



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**AGRICULTURAL SCIENCES P1**

**NOVEMBER 2022**

**MARKING GUIDELINES**

**MARKS: 150**

**These marking guidelines consists of 11 pages**

**SECTION A****QUESTION 1**

1.1	1.1.1	C ✓✓	(10 x 2)	(20)
	1.1.2	B ✓✓		
	1.1.3	A ✓✓		
	1.1.4	D ✓✓		
	1.1.5	C ✓✓		
	1.1.6	B ✓✓		
	1.1.7	D ✓✓		
	1.1.8	A ✓✓		
	1.1.9	B ✓✓		
	1.1.10	C ✓✓		
1.2	1.2.1	B only ✓✓	(5 x 2)	(10)
	1.2.2	A only ✓✓		
	1.2.3	None ✓✓		
	1.2.4	None ✓✓		
	1.2.5	Both A and B ✓✓		
1.3	1.3.1	Passive absorption/diffusion ✓✓	(5 x 2)	(10)
	1.3.2	Quarantine/isolation ✓✓		
	1.3.3	Adrenalin ✓✓		
	1.3.4	Semen ✓✓		
	1.3.5	Vagina ✓✓		
1.4	1.4.1	Ideal/complete/egg ✓	(5 x 1)	(5)
	1.4.2	Knife/scalpel ✓		
	1.4.3	Ectoderm ✓		
	1.4.4	Mating/copulation ✓		
	1.4.5	Mitosis ✓		
<b>TOTAL SECTION A:</b>			<b>45</b>	

**SECTION B****QUESTION 2: ANIMAL NUTRITION****2.1 Stomach compartments in farm animal**

- 2.1.1 **Naming the farm animal**  
Cattle/sheep/goat ✓ (1)
- 2.1.2 **Identification of the letter**  
(a) C ✓ (1)  
(b) B ✓ (1)
- 2.1.3 **Justification of animal surviving on food poor in vitamins**  
Stomach has rumen micro-organisms ✓ that can synthesise vitamins ✓ (2)
- 2.1.4 **Letters indicating the sequence of feed flow**  
B ✓ → C ✓ → A ✓ (3)

**2.2 Nutrient deficiencies**

- 2.2.1 **Identification of the mineral deficient in**  
C - Zinc/Zn ✓ (1)  
D - Iron/Fe ✓ (1)
- 2.2.2 **Naming of the deficiency symptoms**  
B - Osteomalacia/porous bones ✓ (1)  
E - Goitre/enlarged thyroid gland ✓ (1)
- 2.2.3 **Classification of vitamin A**  
Fat-soluble vitamin ✓ (1)
- 2.2.4 **TWO methods of supplementing vitamin deficiency in A**  
• Injection ✓  
• Dosing/water based vitamin A mixed with drinking water ✓  
• Supplementing the ration ✓ (Any 2) (2)

**2.3 Digestibility co-efficiency trial**

- 2.3.1 **Type of farm animal**  
Animal A - Non-ruminant/monogastric farm animal ✓ (1)
- 2.3.2 **Reason**  
Feed is less digested/low digestibility co-efficient/stomach of the animal is not adaptable to digest crude fibre/simple stomach/13%/2 kg of the feed was digested and 87%/13 kg was excreted ✓ (1)

2.3.3 **TWO factors that have influenced digestibility of feed**

- Type/composition of feed ✓
- Type of animal ✓
- Individuality ✓
- Preparation of the feed ✓
- Age of the animal ✓
- Age of the plant ✓
- Quantity of feed consumed ✓

(Any 2) (2)

2.3.4 **TWO methods of improving digestibility of wheat straw**

- Pelleting ✓
- Supplementing/mixing with additives/molasses/urea/ammonification ✓
- Grinding ✓

(Any 2) (2)

2.4 **Composition of a feed**

2.4.1 **Calculation of the nutritive ratio**

$$\text{TDN} = 55\% + 15\% + 5\% = 75\% \checkmark$$

$$\text{NR} = 1: \frac{\% \text{TDN} - \% \text{DP}}{\% \text{DP}} \checkmark$$

$$\text{NR} = 1: \frac{75\% - 15\%}{15\%} \checkmark$$

$$\text{NR} = 1:4 \checkmark$$

**OR**

$$\text{DNNS} = 75\% - 15\% = 60\% \checkmark$$

$$\text{NR} = 1: \frac{\% \text{DNNS}}{\% \text{DP}} \checkmark$$

$$\text{NR} = 1: \frac{60\%}{15\%} \checkmark$$

$$\text{NR} = 1:4 \checkmark$$

(4)

