basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

# NATIONAL SENIOR CERTIFICATE

## GRADE 12

## AGRICULTURAL SCIENCES P1

## NOVEMBER 2025

## MARKING GUIDELINES

**MARKS: 150**

**These marking guidelines consist of 13 pages.**

## SECTION A

## QUESTION 1

| | | | | |
|---|---|---|---|---|
| 1.1 | 1.1.1 | C ✓✓ | | |
| | 1.1.2 | B ✓✓ | | |
| | 1.1.3 | B ✓✓ | | |
| | 1.1.4 | A ✓✓ | | |
| | 1.1.5 | B ✓✓ | | |
| | 1.1.6 | D ✓✓ | | |
| | 1.1.7 | A ✓✓ | | |
| | 1.1.8 | C ✓✓ | | |
| | 1.1.9 | D ✓✓ | | |
| | 1.1.10 | C ✓✓ | (10 x 2) | (20) |
| 1.2 | 1.2.1 | None ✓✓ | | |
| | 1.2.2 | Both A and B ✓✓ | | |
| | 1.2.3 | A only ✓✓ | | |
| | 1.2.4 | None ✓✓ | | |
| | 1.2.5 | B only ✓✓ | (5 x 2) | (10) |
| 1.3 | 1.3.1 | Ideal/complete protein ✓✓ | | |
| | 1.3.2 | Battery system ✓✓ | | |
| | 1.3.3 | Congenital/genetic ✓✓ | | |
| | 1.3.4 | Milk ejection/milk let down ✓✓ | | |
| | 1.3.5 | Preparatory ✓✓ | (5 x 2) | (10) |
| 1.4 | 1.4.1 | Cellulase ✓ | | |
| | 1.4.2 | Urea ✓ | | |
| | 1.4.3 | Hydrocephalus ✓ | | |
| | 1.4.4 | Dismounting ✓ | | |
| | 1.4.5 | Corpus luteum ✓ | (5 x 1) | (5) |

**TOTAL SECTION A: 45**

## SECTION B

## QUESTION 2: ANIMAL NUTRITION

### 2.1 Feed intake, digestion and the flow of feed

**2.1.1 Name of the farm animal**
Pig ✓ (1)

**2.1.2 Reason**
- Presence of salivary amylase in the mouth ✓
- Both physical and chemical digestion in the mouth ✓
- Flow of feed shows the route within a simple stomach ✓ (Any 1) (1)

**2.1.3 ONE part assisting in ingestion of food**
- Snout/lips/teeth ✓
- Tongue ✓ (Any 1) (1)

**2.1.4 Name of the part A**
Oesophagus/gullet ✓ (1)

**2.1.5 ONE function of hydrochloric acid**
- Antiseptic and therefore it destroys bacteria/prevents bacterial growth/prevents the stomach content from rotting ✓
- Neutralizes the alkaline reaction of the saliva ✓
- Changes the pH of the stomach into acid medium ✓
- Changes disaccharides (sucrose) into monosaccharaides (glucose and fructose) ✓
- Activates pepsinogen to pepsin ✓ (Any 1) (1)

### 2.2 Accessory glands

**2.2.1 Identification of part labelled B**
Pancreas ✓ (1)

**2.2.2 ONE enzyme found in pancreas**
- Amylase ✓
- Lipase ✓
- Proteolytic enzymes (Peptidase/Trypsin/chymotrypsin/protease/erepsin) ✓ (Any 1) (1)

2.2.3 **ONE function of part A/liver**

- Secretes bile ✓
- Stores glycogen/convert glucose to glycogen ✓
- Synthesizing all glucose needed by the animal ✓
- Stores water/thereby regulates the fluid balance in the blood ✓
- Produces red blood cells and destroys old red blood cells ✓
- Stores the fat-soluble vitamins A, D, K and E ✓
- Secretes heparin which prevent blood clotting ✓
- Converts toxic ammonia produced by bacteria in large intestines into urea ✓
- Detoxifies poisonous substances ✓ (Any 1) (1)

2.2.4 **Importance of emulsification**

To increase the surface area ✓ for the action of lipase ✓ (2)

2.3 **Components of a feed**

2.3.1 **Identification of the mineral**

Sodium ✓ (1)

