



JENN

Training and Consultancy

The path to enlightened education

SUBJECT: AGRICULTURAL SCIENCES

SPRING CLASSES 2023

TEACHER/LEARNER ACTIVITY MANUAL

This activity book consists of 27 pages (including cover page)

ACTIVITY BOOK GUIDELINES	4
SECTION B	5
ANIMAL PROTECTION AND CONTROL.....	5
QUESTION 2	5
2.1. Vaccination plan	5
Activity 1	5
2.2. Control of parasites	5
Activity 2	5
2.3. Life cycle of a blowfly.....	6
Activity 3	6
2.4. Plant poisoning.....	7
Activity 4	7
2.5. Animal diseases	7
Activity 5	7
Activity 6	7
2.6. Measures by the state	8
Activity 7	8
2.7. External parasites	8
Activity 8	8
2.8. Life cycle of a parasite in farm animals	9
Activity 9	9
2.9. Parasites.....	10
Activity 10	10
2.10. Salt poisoning	10
Activity 11	10
SECTION C.....	11
ANIMAL REPRODUCTION.....	11
QUESTION 3	11
3.1. The reproductive system of a bull	11
Activity 1	11
Activity 2	12
3.2. Reproductive systems of animals	13
Activity 3	13
Activity 4	14
3.3. Sperm morphology	14
Activity 5	14

Activity 6	15
3.4. Reproductive system of a cow.....	16
Activity 7	16
3.5. Hormones.....	16
Activity 8	16
3.6. Female reproductive system	17
Activity 9	17
3.7. Embryo transplantation	18
Activity 10	18
3.8. Oestrus cycle	18
Activity 11	18
3.9. Hormone levels	19
Activity 12	19
3.10. Stages of the oestrus cycle	20
Activity 13	20
3.11. Synchronisation schedule of female animals.....	20
Activity 14	20
3.12. Artificial Insemination (AI) process	21
Activity 15	21
3.13. Mating.....	22
Activity 16	22
3.14. Multiple births.....	23
Activity 17	23
3.15. Foetal position.....	24
Activity 18	24
3.16. Embryo development.....	25
Activity 19	25
3.17. Milk production/Lactation	26
Activity 20	26
3.18. Milk ejection.....	26
Activity 21	26
3.19. The importance of the aspects of embryo transfer	27
Activity 22	27
3.20. Nuclear transfer.....	27
Activity 23	27

ACTIVITY BOOK GUIDELINES

About the Learner Activity Book	This Learner Activity Book has been designed and developed to evaluate learners' level of understanding of Animal Production, Protection and Control; and Animal Reproduction content. It forms part of a series of Learner Activity Books that have been developed.
Purpose	The purpose of the Learner Activity Book is to evaluate learners understanding on Animal Production, Protection and Control; and Animal Production
Context	This assessment represents the Formative Assessment component of the Animal Protection and Control; and Animal Reproduction topics for Agricultural Science subject, and should be completed in the classroom.
Instruction to Facilitator	Facilitator will be required to: <ul style="list-style-type: none"> ● Explain the completion of each activity to the learner ● Engage with learner on questions should he/she lacks understanding
Instructions to Learner	Learner will be required to: <ul style="list-style-type: none"> ● Complete each activity as per the instructions; ● Ensure that all questions are completed and correctly referred to; ● Ensure that the completion of each activity is their own work; ● Ensure all annexures are attached to the activity book and clearly referred to:
Total Mark	This Learner Activity Book carries a total of _____ Marks . Learners are required to achieve a minimum of 60% of the Total Marks .
Equipments	The following are required to completing the activities: <ul style="list-style-type: none"> ● Pen and Pencil; ● Ruler; and ● Exam pad - for additional paper

SECTION B

ANIMAL PROTECTION AND CONTROL



Instruction

Complete the following questions as per the instructions provided

QUESTION 2

Answer all the questions in this SECTION.

2.1. Vaccination plan

Activity 1

The table below represents the vaccination plan that a farmer uses to prevent acute animal diseases on a farm.

DISEASE	PATHOGEN INVOLVED	MAJOR SYMPTOM OF THE DISEASE	FARM ANIMALS IMMUNISED	TIME TO VACCINATE
A	Bacteria	Swelling of neck, causing respiratory distress and bloody discharge from the nose, mouth and rectum	B	Any time
Redwater	C	Dark red urine	D	Annually
Foot-and-mouth disease	Virus	E	Cattle, sheep and goats	F
Rift Valley Fever	G	High fever, blood- stained nasal discharge and abortion in affected female animals	Cattle, sheep and goats	Annually

2.1.1. Complete the table above. Write only the answer next to the letter (A–G) in the ANSWER BOOK. (7)

2.1.2. Name the vector for redwater. (1)

[8]

2.2. Control of parasites

Activity 2

Parasites can cause serious economic losses; hence the farmer should ensure that parasites are effectively controlled.

Suggest the most appropriate method used to administer remedies to control each of the following parasites and conditions:

2.2.1. To eradicate round and flat worms (1)

2.2.2. To treat external parasites such as ticks and mites (1)

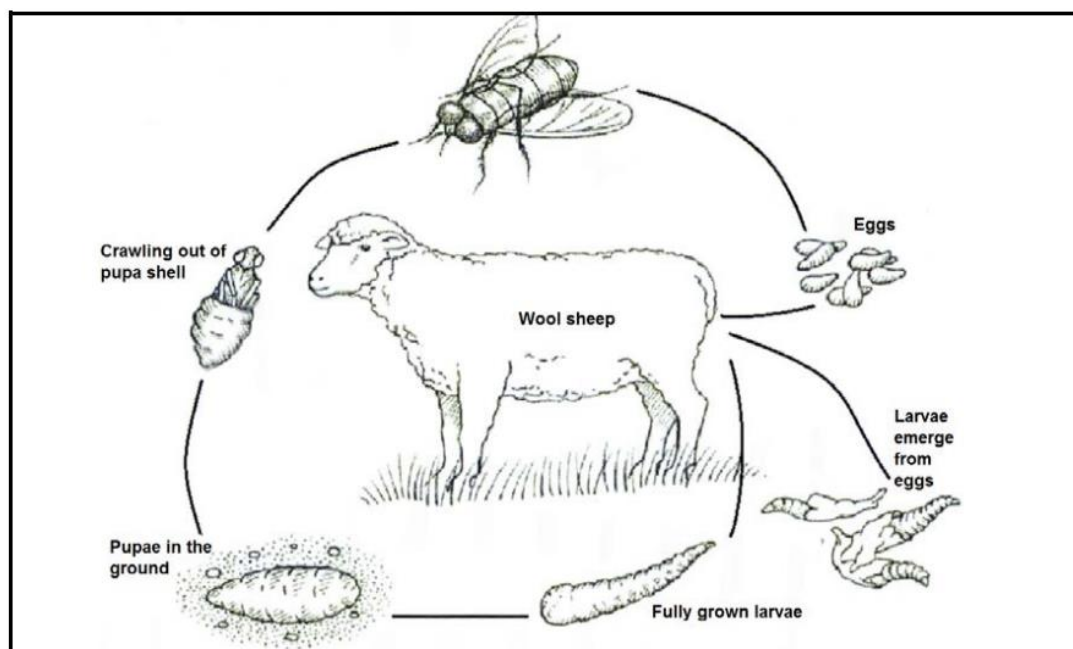
2.2.3. To treat blowfly attacking open wounds (1)

[3]

2.3. Life cycle of a blowfly

Activity 3

The picture below represents the life cycle of a type of fly that attacks farm animals, especially wool sheep.