2.4.2 **Suitability of feed**

Suitable for growth/production/reproduction ✓

(1)

2.4.3 **Reason**

High in protein/has a narrow nutritive ratio/less than 1:6 ✓

(1)

2.5 **Energy flow**

2.5.1 **Name of the energy in C**

Net energy/NE ✓

(1)

2.5.2 **Function of energy represented by D**

Production/growth/reproduction/work ✓

(1)

**2.5.3 Calculation of digestible energy and energy lost through heat****(a) Calculation of digestible energy**

$$\begin{aligned} & \text{Gross energy} - \text{energy lost in faeces} \\ & = 1000 \text{ kJ} - 150 \text{ kJ} \checkmark \\ & = 850 \text{ kJ} \checkmark \end{aligned}$$

(2)

**(b) Calculation of amount of energy lost through heat**

$$\begin{aligned} & \text{Metabolic energy} - \text{net energy} \\ & = 800 \text{ kJ} - 550 \text{ kJ} \checkmark \\ & = 250 \text{ kJ} \checkmark \end{aligned}$$

(2)

**2.5.4 TWO aims of calculating the energy value of the feed**

- To determine the animal's diet ✓
- To determine the feeding standards ✓
- To determine the ration formulation ✓

(Any 2)

(2)

**[35]****QUESTION 3 : ANIMAL PRODUCTION, PROTECTION AND CONTROL****3.1 Temperature ranges and the expected growth rates****3.1.1 Identification of animals that need an environment with housing facilities - Pigs ✓**

(1)

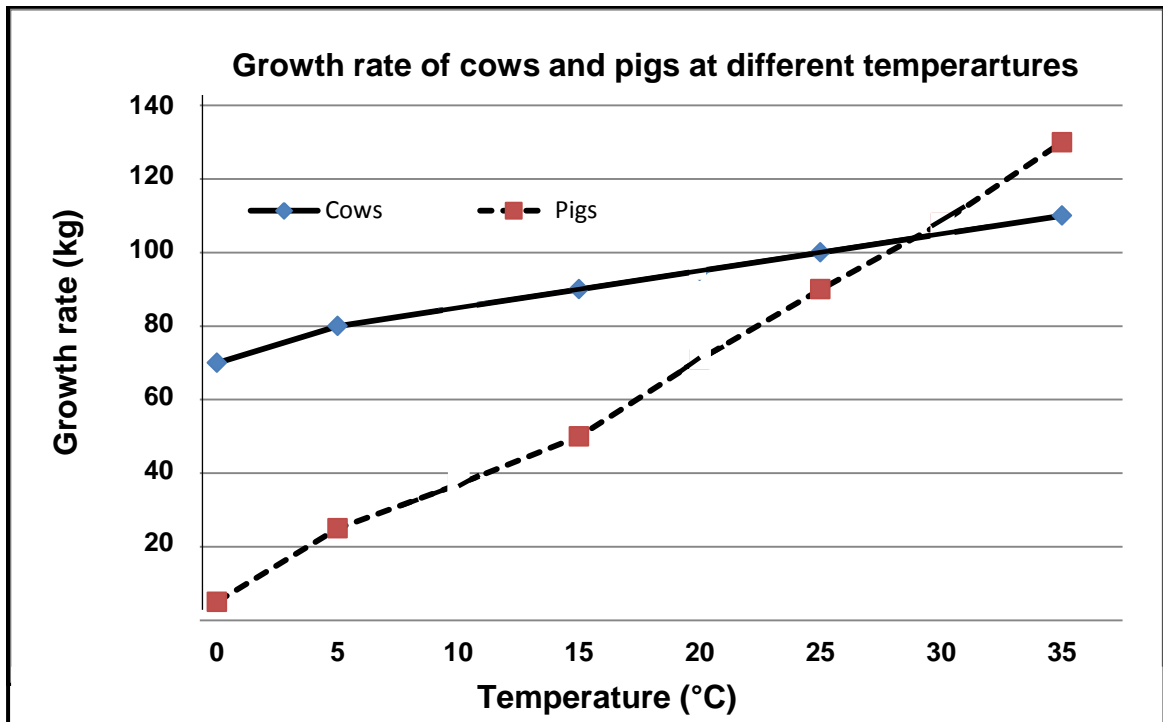
**3.1.2 Reason**

- Growth rate shows a substantial decrease ✓ with a slight decrease in temperature ✓
- Growth rate shows a substantial increase ✓ with a slight increase in temperature ✓

