



# **AGRICULTURAL SCIENCES**

**GRADE 12**

**SPRING CLASSES 2023**

**TOPICS: ANIMAL PROTECTION AND CONTROL  
ANIMAL REPRODUCTION**

## **MARKING GUIDELINES**

**2.1. Activity 1: Vaccination plan**

- 2.1.1. **A** Anthrax ✓
- B** Cattle/sheep/goats ✓
- C** Protozoa ✓
- D** Cattle/sheep/goats ✓
- E** Blisters on the tongue/nose/lips/mouth/teats/udder/  
between the toes/around hooves ✓
- F** Annually/once a year ✓
- G** Virus ✓ (7)
- 2.1.2. Ticks ✓ (1)

**2.2. Activity 2: Control of parasites**

- 2.2.1. Dosing/drenching/injecting/provision of licks ✓ (1)
- 2.2.2. Dipping/spraying/spot treatment/injecting ✓ (1)
- 2.2.3. Cleaning/apply ointments/medication/apply insecticides/dipping ✓ (1)

**2.3. Activity 3: Life cycle of a blowfly**

- 2.3.1. Blowfly ✓ (1)
- 2.3.2. Larval stage ✓ (1)
- 2.3.3. Blowfly strike/attacks ✓ (1)
- 2.3.4. Crutching ✓ (1)
- 2.3.5. Correct timing of shearing and crutching ✓
- Clipping and cleaning of wool ✓
  - Tail docking ✓
  - Lambing time after shearing ✓
  - Breeding and selection of resistant breeds ✓ (Any 3) (3)

## 2.4. Activity 4: Plant poisoning

- 2.4.1. Feed them before transporting ✓ (1)
- 2.4.2. Inspection of hay for fusarium/fungi ✓ (1)
- 2.4.3. Practise rotational grazing ✓ (1)

## 2.5. Activity 5: Animal diseases

- 2.5.1. Virus ✓ (1)
- 2.5.2. Both are contagious/deadly ✓  
Both are enzootic ✓ (Any 1) (1)
- 2.5.3. Public awareness/notify public ✓  
• Import/export bans ✓  
• Supplying veterinary services ✓  
• Setting of quarantine zones ✓ (Any 2) (2)
- 2.5.4. Export bans affect economy ✓  
• Job loss ✓  
• Financial implications/millions of rands lost ✓  
• Cost/time/labour of medication ✓  
• Suspension of production ✓ (Any 2) (2)

## Activity 6: Animal diseases

- 2.5.5. A Anthrax ✓  
B Vaccination/inoculation ✓  
C Mosquitoes ✓  
D Blood stained nasal discharge/abortions/fever ✓  
E Red/brown urine/fever ✓ (5)
- 2.5.6. Vaccination/inoculation ✓ (1)
- 2.5.7. Burn the carcasses ✓  
• Dispose of all the manure/bedding/ other contaminated materials ✓

- Clean/disinfect housing ✓
- Report to the authorities ✓
- Quarantine/isolate affected animals ✓
- Treat animals with antibiotics ✓
- Vaccination/inoculation ✓ (Any 2) (2)

## 2.6. Activity 7: Measures by the state

- 2.6.1. Hygiene/legislation ✓ (1)
- 2.6.2. Quarantine/ban on imports/legislation ✓ (1)
- 2.6.3. Reporting notifiable disease to authorities/veterinary services/SAPS/legislation/destroy infected animals ✓ (1)

## 2.7. Activity 8: External parasites

- 2.7.1. Mite ✓ (1)
- 2.7.2. Mange/scab ✓ (1)
- 2.7.3. Severe itching/rubbing/scratching/skin irritation ✓
  - Wool/hair loss ✓
  - Dermatitis/inflammation of the skin ✓
  - Hairless patches/lersions ✓
  - Animals do not feed well/weight loss ✓ (Any 1) (1)
- 2.7.4. Loss in production/income/yield ✓
  - Quality of products will be damaged/reduced ✓
  - Financial implications/increased cost ✓
  - Cost of labour/time consuming ✓ (Any 2) (2)

## 2.8. Activity 9: Life cycle of a parasite in farm animals

- 2.8.1. Tapeworm ✓ (1)
- 2.8.2. Two hosts ✓ (1)