2.3.1. Identify the parasite in the life cycle above. (1)

2.3.2. Indicate the most harmful stage in the life cycle of this parasite. (1)

2.3.3. Identify the condition caused by the stage in QUESTION 2.3.2 that occurs in the wounds of wool sheep. (1)

2.3.4. Give the term used for the removal of wool around the tail and rear leg areas. (1)

2.3.5. Name THREE non-chemical management practices used to control infestation by this parasite. (3)

[7]

2.4. Plant poisoning

Activity 4

Identify the control measures a farmer may take to prevent plant poisoning in EACH of the following situations:

2.4.1 Animals graze after being transported over long distances (1)

2.4.2 Animals feed on hay kept in stables (1)

2.4.3 Overgrazed or overstocked camps (1)

[3]

2.5. Animal diseases

Activity 5

H1N1 is a respiratory disease of fowls caused by the Type A influenza virus. This disease is very resistant and can remain infectious for many months. Swine fever is also a highly contagious, notifiable viral disease. The organism causing the disease can remain viable for several weeks in unprocessed pig meat. Both diseases are enzootic.

2.5.1. Name the pathogen responsible for both H1N1 and swine fever. (1)

2.5.2. Identify a common characteristic of H1N1 and swine fever. (1)

2.5.3. Give TWO roles of the state in controlling the spreading of these diseases. (2)

2.5.4. State TWO economic implications of these diseases. (2)

[6]

Activity 6

The table below shows diseases that affect farm animals and the role of the state in controlling the spread of diseases.

DISEASE	AGENT OF TRANSMISSION	KEY IDENTIFIABLE SYMPTOM	PREVENTION METHOD
A	Spores	Bloody discharge from the nose, mouth and rectum	B
Rift Valley Fever	C	D	Control vector/ Vaccination
Redwater	Blue tick	E	Vaccination

2.5.5. Refer to the table above and identify **A, B, C, D** and **E**. (5)

2.5.6. Refer to the table above and identify the role of the state in controlling the spread of diseases. (1)

2.5.7. Suggest TWO duties of stock owners to prevent the spread of deadly diseases, such as the one in **A**. (2)

[8]

2.6. Measures by the state

Activity 7

Which measures have been introduced by the state to address EACH of the following cases?

2.6.1. To ensure that meat is not contaminated during the slaughtering process (1)

2.6.2. To prevent the introduction of diseases from other countries (1)

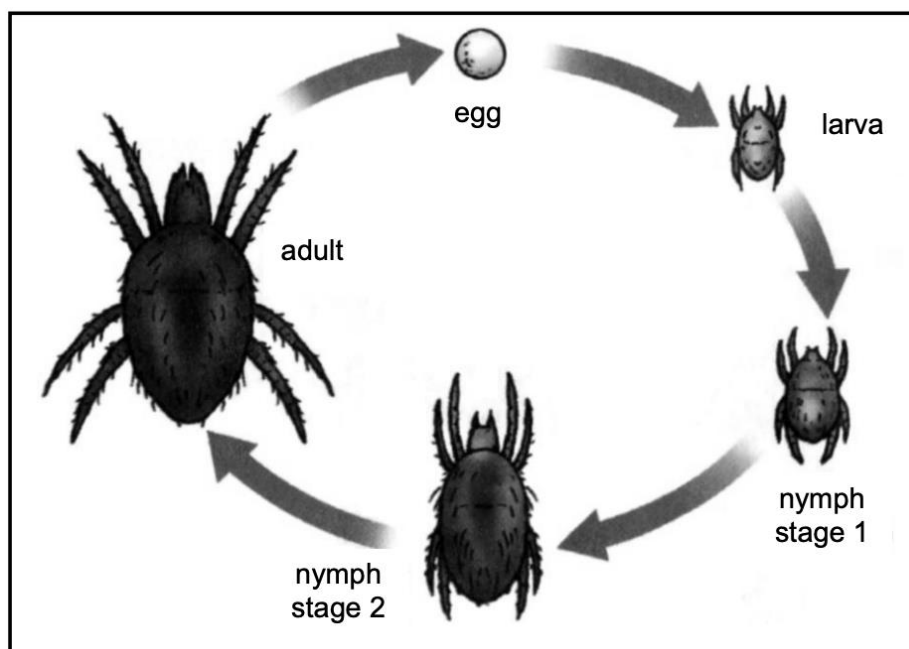
2.6.3. To prevent the outbreak and further spread of a notifiable disease (1)

[3]

2.7. External parasites

Activity 8

The picture below represents the life cycle of a microscopic external parasite that is found mainly in sheep.



2.7.1. Identify the external parasite in the life cycle above. (1)

2.7.2. Give the term used to describe the symptom of a severe infestation by this parasite in sheep. (1)

2.7.3. Indicate a visible sign of the symptom in QUESTION 2.7.2. (1)

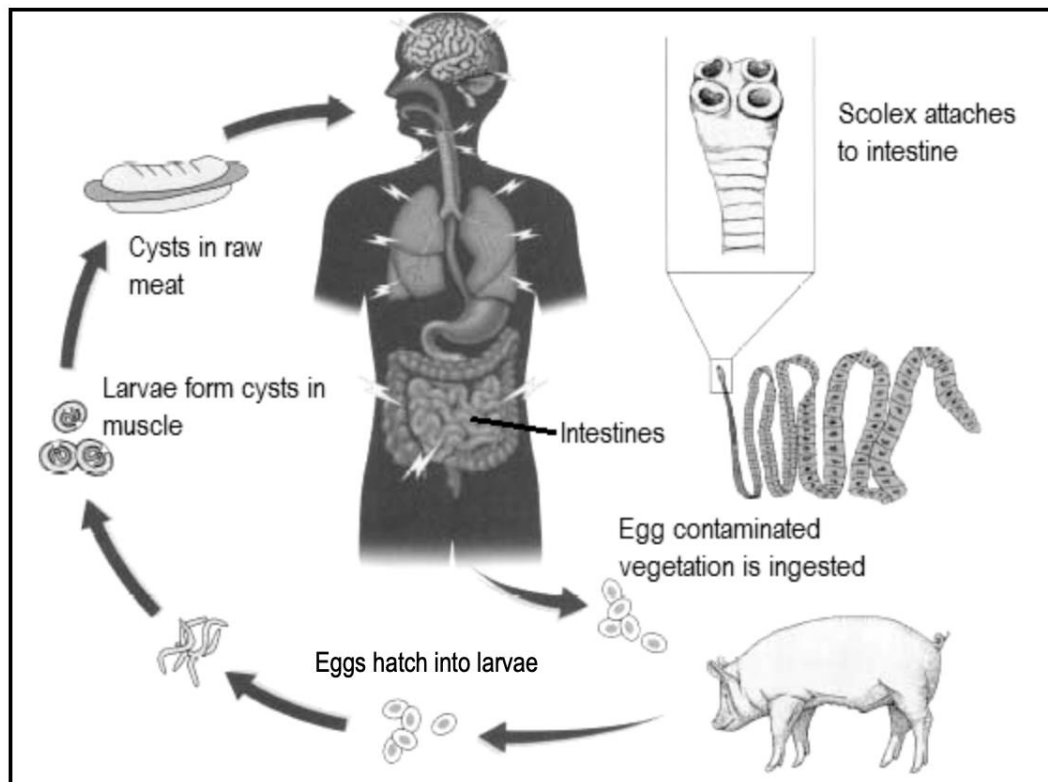
2.7.4. State TWO economic implications of this parasite. (2)

[5]

2.8. Life cycle of a parasite in farm animals

Activity 9

The diagram below represents the life cycle of a parasite in farm animals.



