalism ✓
- Belly nibbling ✓
- Snout rubbing ✓
- Hyperactivity ✓ (Any 2 x 1) (2)

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3.2.5 **Increasing production in extensive beef production**

(a) **TWO for general production enterprise management**

- A good record-keeping system on the farm is very important. ✓
- Monitoring the condition of the natural resources to detect a change over time. ✓
- Good health management forms an important part of successful farming. ✓
- Market animals at the correct age. ✓ (Any 2 x 1) (2)

(b) **TWO for reproduction/ breeding**

- It can be improved by artificial insemination and ovum embryo transplant ✓
- Farmers make use of cross breeding systems to increase production. ✓
- Management of the breeding season to optimise the reproductive performance of a breeding herd. ✓
- Management of the breeding season to optimise the pre-weaning growth rate of calves. ✓
- Ensuring that calving takes place at an appropriate season.
- Making use of good genetic breeding material ✓
- Have a controlled breeding season for the bulls not to run continuously with cows./45-60-day breeding season is recommendable ✓
- Cows should calf during the growing season when the nutritional value of the natural vegetation is high. ✓ (Any 2 x 1) (2)

3.3 **Livestock in a restrained environment**

3.3.1 **Facilities in PICTURE B above**

Holding pen ✓ (1)

3.3.2 **TWO visible differences in the PICTURES above to be considered when handling livestock**

- Height ✓
- Size ✓
- Number of animals ✓ (Any 2 x 1) (2)

3.3.3 **TWO reasons for handling farm animals**

- Administration of medication ✓
- Management programme such as dehorning; marking; castration; tail docking; ear tagging ✓
- Prevention and treatment of external parasites/dipping; vaccination ✓
- Pregnancy testing ✓
- Transportation ✓
- Age determination ✓
- Data generation purpose/growth rate; mass and market readiness ✓
- For agricultural shows ✓
- For production purposes ✓ (Any 2 x 1) (2)

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3.4 **Animal with health issues**

3.4.1 **Identify the disease that is depicted in the picture above**
Foot and mouth disease/FMD ✓ (1)

3.4.2 **Classification of the disease mentioned in QUESTION 3.4.1**
Viral disease ✓ (1)

3.4.3 **Indication if disease is infectious or not**
Infectious ✓ (1)

3.4.4 **Reason to the answer in QUESTION 3.4.3**
It can be transmitted easily from one animal host to another ✓ in contaminated food/body secretions/contaminated objects and inhalation or vector organisms. ✓ (2)

3.4.5 **Levels of seriousness in animal diseases**

(a) **Animals may be found dead without previous signs of the disease**
Per acute ✓ (1)

(b) **Disease is long lasting and recur repeatedly in the same animal**
Chronic ✓ (1)

(c) **Illness develops quickly and lasts only a short amount of time.**
Acute ✓ (1)

3.5 **Cattle with salt intake**

3.5.1 **Mineral element in the salt lick**
- Sodium ✓
- Chlorine ✓ (Any 1 x 1) (1)

3.5.2 **TWO visible symptoms shown by animals with salt poisoning**
- Hypersensitivity to touch ✓
- Mucous membranes of mouth are red and dry ✓
- Excessive salivation ✓
- Wobbling; circling; blindness; seizures and partial paralysis ✓
- Increased urination and defaecation ✓
- Increased thirst ✓
- Vomiting and regurgitation ✓
- Constipation ✓
- Diarrhoea ✓
- Aggressiveness ✓ (Any 2 x 1) (2)

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3.5.3 **TWO basic principles of good health to control animal diseases and pests**

- Sanitation by disinfecting shelter and equipment/hygiene ✓
- Controlling pests and parasites by doing regular checking and treating the animals ✓
- Isolation/quarantine the sick animals to prevent the spread of diseases. ✓
- Handling manure by removing it regularly ✓
- Provide enough space, light and ventilation to avoid overcrowding. ✓
- Vaccinate animals to be immune to diseases so that they produce antibodies. ✓ (Any 2 x 1) (2)