2.3.2 **TWO importance of protein in the feed**

- Main component of muscle tissue ✓
- Needed to build new cells/growth✓
- Repairs damaged tissue ✓
- For the production of eggs and milk ✓
- Needed for the production of enzymes, internal secretions and hormones/antibodies ✓
- Play a role in reproduction and regulation of metabolism/ biochemical reactions ✓
- Provide support for hair/skin/tendons/ligaments ✓ (Any 2) (2)

2.3.3 **ONE other organic component of the feed**

- Fats/oils/lipids ✓
- Vitamins ✓ (Any 1) (1)

2.3.4 **Justification of the suitability of the feed**

Has a high calcium content ✓ which is needed for stronger bones ✓ (2)

2.4 **Digestibility of feed**

2.4.1 **Calculation of the dry matter absorbed in the feed**

DM excreted = $\frac{40}{100}$ x 3,5 kg = 1,4 kg (3,5 kg **–** 1,4 kg = 2,1 kg) ✓

**OR**

DM excreted = $\frac{60}{100}$ x 3,5 kg = 2,1 kg ✓

DM absorbed = 12,5 kg **–** 2,1 kg ✓

= 10,4 kg ✓ (3)

2.4.2 **ONE animal factor that influenced the digestibility of the feed**

- Age/body mass of animal ✓
- Type of animal/digestive system ✓
- Individuality ✓
- Stage of production of the animal ✓
- Animal breed ✓
- Animal health ✓ (Any 1) (1)

2.5 **Nutritive ratio/NR**

2.5.1 **Calculation of the nutritive ratio**

% digestible non-nitrogen substances (DNNS) = %TDN - %DP
= 89% **–** 15%
= 74% ✓

Nutritive Ratio = 1 **:** $\frac{\text{\% digestible non-nitrogen substances (DNNS)}}{\text{\% digestible protein (DP)}}$

= 1 **:** $\frac{74\%}{15\%}$ ✓

= 1 **:** 4,9 /1 **:** 5 ✓ (3)

2.5.2 **ONE purpose of the feed**

- Production ✓
- Reproduction ✓
- Growth ✓ (Any 1) (1)

2.5.3 **Justification**

It has a high protein content/narrow NR/less than 1:6 ✓ (1)

2.6 **The types of feeds**

2.6.1 **Identification of**

**A** Roughages ✓ (1)
**C** Dry ✓ (1)

2.6.2 **The importance of A in young ruminant**
Stimulate the development of the fore stomach in young ruminants ✓ (1)

2.6.3 **ONE example of**

(a) **B** Maize meal/oatmeal/barley meal/rye meal/sorghum meal/ wheat meal ✓ (1)
(b) **D** Lucerne hay/legume hays ✓ (1)

2.7 **Energy value of feeds**

2.7.1 **Calculation of energy value of feeds**
Energy lost through faeces = $\frac{35}{100}$ x 21MJ/kg = 7,35MJ/kg ✓

Digestible Energy/DE = Gross Energy/GE **–** Energy loss in faeces ✓

= 21MJ/kg **–** 7,35MJ/kg = 13,65MJ/kg ✓

= 13,65MJ/kg x 30kg = 409,5MJ ✓

**OR**

GE = 30 x 21MJ = 630MJ ✓
DE = GE **–** Faeces ✓
DE = 630MJ **–** (630MJ x $\frac{35}{100}$)
DE = 630MJ **–** 220,5MJ ✓
DE = 409,5MJ ✓ (4)

2.7.2 **Energy remaining for maintenance and production**
Net Energy/NE ✓ (1)
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## QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

### 3.1 Farming systems

#### 3.1.1 Identification of the farming systems

(a) **PICTURE B -** Commercial ✓ (1)
(b) **PICTURE A -** Subsistence ✓ (1)

#### 3.1.2 Reason

(a) **PICTURE B** Production of the large herd of beef cattle to sell and make profit ✓ (1)
(b) **PICTURE A** Fewer animals used for ploughing the field to sustain the family ✓ (1)

### 3.2 Animal production

#### 3.2.1 Identification of the factors to increase animal production

**PICTURE A -** Nutrition/feeding ✓ (1)
**PICTURE B -** Breeding/reproduction ✓ (1)

#### 3.2.2 TWO other factors that would adversely affect the young calf

- Harsh environmental conditions ✓
- Poor general enterprise management ✓
- More prone to predators ✓ (Any 2) (2)