2.8.1. Identify the parasite in the diagram above. (1)

2.8.2. Indicate the number of hosts needed by the parasite in QUESTION 2.8.1. to complete its life cycle. (1)

2.8.3. State TWO economic implications of this parasite for farmers. (2)

2.8.4. State TWO roles of the state to control the spread of the internal parasites. (2)

[6]

2.9. Parasites

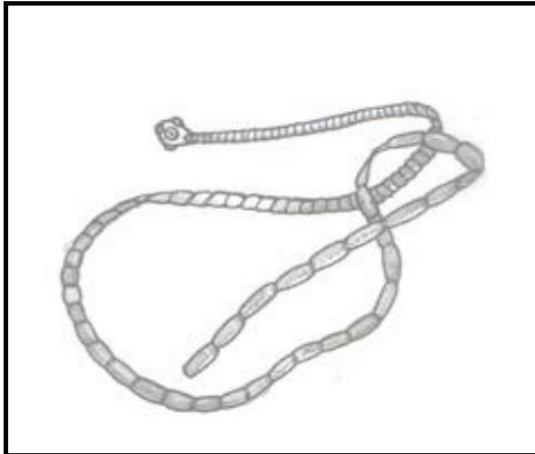
Activity 10

The pictures below show parasites affecting farm

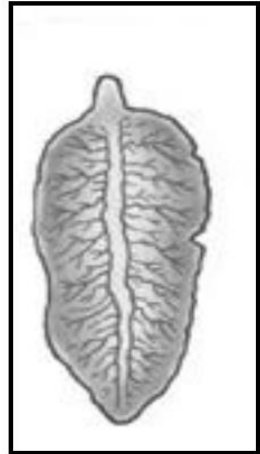
PARASITE A



PARASITE B



PARASITE C



2.9.1. Classify parasite **A** according to its life cycle. (1)

2.9.2. Name the protozoan disease that is transmitted by the parasite in QUESTION 2.9.1 (1)

2.9.3. Write down the letter of the parasite to which EACH of the statements below applies:

(a) Its infestation can be controlled by destroying the snail. (1)

(b) It can cause bloated bellies in young animals. (1)

2.9.4. Name TWO requirements of the use of medication in farm animals. (2)

[6]

2.10. Salt poisoning

Activity 11

Salts can be toxic to farm animals. Precautions should be taken to minimise the risk of salt poisoning.

2.10.1. Give TWO symptoms of salt poisoning in farm animals. (2)

2.10.2. State TWO ways in which a farmer can treat an animal with salt poisoning. (2)

[4]

TOTAL SECTION B: 59

SECTION C ANIMAL REPRODUCTION



Instruction

Complete the following questions as per the instructions provided

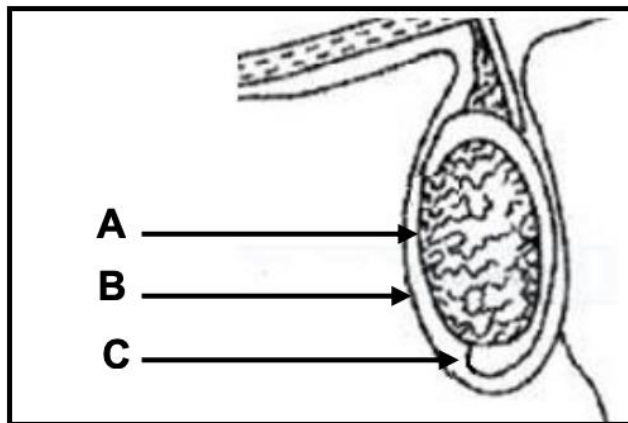
QUESTION 3

Answer all the questions in this SECTION

3.1. The reproductive system of a bull

Activity 1

The diagram below illustrates parts of the reproductive system of a male farm animal.



3.1.1. Identify **B** and **C**. (2)

3.1.2. Indicate the hormone secreted by **A**. (1)

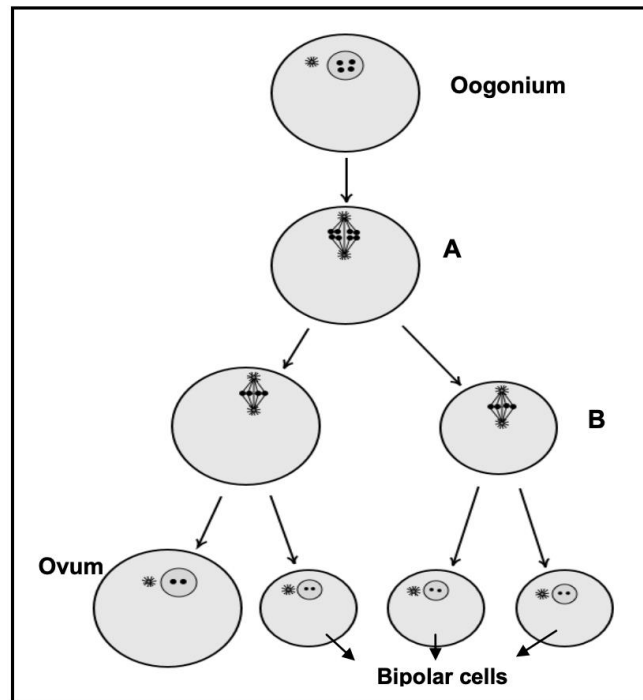
3.1.3. Name the condition that occurs when **A** remains in the body cavities.(1)

3.1.4. Explain the role of **B** in regulating the temperature of **A** in male farm animals. (2)

[6]

Activity 2

The diagram below shows a process taking place during the reproduction cycle of a cow.



3.1.5. Identify the process illustrated in the diagram above. (1)

3.1.6. Name the type of cell division responsible for the formation of the following:

(a) Cells labelled **B**

(b) Cells labelled **A** (2)

3.1.7. State the purpose of the cell division in QUESTION 3.1.6(a). (1)

3.1.8. Name the organ where EACH of the following cells are found:

(a) Spermatogonium

(b) Oogonium (2)

[6]

3.2. Reproductive systems of animals

Activity 3

The diagrams below illustrate the reproductive systems of cattle.

DIAGRAM A

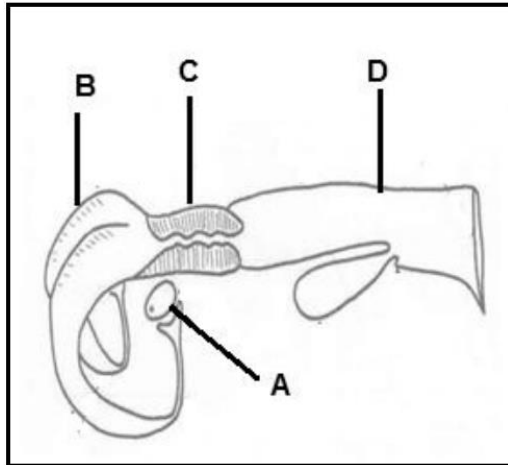
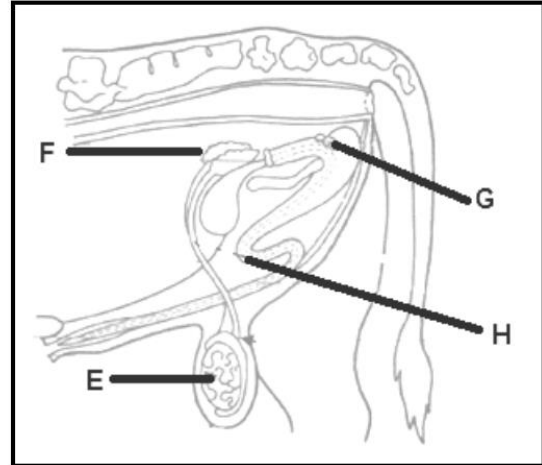