(Any 1)

(2)

3.1.3 Line graph



**CRITERIA/RUBRIC/MARKING GUIDELINES**

- Correct heading ✓
  - X-axis: Correctly calibrated and labelled (Temperature) ✓
  - Y-axis: Correctly calibrated and labelled (Growth rate) ✓
  - Line graph ✓
  - Correct units (kg and °C) ✓
  - Accuracy (80%+ correctly plotted) ✓
- (6)

3.2 **Equipment in a broiler production unit**

3.2.1 **Indication of equipment**

- (a) Insulation material on the roof ✓ (1)
- (b) Electric heaters ✓ (1)
- (c) Fans on the roof and walls/foldable curtains ✓ (1)

3.3 **Types of intensive chicken production systems**

3.3.1 **Identification of the types of intensive chicken production systems**

- PICTURE A - Free range ✓ (1)
- PICTURE B - Backyard ✓ (1)

3.3.2 **TWO factors leading to increased production other than nutrition**

- Environment ✓
- Reproduction/breeding ✓
- General enterprise management ✓ (Any 2) (2)

- 3.4 **Type of animal handled**
- 3.4.1 Chicken/poultry/fowl ✓ (1)
- 3.4.2 Sheep/goat ✓ (1)
- 3.4.3 Pigs ✓ (1)
- 3.5 **Seasonal trends of parasite infestation**
- 3.5.1 **Identification of the season**  
Summer ✓ (1)
- 3.5.2 **ONE possible reason for the higher parasite infestation**
- Conducive environmental conditions for parasites to breed ✓
  - Poor herd management ✓ (Any 1) (1)
- 3.5.3 **TWO economic impacts of parasites**
- Stock losses ✓
  - Loss of production/reproduction ✓
  - Degrading of carcasses ✓
  - Increased production costs ✓
  - Loss of income/profit ✓ (Any 2) (2)
- 3.5.4 **TWO good herd management practices**
- Adequate feeding ✓
  - Well planned health programme/chemical/biological control ✓
  - Avoiding breeding places of parasites/wet areas ✓
  - Practice rotational grazing ✓
  - Avoid keeping animals in infested pens ✓
  - Good clean/hygienic practices ✓
  - Creating an environment for natural enemies ✓
  - Using/selecting/breeding more resistant animals ✓
  - Burning of veld and pasture fields ✓ (Any 2) (2)
- 3.6 **The life cycle of two different parasites**
- 3.6.1 **Classification of the parasite in DIAGRAM B**  
Internal/endo parasite ✓ (1)
- 3.6.2 **Naming the parasites that are represented by**  
**DIAGRAM A - Tapeworm ✓ (1)**  
**DIAGRAM B - Liver fluke/fluke worm ✓ (1)**
- 3.6.3 **TWO biological measures of controlling liver fluke**
- Creating an environment for natural enemies ✓
  - Introduction of dung beetles/micro-fungi ✓
  - Breeding parasite resistant animals ✓ (Any 2) (2)

**3.7 Different symptoms of diseases that affect farm animals**

- 3.7.1 **Indication of diseases**  
**ANIMAL 1 - Anthrax ✓** (1)  
**ANIMAL 2 - Red water ✓** (1)
- 3.7.2 **Identification of the animal**  
 Animal 1 ✓ (1)
- 3.7.3 **Indication of the animal with non-infectious disease**  
 Animal 2 ✓ (1)
- 3.7.4 **Name of the vector**  
 Blue tick ✓ (1)
- [35]**

**QUESTION 4: ANIMAL REPRODUCTION****4.1 The accessory sex glands**

- 4.1.1 Prostate ✓ (1)
- 4.1.2 Cowper's glands ✓ (1)
- 4.1.3 Seminal vesicle ✓ (1)