### 3.3 Housing facilities

#### 3.3.1 Identification of the facility

(a) **PICTURE A -** Holding pen ✓ (1)
(b) **PICTURE B -** Farrowing pen/crate ✓ (1)

#### 3.3.2 Indication of the use of bedding in PICTURE B

- To insulate cold cement floors/maintains heat ✓
- Protects piglets against abrasive/rough cement/concrete floors ✓
- Absorption of moisture ✓ (Any 1) (1)

#### 3.3.3 Differentiation between facility in PICTURE C and PICTURE D

**Facility in PICTURE C -** Used to feed animals ✓ (1)
**Facility in PICTURE D -** Used to store animal feed ✓ (1)

### 3.4 Tools and equipment to handle farm animal

3.4.1 Plastic shaker ✓ (1)

3.4.2 Halter ✓ (1)

3.4.3 Prodder ✓ (1)

3.4.4 Casting harness ✓ (1)

3.5 **ONE basic guideline for handling sheep**

- Approach them calmly and slowly ✓
- Do not catch or hold sheep by their wool ✓
- Use a herding dog to move them ✓
- Handle them as a flock ✓
- They can be trained to act on a vocal command ✓
- Catch them from behind/grabbing as high as possible on the hind leg ✓
- Sit the sheep on its rump, squat down and take a firm hold of its back legs keeping its head up ✓
- Pull the animal firmly against your body ✓
- When lifting it over a fence, do not attempt to drag but work from the same side as the animal ✓
- Avoid blind spot ✓
- No sudden movements ✓
- Do not make loud noises/avoid noise ✓
- Use the correct handling facilities/methods ✓
- Do not beat/throw objects to sheep ✓ (Any 1) (1)

3.6 **Parasites**

3.6.1 **Identification of the parasite in DIAGRAM A**
Tapeworm ✓ (1)

3.6.2 **Classification of the parasite in DIAGRAM B**
External/ecto parasite ✓ (1)

3.6.3 **Differentiation of parasites based on their life cycles**

- Parasite in **DIAGRAM A** is two host/needs two hosts to complete its cycle/has a 3 stage life cycle ✓ (1)
- Parasite in **DIAGRAM B** is one host/needs one hosts to complete its cycle/has a 4 stage life cycle ✓ (1)

3.6.4 **TWO economic implications of internal parasites**

- High feeding costs ✓
- High treatment costs ✓
- Poor production/degrading of carcasses ✓
- Loss of income/profit ✓ (Any 2) (2)

3.7 **Plant poisoning**

3.7.1 **TWO measures to treat plant poisoning**

- Keep affected animals away from drinking water ✓
- Allow small quantities of water after two days ✓
- Administer remedies that will neutralize the plant poison/strong tea/activated charcoal/laxatives ✓
- Provide large doses of purgatives to cause expulsion of poison ✓
- Dose with sugar/glucose ✓
- Keep animals calm/in shade ✓ (Any 2) (2)

3.7.2 **TWO roles played by the state**

- Awareness campaigns ✓
- Legislation/registration of medication ✓
- Research ✓
- Training/education ✓
- Quarantine services ✓
- Import/export bans ✓
- Importation/production of vaccines ✓
- Movement control/permits ✓
- Veterinarian services ✓ (Any 2) (2)

3.8 **Animals diseases**

3.8.1 Foot and mouth disease/FMD ✓ (1)

3.8.2 Red water ✓ (1)

3.8.3 Lumpy wool ✓ (1)

3.8.4 Heart water ✓ (1)

3.8.5 Mastitis ✓ (1)

3.9 **TWO methods of administering medication**

- Injection ✓
- Oral administration ✓
- Topical application ✓
- Vaginal administration ✓
- Dipping/foot bathing ✓
- Intra nasal application ✓
- Rectal application ✓
- Eye drop application ✓ (Any 2) (2)

**[35]**

## QUESTION 4: ANIMAL REPRODUCTION

### 4.1 Male reproductive system

**4.1.1 Identification of part D**

Epididymis ✓ (1)