DIAGRAM B



3.2.1. Identify the diagram (**A** or **B**) above that represents the reproductive system of a cow. (1)

3.2.2. Give ONE visible reason in the diagram for the answer to QUESTION 3.2.1. (1)

3.2.3. Name parts **C** and **G**. (2)

3.2.4. Give a function of EACH of the following:

(a) Part **B**

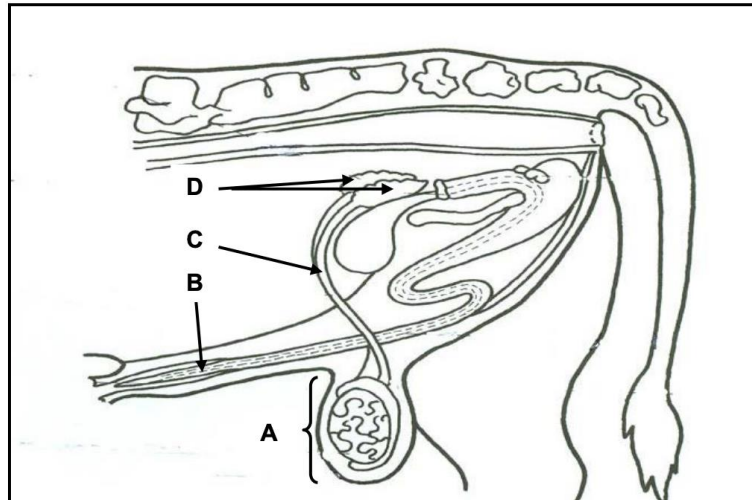
(b) The fluid secreted by part **F** (2)

3.2.5. Identify the letter representing the part where gametes are formed in DIAGRAM B. (1)

[7]

Activity 4

The picture below shows the reproductive system of a bull.



3.2.6. Identify **A**, **B** and **C**. (3)

3.2.7. State ONE function of **A**. (1)

3.2.8 Indicate the role of gland **D**. (1)

Bulls may appear healthy and normal but lack the drive to service cows.

3.2.9. Give a term for the condition described in the statement above. (1)

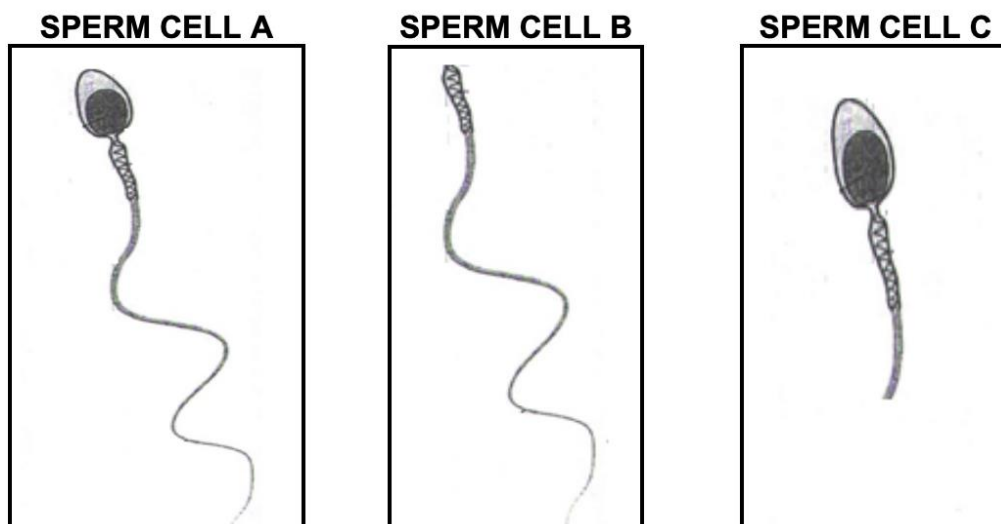
3.2.10. State THREE causes of the condition given in QUESTION 3.2.9. (3)

[9]

3.3. Sperm morphology

Activity 5

The pictures below show the morphology of sperm cells.



3.3.1. Name the process during which the sperm cells above are formed. (1)

3.3.2. Identify a high quality sperm cell. (1)

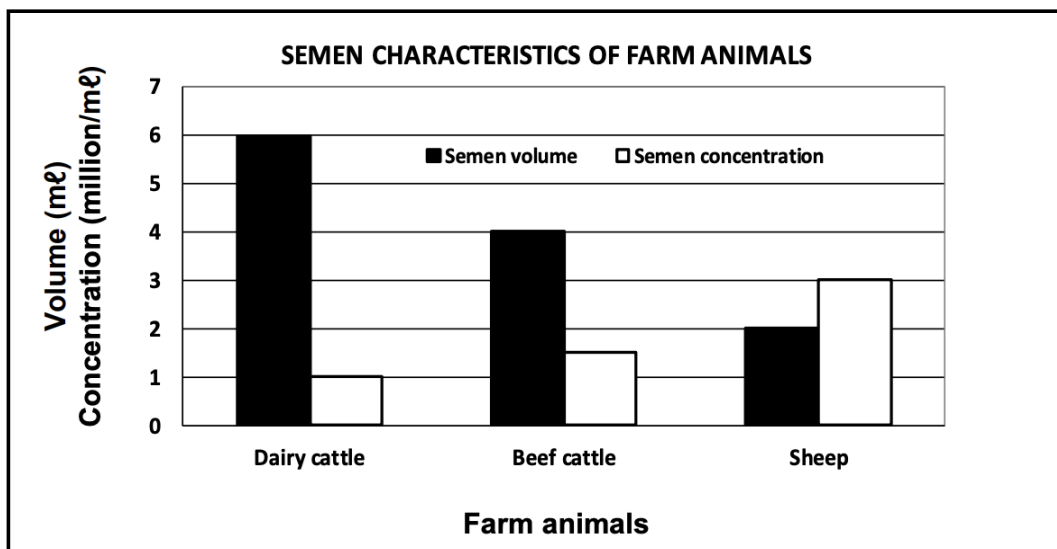
3.3.3. Name the instrument used to evaluate the sperm cells above during semen examination. (1)

3.3.4. Explain how sperm cell **B** and sperm cell **C** can affect the ability of a bull to fertilize a cow. (2)

[5]

Activity 6

The graph below shows the volume and concentration of semen in different farm animals.



3.3.5. Determine the concentration of semen at a volume of 6 mL in dairy cattle. (1)

3.3.6. Refer to the graph and give the correlation between semen volume and semen concentration of dairy cattle and sheep. (4)

The colour and quality of semen will determine the success of artificially inseminating livestock.

3.3.7. Give a reason why semen could have the following colour:

(a) Red (1)

(b) Grey (1)

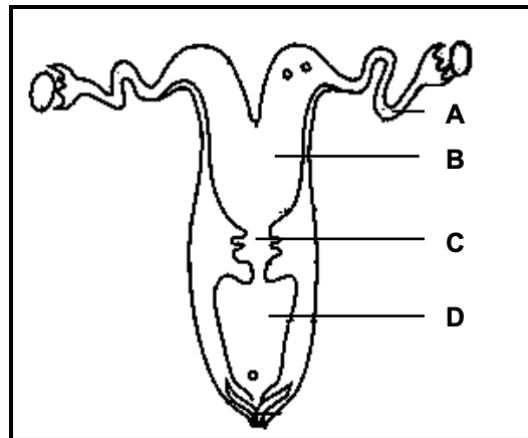
3.3.8. State TWO ways in which the quality of semen may be negatively affected. (2)

[9]

3.4. Reproductive system of a cow

Activity 7

The diagram below illustrates the reproductive system of a cow.