2.8.3. Loss of production ✓

- Infected carcasses are degraded at the abattoir ✓
- Loss of income/profit ✓
- High cost of treatment ✓ (Any 2) (2)

2.8.4. Meat testing/inspection/hygiene ✓

- Research/outreach to farmers ✓
- Legislation on the duties/roles/responsibilities of owners ✓
- Impose product bans ✓ (Any 2) (2)

**2.9. Activity 10: Parasites**

2.9.1. One/single-host tick ✓ (1)

2.9.2. Red water ✓

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

2.9.3. (a) Parasite C ✓ (1)

(b) Parasite B ✓ (1)

2.9.4. 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)

**2.10. Activity 11: Salt poisoning**

2.10.1. 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)

2.10.2. 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)

**TOTAL SECTION B:**

**3.1. Activity 1: The reproductive system of a bull****Organs of a bull**

- 3.1.1. **B** - Scrotum ✓ (2)  
    **C** - Epididymis ✓
- 3.1.2. Testosterone ✓ (1)
- 3.1.3. Cryptorchidism ✓ (1)
- 3.1.4. In hot conditions the scrotum relaxes moving the testes away from the body ✓ in cooler conditions the scrotum contracts pulling the testes closer to the body ✓ (2)

**Activity 2: Oogenesis**

- 3.1.5. Oogenesis/ovigenesis ✓ (1)
- 3.1.6. (a) **B** - Meiosis ✓ (2)  
    (b) **A** - Mitosis ✓
- 3.1.7. Reduce the number of chromosomes from diploid (2n) to haploid (n) ✓  
    To form gametes ✓ (Any 1) (1)
- 3.1.8. (a) **Spermatogonium** - Testis ✓ (2)  
    (b) **Oögonia** - Ovary ✓

**3.2. Activity 3: Reproductive systems of animals**

- 3.2.1. Diagram A ✓ (1)
- 3.2.2. Presence of an ovary ✓  
    - Presence of uterus ✓  
    - Presence of Cervix ✓  
    - Presence of vagina ✓  
    - Presence of fallopian tube ✓ (Any 1) (1)
- 3.2.3. **C** - Cervix ✓ (2)  
    **G** - Cowper's/bulbo-urethral glands ✓
- 3.2.4. **B** - Where the zygote is implanted and develops ✓

- 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) (2)

3.2.5. E ✓ (1)

#### Activity 4: Reproductive system of a bull

3.2.6. A - Testes/scrotum ✓

B - Penis/urethra ✓

C - Vas deferens/seminal tube/ductus deferens/sperm duct ✓ (3)

3.2.7. Secretion of hormone testosterone/male sex hormone ✓

Production of sperm cells/male sex cells ✓ (Any 1) (1)

**OR**

Protects the testis ✓

Regulates temperature of the testis ✓ (Any 1) (1)

3.2.8. Secrete fluid that transports the spermatozoa ✓

Protect the semen against pH changes ✓

Provide energy for sperm cells ✓ (Any 1) (1)

3.2.9. Lack of libido ✓ (1)

3.2.10. Immaturity/lack of experience ✓

Overwork/exhaustion/over exertion ✓

Malnutrition ✓

Poor health/diseases/low testosterone ✓

Change in environment ✓

Stress ✓

Temperament ✓

Age/senility ✓ (Any 3) (3)

### 3.3. Activity 5: Sperm morphology

#### Sperm Cells

3.3.1. Spermatogenesis ✓ (1)

3.3.2. Sperm cell **A** ✓ (1)

3.3.3. Microscope ✓ (1)

3.3.4. **SPERM CELL B** - It cannot fuse with the egg cell because it does not have an acrosome/no head ✓

**SPERM CELL C** - It cannot move towards the point of fertilization since it does not have a tail ✓ (2)

#### Activity 6: Semen in animals

3.3.5. 1 billion/ml ✓ (1)

#### 3.3.6. Dairy cattle

- Dairy bulls produce a lot of semen ✓ that is less concentrated ✓

#### Sheep

- Sheep produce less semen ✓ that is highly concentrated ✓ (4)

3.3.7. (a) Red-Presence of fresh blood ✓

(b) Grey-Presence of old blood/infection ✓ (2)

3.3.8. • Poor nutrition ✓

- Severe environmental conditions/temperature ✓

- Age ✓

- Diseases ✓ (Any 2) (2)