**4.1.2 ONE function of**

**(a) Seminal fluid**

- Provides nutrients for sperm cells ✓
- Lubricates/cleanses the urethra ✓
- Improves the motility/mobility of sperm cells ✓
- pH buffer ✓
- Increases the volume of the semen ✓ (Any 1) (1)

**(b) Vas deferens**

- Transportation of the sperm cells ✓
- Plays a role during ejaculation ✓ (Any 1) (1)

**4.1.3 Congenital defects**

- Cryptorchidism ✓
- Hypoplasia ✓ (Any 1) (1)

### 4.2 Sperm cell

**4.2.1 Name of the process whereby sperm cell is formed**

Spermatogenesis ✓ (1)

**4.2.2 Letter of the part**

C ✓ (1)

**4.2.3 The type of cell division**

**(a)** Meiosis 1 ✓ (1)
**(b)** Mitosis ✓ (1)

### 4.3 Hormonal levels in cattle during the reproduction cycle

**4.3.1 Identification of the time (in days)**

Day 2 ✓ (1)

**4.3.2 Evidence that the cow was not pregnant after day 1**

- Declining levels of progesterone ✓ and increased levels of oestrogen ✓
- The cow was able to go to a second oestrus cycle ✓✓ (Any 1) (2)

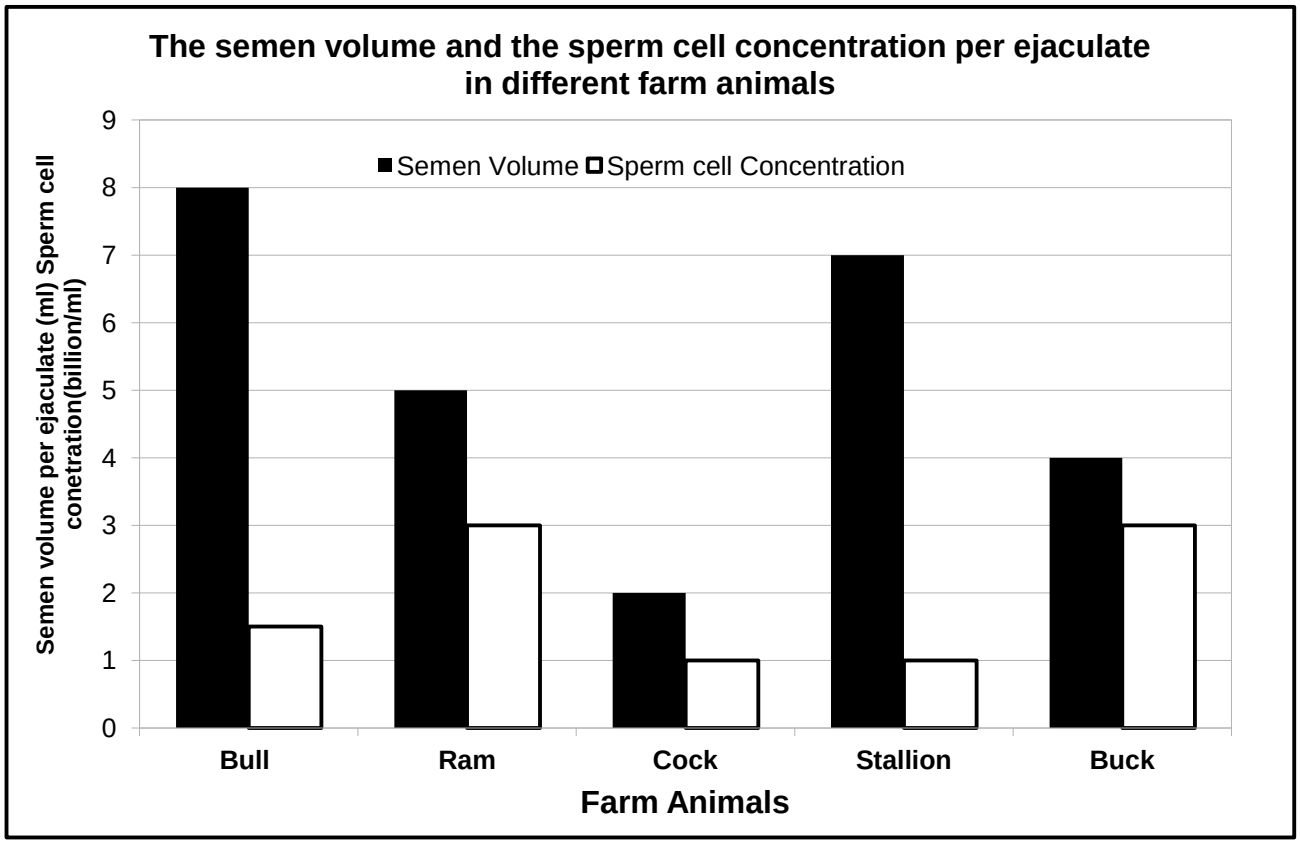
**4.3.3 Description of what could have happened to the corpus luteum after day 15**