Write down only the letter (A–D) of the part where EACH of the following occurs:

3.4.1. Fertilisation (1)

3.4.2. Implantation of the fertilised ovum (1)

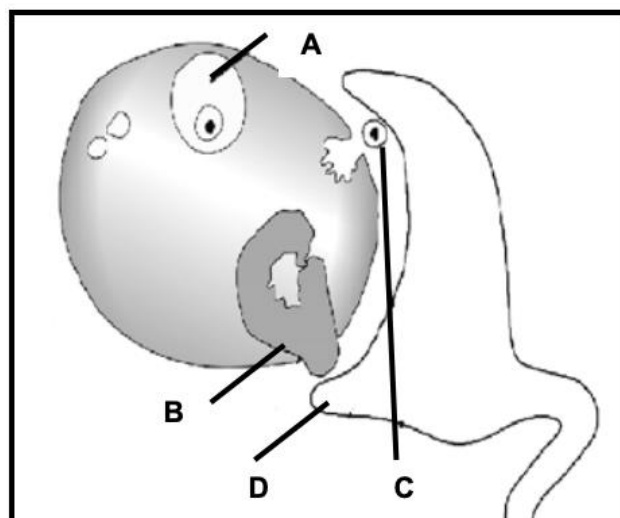
3.4.3. Deposition of semen by a male organ (1)

[3]

3.5. Hormones

Activity 8

The diagram below illustrates the role of hormones in the development and functioning of organs in the female animal.



3.5.1. Name parts A and C. (2)

3.5.2. Indicate the hormone that:

(a) Stimulates the growth and development of part **A**

(b) Is produced by part **B** (2)

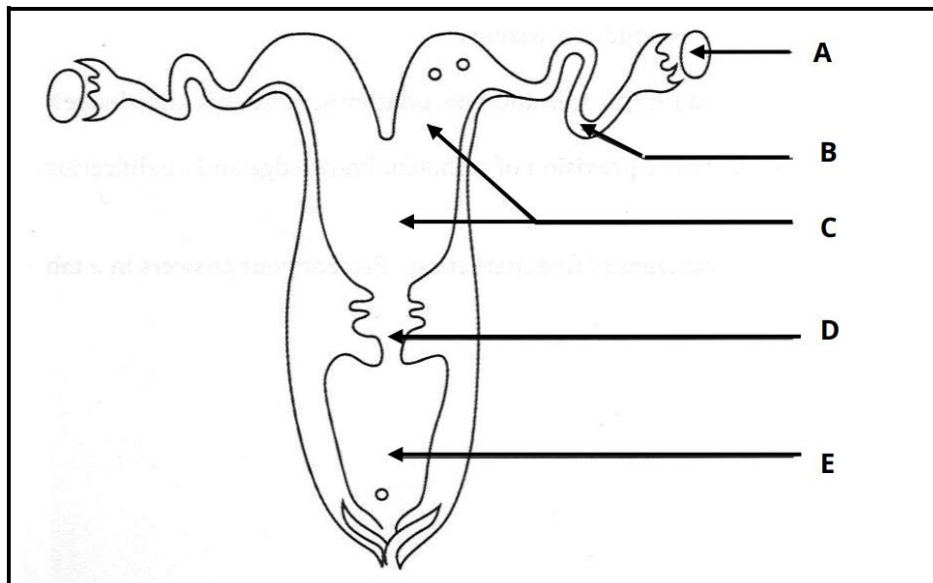
3.5.3. State the function of part **D**. (1)

[5]

3.6. Female reproductive system

Activity 9

The diagram below shows the reproductive system of a female farm animal.



3.6.1. Write down the letters (**A – E**) that represent TWO secondary genitals in the diagram above. (2)

3.6.2. Write down the letter (**A – E**) that represents the part where EACH of the following takes place:

(a) Fertilization

(b) Secretion from these glands provides nutrients to developing embryos (2)

3.6.3. Name the function of **D** under the following conditions:

(a) During mating

(b) During pregnancy (2)

[6]

3.7. Embryo transplantation

Activity 10

A female animal is treated with hormones to make her super-ovulate. The eggs are fertilised and the embryos are removed and placed into another female animal.

3.7.1. Identify the reproductive process above. (1)

3.7.2. State TWO advantages of the reproductive process identified in QUESTION 3.7.1 to farmers. (2)

3.7.3. Give the term for a cow that has undergone the following procedures:

(a) Treated with hormones to super-ovulate

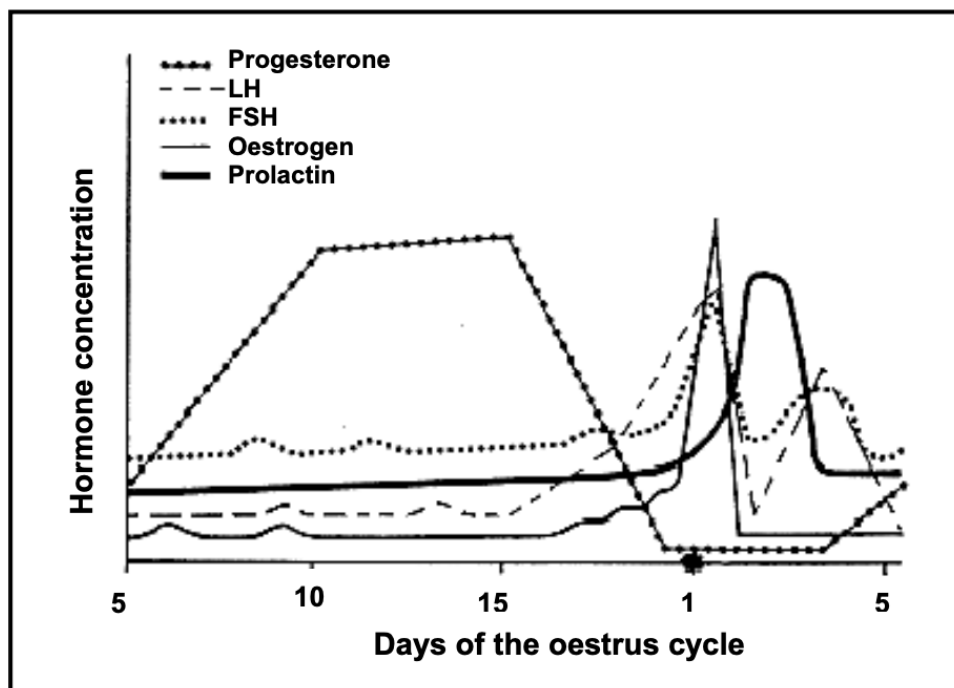
(b) Placement of an embryo (2)

[5]

3.8. Oestrus cycle

Activity 11

The graph below represents the hormone levels of a cow at different stages in the oestrus cycle.