### 3.4. Activity 7: Reproductive system of a cow

3.4.1. **A** ✓ (1)

3.4.2. **B** ✓ (1)

3.4.3. **D** ✓ (1)

### 3.5. Activity 8: Hormones

- 3.5.1. **A** - Mature Graafian follicle ✓  
**C** - Ovum/egg/female reproductive cell/gamete ✓ (2)
- 3.5.2. (a) Follicle stimulating hormone/FSH ✓  
(b) Progesterone ✓ (2)
- 3.5.3. It captures(picks up) the ova/channel ova into the fallopian tube ✓ (1)

### 3.6. Activity 9: Female reproductive system

- 3.6.1. **B** ✓  
**C** ✓  
**D** ✓  
**E** ✓ (Any 2) (2)
- 3.6.2. (a) The site of fertilisation - **B** ✓  
(b) Glands secreting nutrients - **C** ✓ (2)
- 3.6.3. (a) Opens to allow semen passage to the uterus ✓  
(b) Closes the uterus through the thick mucus secretion/mucus plug to prevent microbial infection of the uterus ✓ (2)

### 3.7. Activity 10: Embryo transplantation

- 3.7.1. Embryo transplantation/transfer/ET ✓ (1)
- 3.7.2. • Fast/cost effective way to increase genetic improvement ✓  
• Extend the reproductive life of older/unproductive cows ✓  
• Offspring from superior animals are multiplied/higher calving percentage ✓  
• Genetic material in the herd is conserved ✓  
• Genetic material can be transported internationally ✓  
• Can improve the medical properties of products ✓  
• Produce animals with improved resistance towards diseases ✓  
• Prevent the extinction of valuable and endangered animals ✓

- Profits from increased sales of quality genes/products ✓
- A planned breeding programme can be implemented ✓ (Any 2) (2)

3.7.3. (a) Donor cow ✓

(b) Recipient/surrogate cow ✓ (2)

### 3.8. Activity 11: Oestrus cycle

3.8.1. • Hormonally-controlled cycle of activity ✓

• of the female reproductive organs ✓

**OR**

• Recurring periods of oestrus ✓

• alternating with sexual rest in the matured female ✓ (Any 1) (2)

3.8.2. From day 9/10 to day 15/16 (indicate any two days within the range) ✓ (1)

3.8.3. Oestrogen levels is at its peak/high/went up ✓ (1)

3.8.4. Fertilisation has taken place ✓✓

**OR**

• Corpus luteum has been formed ✓✓ (Any 1) (2)

3.8.5. Oestrogen stimulates the release of LH ✓ (1)

3.8.6. Pituitary gland/Hypophysis ✓ (1)

### 3.9. Activity 12: Hormone levels

3.9.1. The period when non-pregnant female animals will be receptive to male animals/will allow mating ✓ (2)

3.9.2. The female animal is not pregnant ✓ (1)

3.9.3. The animal is showing a normal oestrus cycle/the level of progesterone is decreasing/the level of oestrogen is increasing/ re-appearance of oestrus ✓ (1)

3.9.4. FSH level will be high ✓ (1)

### 3.10. Activity 13: Stages of the oestrus cycle:

- 3.10.1. A - Oestrus ✓  
B - Di oestrus ✓  
C - Met oestrus ✓  
D - Pro oestrus ✓ (4)
- 3.10.2. (a) A ✓  
(b) C ✓ (2)

### 3.11. Activity 14: Synchronisation schedule of female animals

- 3.11.1. Synchronisation of oestrus ✓ (1)
- 3.11.2. • Poor nutrition/body condition/health will affect the process negatively ✓  
• Needs good/expensive facilities ✓  
• Labour/time intensive ✓  
• Involves skilled management and technologies ✓ (Any 2) (2)
- 3.11.3. • Synthetic progesterone/progestin/oestradiol ✓  
• Co-Synch/gonadotropin/co-synch synchronisation ✓  
• Ear patches/implants ✓  
• Vaginal insurgents ✓ (Any 2) (2)
- 3.11.4. Day 35 – 40 ✓ (1)
- 3.11.5. • Immaturity ✓  
• Inexperience ✓  
• Diseases ✓  
• Underfeeding/overfeeding/malnutrition ✓  
• Old age/senility ✓  
• Overwork/exhaustion/over exertion ✓  
• Improper handling/stress ✓  
• Lack of testosterone ✓  
• Temperament ✓