The corpus luteum will degenerate/disappear/disintegrate/luteolysis has taken place ✓ (1)

4.3.4 **Stage of oestrus between day 5 and day 8**
Met-oestrus ✓ (1)

4.4 **Bar graph**

4.4.1 **Bar graph**




**Criteria/rubric/marking guidelines**

- Correct heading (with both variables) ✓
- X-axis: Correctly calibrated with label (Farm animal) ✓
- Y-axis: Correctly calibrated with label (Semen volume per ejaculate and sperm cell concentration) ✓
- Correct units (Billion per ml and ml) ✓
- Combined bar graph ✓
- Accuracy (80% + correctly plotted) ✓ (6)

4.4.2 **ONE requirement for the storage of semen**

- Proper/correct equipment should be used ✓
- Presence of a dilutant ✓
- Store a 5°C if stored for shorter periods ✓
- Store at **–**196°C in a cannister/flask containing liquid nitrogen if stored for longer periods ✓
- Store in polyvinyl straws ✓
- End of the straws should be sealed to prevent liquid nitrogen to enter ✓ (1)
- Straws should be properly labelled ✓ (Any 1)

4.5 **Explanation on how each of the following techniques work in detecting oestrus in cattle**

4.5.1 **Pedometer -** Apparatus records the spike in movement and temperatures ✓ which indicates restlessness ✓ because of oestrus (2)

4.5.2 **Tail chalking -** Marker/chalk will rub off from the cow in oestrus ✓ due to mounting by others ✓ (2)

4.6 **The process of artificial insemination (AI)**

**Indication of the action the farmer would take if signs of heat were detected in the afternoon**
The cow should be artificially inseminated early the next morning/12 hours after the signs of oestrus ✓ (1)

4.7 **Multiple births**

“ 4.7.1 **Explanation of multiple birth formation**
Two different ova are fertilized ✓ by two different spermatozoa ✓ (2)

4.7.2 **Naming of the reproductive process**
Pregnancy/gestation ✓ (1)

4.8 **Cloning**

4.8.1 **Deduction of the type of reproductive technique**
Reproductive cloning ✓ (1)

4.8.2 **Justification for the calf being a Holstein**
The nucleus/genetic material of the offspring was extracted from Holstein ✓ and inserted into a Nguni ✓ (2)

4.8.3 **ONE disadvantage of cloning**

- Conception rate is low ✓
- Expensive procedure ✓
- Very scientific/complex procedure ✓
- Clones are prone to diseases/lower immune system ✓
- Time consuming/labour intensive ✓
- Expert knowledge/skills required/veterinarian ✓
- Short life-span ✓
- Less genetic diversity✓
- No guarantees for success ✓
- Dystocia problems can arise ✓
- Genetic defects may occur ✓
- It alters the normal reproductive process ✓ (Any 1) (1)

4.9 **Pregnancy**

4.9.1 **Stage of pregnancy in cows**
Foetal stage ✓ (1)

4.9.2 **TWO reasons for the termination of pregnancy/abortion**

- Metabolic or hormonal disabilities ✓
- Nutritional deficiencies/malnutrition ✓
- Trauma/stress/injuries ✓
- Poisoning/toxins ✓
- Laxatives ✓
- Infections/diseases ✓
- Genetic or chromosomal defects of ova/sperm cells ✓
- Allergies ✓
- Twinning ✓
- Embryo abnormalities ✓
- Vaccination ✓
- Dropsy of the foetal membranes ✓ (Any 2) (2)

**[35]**

**TOTAL SECTION B: 105**
**GRAND TOTAL: 150**