3.8.1 Define the term oestrus cycle. (2)

3.8.2 Identify the days during which the progesterone level is the highest. (1)

3.8.3 Give a reason for the sudden drop in the level of FSH between days 2 and 3. (1)

3.8.4 Give a reason for the increase in the level of progesterone from days 3 and 4. (2)

3.8.5 Indicate the influence of oestrogen on LH. (1)

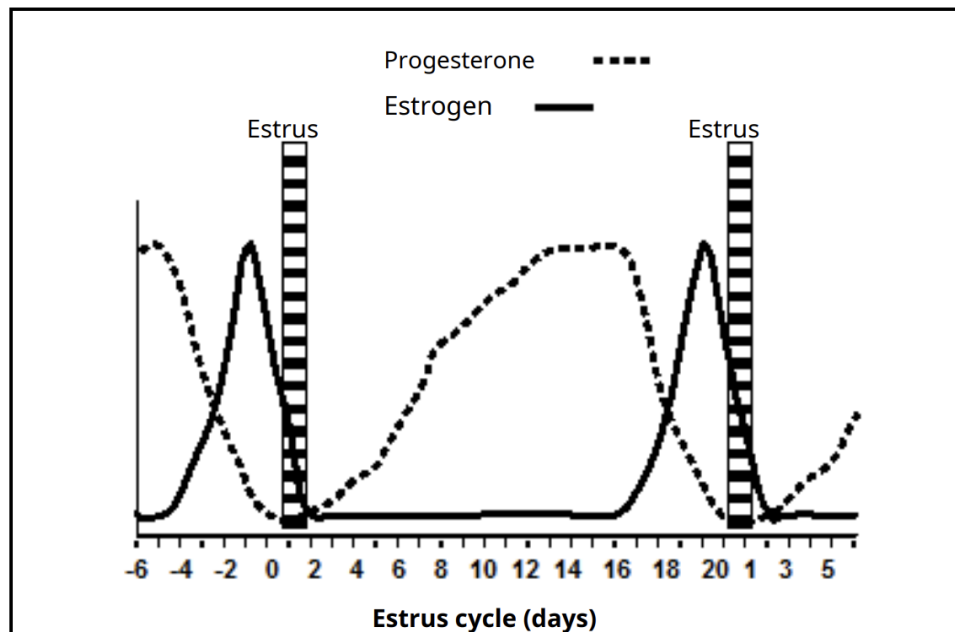
3.8.6 Name the gland in the animal body where prolactin is produced. (1)

[8]

3.9. Hormone levels

Activity 12

The graph below shows the hormone levels of a female farm animal during the reproductive cycle.



3.9.1. Define the concept oestrus. (2)

3.9.2. Indicate whether the female farm animal shown in the graph above becomes pregnant or not. (1)

3.9.3. Give a reason, based on the data in the graph, to support the answer to QUESTION 3.9.2. (1)

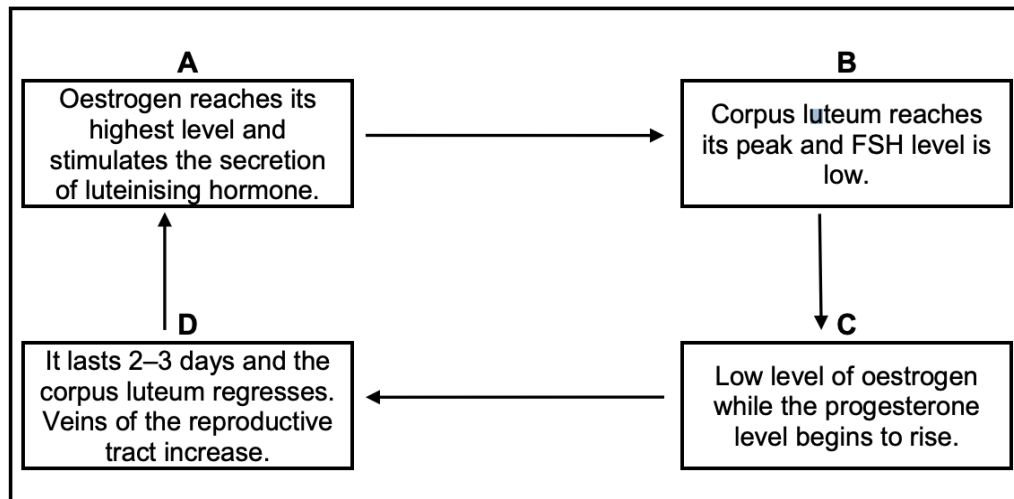
3.9.4. Indicate the expected FSH level from day 17 to day 20 of this female farm animal. (1)

[5]

3.10. Stages of the oestrus cycle

Activity 13

In female animals, hormonal and reproductive changes occur from one heat period to the next. This occurs in stages, which are marked by distinctive characteristics. Below are the characteristics applicable to each stage.



3.10.1. Match characteristics **A**, **B**, **C** and **D** with the stages of the oestrus cycle. (4)

3.10.2. Write down the letter that represents the stage where EACH of the following occurs:

- (a) Graafian follicle ruptures to release the ovum (1)
- (b) Ovum enters the Fallopian tube for fertilisation and the ruptured follicle forms a corpus luteum (1)

[6]

3.11. Synchronisation schedule of female animals

Activity 14

The representation below shows a process used in female farm animals.

Scheduled process:

- Day 1–14: melengestrol acetate (MGA in feed)
- Day 33: inject with prostaglandin

**1–2–3–4–5–6–7–8–9–10–11–12–13–14–15–16–17–18–19–20–21–22–
23–24–25–26–27–28–29–30–31–32–33–34–35–36–37–38–39–40**
(days of the schedule)

3.11.1. Identify the process above. (1)

3.11.2. State TWO disadvantages of the process in QUESTION 3.9.1. (2)

3.11.3. Name TWO other techniques not mentioned in the schedule above, that can also be used in female animals. (2)

3.11.4. Assuming that the above-mentioned schedule is properly followed, identify the day on which the cows will be inseminated. (1)

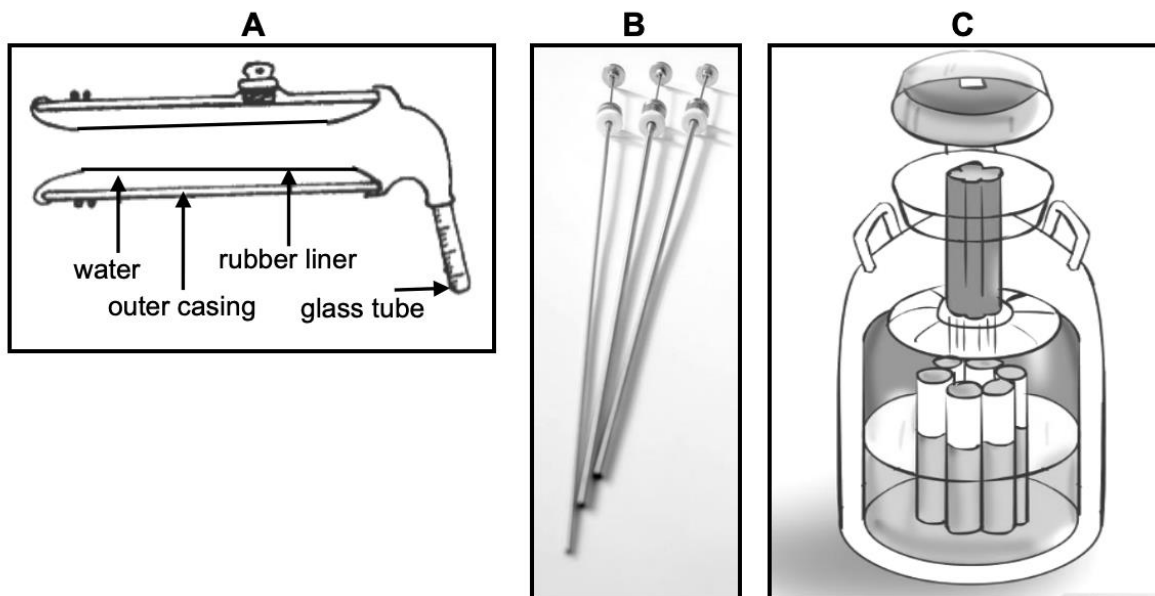
3.11.5. Name THREE causes of the lack of libido in male farm animals. (3)

[9]

3.12. Artificial Insemination (AI) process

Activity 15

The diagrams below show different apparatus that are used in the process of artificial insemination (AI).