**4.2 Part of the reproductive system**

- 4.2.1 **Identify the following**
- (a) Part I - Mid piece ✓ (1)
  - (b) Part H - Tail ✓ (1)
  - (c) Process taking place in 1 - Ovulation ✓ (1)
  - (d) Process taking place in 2 - Fertilization ✓ (1)
- 4.2.2 **The hormone responsible for the process in 1 to take place**  
 Luteinizing hormone/LH ✓ (1)
- 4.2.3 **ONE function of structure D**
- Produce female gametes/egg cells/ova/oogenesis/ovogenesis ✓
  - To produce female sex hormones ✓ (Any 1) (1)
- 4.2.4 **ONE function of fluid in B**
- Protects the embryo from injuries/shock absorber ✓
  - Hydration/prevents dehydration/drying out of the foetus ✓
  - Lubricates the birth canal during parturition ✓
  - Thermo regulation ✓
  - Prevents the embryo to attach to other tissues ✓ (Any 1) (1)



4.2.5 **Description of how the acrosome enables sperm penetration**  
**Part F** - Releases an enzyme ✓ that break the egg wall for the sperm cell to enter ✓ (2)

4.2.6 **The process that leads to formation of the sperm cell**  
Spermatogenesis ✓ (1)

4.3 **Artificial Insemination (AI)**

4.3.1 **The phase of oestrus during which AI could be performed**  
Oestrus/met-oestrus ✓ (1)

4.3.2 **TWO methods to detect heat in cows**

- Chin ball marker ✓
- Tail chalking ✓
- Heat mount/watching detectors
- Heat observation ✓
- Pedometer ✓
- Good record keeping ✓
- The use of teaser animals ✓

(Any 2) (2)

4.3.3 **TWO characteristics of good quality semen**

- Opaque/milky in colour ✓
- Sticky ✓
- Less than 15% dead sperm cells ✓
- No deformed sperm cells/deformities ✓
- No blood in semen ✓
- Healthy sperm cells ✓
- Viable sperm cells ✓
- High concentration of sperm cells ✓

(Any 2) (2)

4.3.4 **TWO disadvantages of AI**

- Spread of diseases if semen is not tested ✓
- Inexperience/unskilled operator may cause damage ✓
- Decreased genetic variation ✓
- Some heifers are difficult to inseminate successfully ✓
- May not give the desirable results ✓
- Higher management demands ✓
- Undesirable traits/congenital defects may be transferred to more offspring ✓
- Labour intensive ✓
- Time consuming ✓
- Expensive procedure ✓
- Difficult under extensive production systems ✓

(Any 2) (2)

- 4.4 The different reproductive processes that occur in a dairy cow**
- 4.4.1 Identification of curve A**  
Lactation curve ✓ (1)
- 4.4.2 Indication of the reproductive process and pregnancy stage**  
**(a) Months 3 to 12 - Pregnancy/gestation ✓ (1)**  
**(b) Stage of the process - Foetal stage ✓ (1)**
- 4.4.3 Identification of the month**  
Month 12 ✓ (1)
- 4.4.4 TWO causes of abortion**
- Malnutrition ✓
  - Injuries ✓
  - Hormonal disturbances/stress conditions ✓
  - Toxins/poisonous substances/laxatives/allergies/  
clovers high in oestrogen/immunization of pregnant animals ✓
  - Diseases/infections/high fever ✓
  - Multiple births ✓
  - Genetic factors ✓
  - Transportation/moving of pregnant animals ✓
  - Embryo abnormalities ✓ (Any 2) (2)
- 4.4.5 Reason for drying off pregnant lactating cows before the next lactation**
- For tissues in the mammary gland to recover ✓
  - To store body reserves/to prepare for the next lactation ✓
  - Supply the foetus with nutrients ✓ (Any 1) (1)
- 4.5 Different techniques used in animal reproduction**
- 4.5.1 Reproductive techniques**
- 1 - Synchronization of oestrus ✓ (1)
  - 2 - Embryo transfer/ET ✓ (1)
  - 3 - Cloning/nuclear transfer ✓ (1)
- 4.5.2 TWO hormones used in technique 1**
- Prostaglandin ✓
  - Gonadotropin-releasing hormone (GnRH) ✓
  - Progestin (synthetic progesterone) ✓
  - Oestradiol ✓
  - MGA/Melengestrol acetate ✓ (Any 2) (2)
- 4.5.3 Naming the two female animals in technique 2**
- Donor/superior cow ✓
  - Recipient/inferior/surrogate cow ✓ (2)

**4.5.4 The aim of cloning**

- To preserve/revive endangered species ✓
  - Rapid increase of animals with superior genetic traits ✓
  - For medical reasons ✓
  - To preserve and extend superior genes ✓
  - To create a replica/genetically identical organisms ✓ (Any 1) (1)
- [35]**

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