- Environment ✓ (Any 3) (3)

### 3.12. Activity 15: Artificial Insemination (AI) process

3.12.1. A - Artificial vagina ✓

B - Pistolette ✓

C - Nitrogen flask/canister/tank ✓ (3)

3.12.2. A - Collection of semen ✓

B - For the deposition of semen in the cow during AI ✓

C - Storage of semen for longer periods ✓ (3)

3.12.3. Should be close to a laboratory ✓

- Equipment must be clean/sterilised ✓

- Availability of appropriate equipment/artificial vagina ✓

- Male animal must be clean/healthy ✓

- Warm collecting vial/placed in a water bath/prevent temperature shock ✓

- Personnel must be trained/experienced ✓

- Floor not slippery ✓

- Semen must be protected from direct sunlight ✓

- Teaser cows availability ✓ (Any 2) (2)

### 3.13. Activity 16: Mating

3.13.1 • ANIMAL A - Oestrogen ✓

- ANIMAL B - Testosterone ✓ (2)

3.13.2. Oestrogen - Makes cow to come into oestrus/allow mating ✓

- Testosterone - Stimulates mating behaviour in the bull ✓ (2)

3.13.3. (a) Fertilization/pregnancy/gestation ✓

(b) Parturition/birth giving/calving ✓ (2)

3.13.4. Oxytocin ✓ (1)

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

### 3.14. Activity 17: Multiple births

3.14.1. **A** Dizygotic twin ✓

**B** Monozygotic twin ✓ (2)

3.14.2. **A** – two eggs fertilised to produce two different offspring ✓

**B** – one egg cell fertilised to produce two similar offspring ✓ (2)

3.14.3. Cleavage of the same zygote ✓ (1)

3.14.4. Fertilisation of two separate ova ✓ (1)

3.14.5. • Fertility/genetics ✓

• Environmental factors ✓

• Breed type ✓

• Nutrition ✓

(Any 3) (3)

### 3.15. Activity 18: Foetal position

3.15.1. Preparatory ✓ (1)

3.15.2. Dystocia ✓ (1)

3.15.3. Correcting the position before calving ✓

Veterinary section if position cannot be corrected. ✓ (2)

### 3.16. Activity 19: Embryo development

3.16.1. **A** - Ejection/expulsion ✓

**B** - Preparatory ✓ (2)

3.16.2. Picture **B/B** ✓

#### Reason

• Retention of one leg towards the vulva/second leg is folded back ✓ (2)

3.16.3. (a) **B** ✓

(b) **A** ✓

(c) A ✓ (3)

3.16.4. • Restlessness/walks around/in pain and discomfort ✓

- Loss of appetite ✓
- Isolation/nesting behaviour ✓
- Tail raising ✓
- Lows often/bellowing noises ✓
- Frequent urination ✓

(Any 3) (3)

### 3.17. Activity 20: Milk production/Lactation

3.17.1. Milking/lactation ✓ (1)

3.17.2. The milking equipment ✓

- The calf ✓
- Touching of the udder/milker ✓ (3)

3.17.3. Oxytocin ✓ (1)

3.17.4. Pregnancy/gestation ✓ (1)

### 3.18. Activity21: Milk ejection

3.18.1. Washing of udder ✓

- Massage of the udder ✓
- Appearance and sound of the milker ✓
- Milking action ✓ (Any 2) (2)

3.18.2. Oxytocin ✓ (1)

3.18.3. Adrenalin ✓ (1)

3.18.4. Mastitis ✓ (1)

### 3.19. Activity 22: The importance of the aspects of embryo transfer

3.19.1. For the production of more genetically superior ova ✓ (1)

3.19.2. For the harvest of more embryos from superior/donor cows ✓ (1)

3.19.3. For the production of superior embryo's ✓ (1)

3.19.4. For implantation of the harvested embryo's ✓ (1)

### 3.20. Activity 23: Nuclear transfer

#### 3.20.1. (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)

#### (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) (2)

#### 3.20.2. 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)

**[4]**

**TOTAL SECTION C:**

**GRAND TOTAL:**