3.12.1. Identify apparatus **A**, **B** and **C** above. (3)

3.12.2. State the main function of apparatus **A**, **B** and **C**. (3)

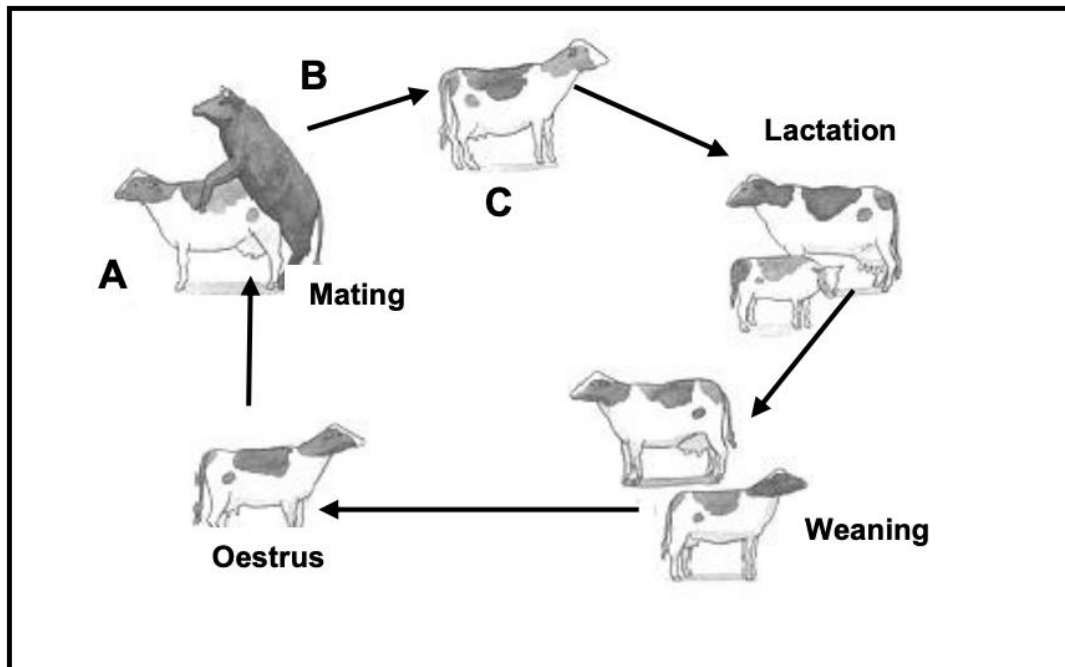
3.12.3. Name TWO basic requirements for the collection of semen from bulls. (2)

[8]

3.13. Mating

Activity 16

The picture below shows the reproductive cycle in cattle.



3.13.1. Identify the hormones that initiated mating by animal **A** and animal **B**.

(2)

3.13.2. Give a function for EACH hormone in QUESTION 3.13.1. secreted by animal **A** and animal **B**.

(2)

3.13.3. Identify the following reproductive processes:

(a) **C** after successful action by animal **A** and animal **B** (1)

(b) Between **C** and lactation (1)

3.13.4. Name the hormone that initiates milk let-down. (1)

3.13.5. Indicate how the hormone in QUESTION 3.13.4 functions in milk letdown. (1)

[8]

3.14. Multiple births

Activity 17

DIAGRAMS A and B below illustrate multiple births in farm animals.

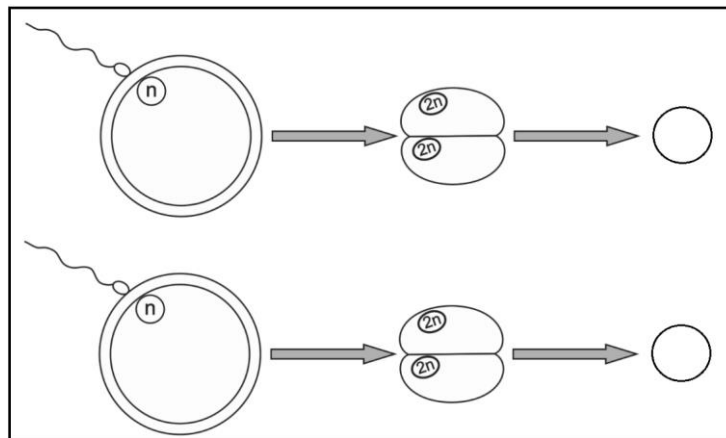


DIAGRAM A

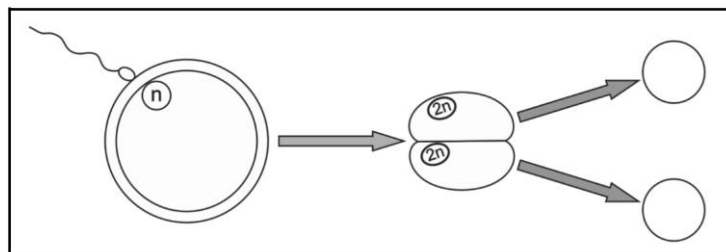


DIAGRAM B

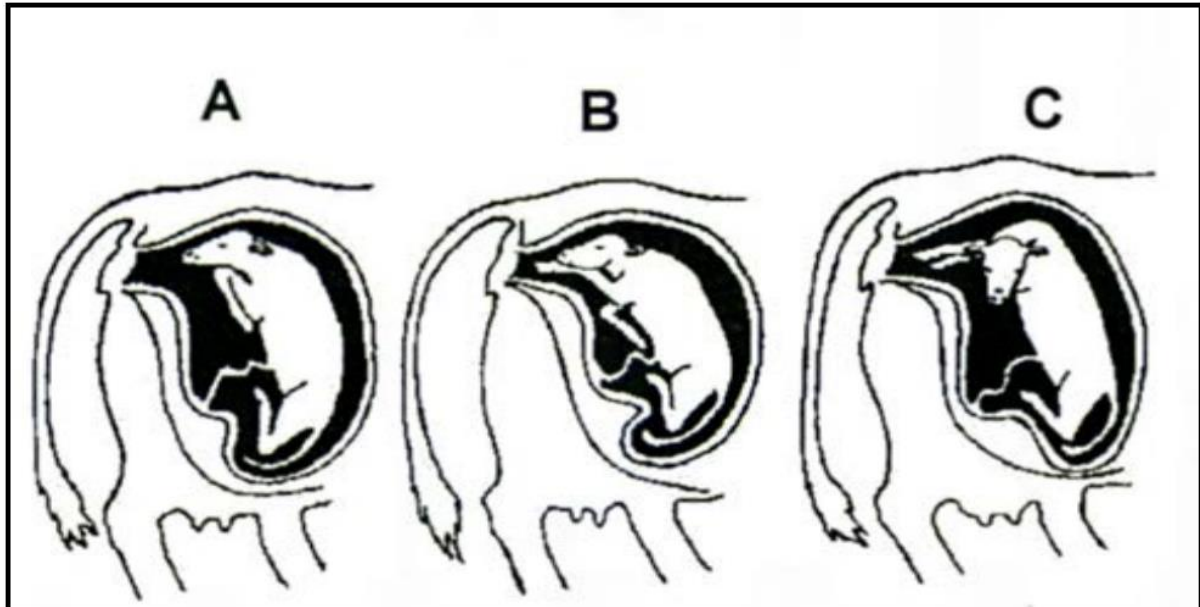
- 3.14.1. Identify the TWO types of twins in DIAGRAMS A and B. (2)
- 3.14.2. Motivate the answer to QUESTION 3.3.1. (2)
- 3.14.3. Name the process that takes place in DIAGRAM B to produce this type of twins. (1)
- 3.14.4. Give ONE reason why the twins in DIAGRAM A will probably NOT be of the same gender. (1)
- 3.14.5. Name THREE factors that are responsible for the occurrence of multiple births. (3)

[9]

3.15. Foetal position

Activity 18

Calves that are incorrectly positioned before and during the time of parturition will cause difficult calving.