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QUESTION 4: ANIMAL REPRODUCTION

4.1 Reproductive systems of a bull and a cow

4.1.1 Parts labelled B; D and G

B Seminal vesicle/vesicular gland ✓ (1)
D Bulbo urethral gland ✓ (1)
G Uterine horn ✓ (1)

4.1.2 LETTERS where the following occurs:

(a) **Placement of semen during artificial insemination**
K ✓ (1)

(b) **Passage for excretion of urine in bulls**
E ✓ (1)

(c) **Flattened elastic tube that extends from urethra to the cervix**
J ✓ (1)

4.2 Sequential events in the reproduction process

4.2.1 Reproductive process in the diagram above
Oestrus cycle ✓ (1)

4.2.2 TWO behaviours shown by the cow in stage A of DIAGRAM 2

- The cow is excited, restless and bellows ✓
- Smells and mounts other cows ✓
- Attempts to ride other cows ✓
- Slightly swollen red vulva ✓
- May have clear mucus discharge from the vulva ✓
- Hair on the tail head and rump in fluffed up, rubbed or matted ✓
- Cow urinates and defecates frequently ✓ (Any 2 x 1) (2)

4.2.3 Hormone labelled B
Luteinising hormone ✓ (1)

4.2.4 Reason to QUESTION 4.2.3
Luteinising hormone levels begin to rise to its peak ✓ when a cow is on heat/ allowing mating/ during oestrus period. ✓ (2)

4.2.5 Label C hormonals levels if the cow has conceived
The levels of hormone will continue to secrete ✓ to maintain the pregnancy until birth. ✓ (2)

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4.3 **LETTERS re-arranging mating stages**

4.3.1 D ✓ (1)
C ✓ (1)
A ✓ (1)
E ✓ (1)
B ✓ (1)

4.3.2 **TWO function for each of the dilutants in the stored semen**

(a) **Egg yolk**
- Controls the pH of the dilutes semen ✓
- Protects sperm membranes against cold shock ✓ (2)

(b) **Antibiotics**
- Prevents the bacterial growth / protects the sperm from bacterial growth ✓
- Maintains sperm quality ✓ (2)

4.4 **Reproductive procedure in livestock**

4.4.1 **Procedure in the diagram**
Embryo flushing ✓ (1)

4.4.2 **Animal in the procedure**
Donor cow ✓ (1)

4.4.3 **Definition of the procedure in QUESTION 4.4.1**
Embryo flushing is a non-surgical, conventional embryo transfer (ET) method used to retrieve multiple, fertilized embryos ✓ from a high-value donor cow for transfer into surrogates. ✓ (2)

4.4.4 **TWO aims of the procedure in QUESTION 4.4.1**
- Prevents the extinction of valuable animals ✓
- Increases the number of endangered species ✓
- Improves the growth rate and production yield ✓
- Improves the disease resistance by using embryos of the superior animals that are resistant to diseases ✓ (Any 2 x 1) (2)

4.5 **Phases of parturition**

4.5.1 **Parturition stage**
Delivery stage ✓ (1)

4.5.2 **TWO conditions which might interfere with normal parturition process**
- abnormal birth position in calves/deviation of the head/posterial presentation/flexion of the elbow ✓
- hydrocephalus ✓
- congenital defects/deformities ✓
- twins ✓ (Any 2 x 1) (2)

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4.5.3 **Lactation phase**

(a) **Hormone that stimulates the milk release**
Oxytocin ✓ (1)

(b) **TWO stimuli to the answer provided in QUESTION 4.5.3(a).**
- Washing of the udder with warm water ✓
- Suckling by the calf ✓
- Massaging of the udder ✓
- Milking by hand or by machine ✓
- Sight of the calf ✓
- Noise of the calf from the stable ✓ (Any 2 x 1) (2)

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TOTAL SECTION B: 105
GRAND TOTAL: 150

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