3.15.1. Refer to the pictures of foetal positions (**A–C**) above and identify the parturition stage. (1)

3.15.2. Give the correct scientific name for the calving difficulty that might be caused by foetal positions **A**, **B** and **C**. (1)

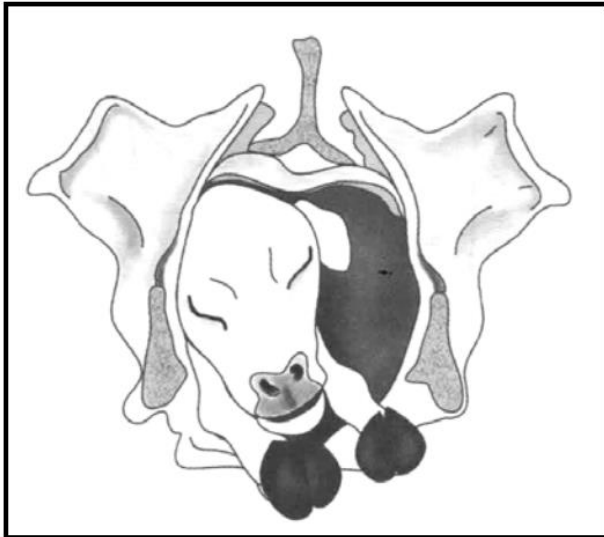
3.15.3. Suggest TWO actions that a farmer can take to save both the calf and the cow during calving difficulty. (2)

[4]

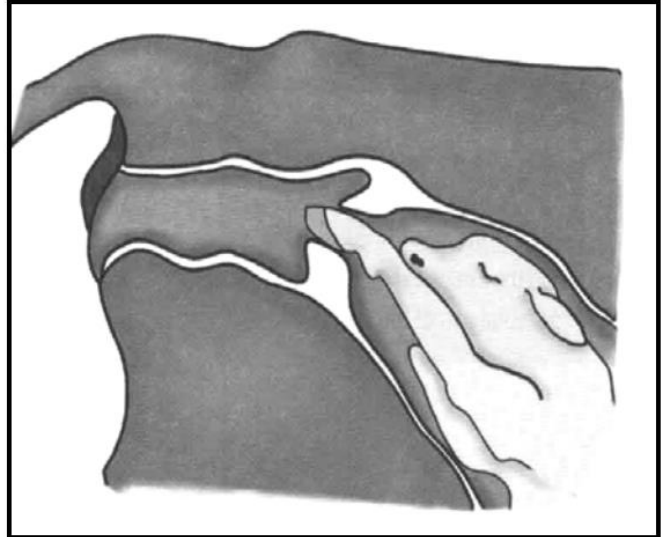
3.16. Embryo development

Activity 19

Pictures **A** and **B** below represent some stages of parturition in cattle.



A



B

3.16.1. Name the stages of parturition in picture **A** and picture **B**. (2)

3.16.2. Identify, in picture **A** or **B**, the incorrect positioning of the calf. Give a reason for the answer. (2)

3.16.3. Which picture (**A** or **B**) corresponds to the following activities?

(a) Oxytocin is released to initiate contractions. (1)

(b) Contractions occur every two minutes. (1)

(c) The umbilical cord breaks and the calf starts breathing. (1)

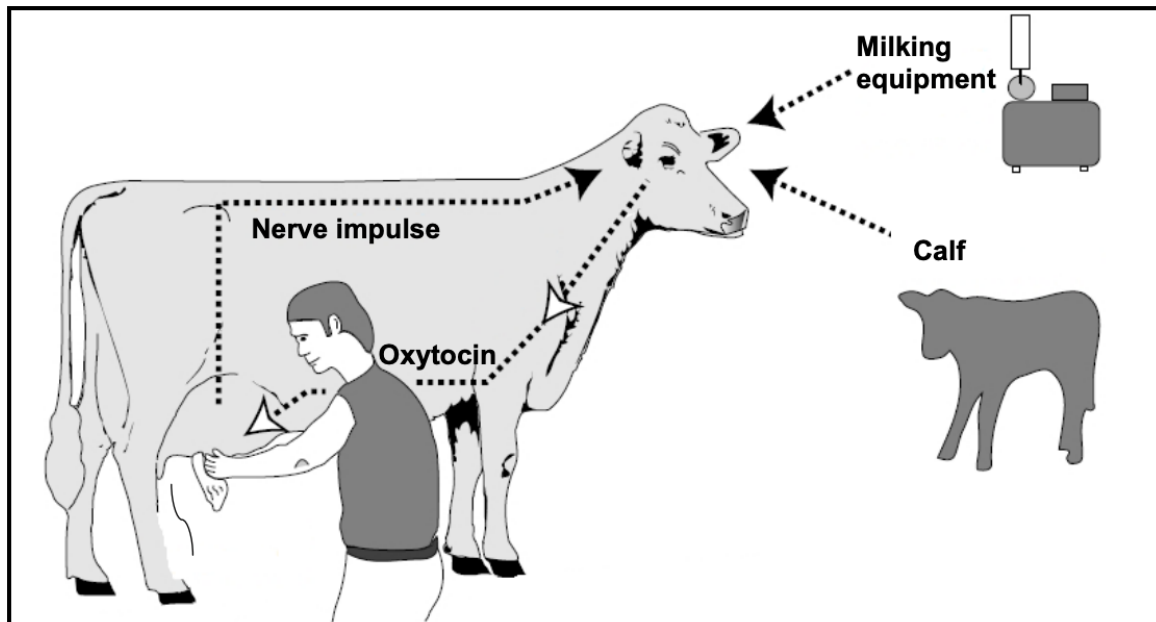
3.16.4. There are noticeable behavioural changes in the cow during stage **B**. Name THREE of these changes. (3)

[10]

3.17. Milk production/Lactation

Activity 20

The picture below represents a process that takes place in cows.



3.17.1. Identify the process in the picture above. (1)

3.17.2. Identify THREE visible stimuli in the picture above that activate the process in QUESTION 3.17.1. (3)

3.17.3. Name the hormone responsible for the contractions of the glandular cavity in the process above. (1)

3.17.4. Name the reproductive process which lasts 282 days in cattle and which precedes the process shown above. (1)

[6]

3.18. Milk ejection

Activity 21

Milk ejection is initiated by the stimulation of the central nervous system, which is brought about by the milking action of the milker. The udder must be healthy and needs to be observed at all times to ensure optimal milk production.

3.18.1. Give TWO stimuli initiated by the milker during the milking process. (2)

3.18.2. Name the hormone responsible for milk ejection. (1)

3.18.3. What hormone inhibits milk ejection? (1)

3.18.4. State the bacterial disease that affects the udder. (1) **[5]**

3.19. The importance of the aspects of embryo transfer

Activity 22

State the importance of EACH of the aspects below in embryo transfer:

- 3.19.1. Superovulation (1)
 - 3.19.2. Embryo flushing (1)
 - 3.19.3. Donor cow (1)
 - 3.19.4. Recipient cow (1)
- [4]**

3.20. Nuclear transfer

Activity 23

In nuclear transfer (cloning), the nucleus of a somatic cell from a superior animal is transferred to an enucleated egg cell.

- 3.20.1. State the importance of nuclear transfer for the following:
 - (a) Farmer
 - (b) Veterinarian services (2)
 - 3.20.2. Name TWO disadvantages of nuclear transfer. (2)
- [4]**

TOTAL SECTION C:

GRAND TOTAL: