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Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P1

NOVEMBER 2011

MARKS: 150

TIME: 2½ hours

This question paper consists of 16 pages and 1 answer sheet.

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. SECTION A (QUESTION 1) must be answered on the attached ANSWER SHEET.
3. SECTION B (QUESTIONS 2 to 4) must be answered in the ANSWER BOOK.
4. Start EACH question from SECTION B on a NEW page.
5. Read ALL the questions carefully and answer only what is asked.
6. Number the answers correctly according to the numbering system used in this question paper.
7. Place your ANSWER SHEET for SECTION A (QUESTION 1) inside your ANSWER BOOK.
8. Non-programmable calculators may be used.
9. Write neatly and legibly.

SECTION A**QUESTION 1**

- 1.1 Various options are provided as possible answers to the following questions. Choose the answer and make a cross (X) in the block (A–D) next to the question number (1.1.1–1.1.10) on the attached ANSWER SHEET. NO marks will be allocated if more than one cross (X) appears for an answer.

Example:

1.1.11	<input checked="" type="checkbox"/>	A	B	C	D
--------	-------------------------------------	---	---	---	---

- 1.1.1 Secretion of a digestive juice that contains an enzyme, amylase, secreted in the small intestine is associated with the ... which is an accessory organ of the alimentary canal.
- A liver
B salivary gland
C pancreas
D intestinal gland
- 1.1.2 Wasting disease in cattle is caused by a shortage of ...
- A zinc.
B cobalt.
C iron.
D copper.
- 1.1.3 ONE of the following feeds is an example of a protein-rich concentrate:
- A Soybean oilcake meal
B Soybean hay
C Yellow-maize meal
D Silage
- 1.1.4 The ... has finger-like protrusions called papillae that act as heating rods for temperature control.
- A omasum
B abomasum
C small intestine
D rumen

1.1.5 The Zulu people's system of building kraals from the branches of acacia thorn trees, forms part of a system called the ... knowledge system.

- A subsistence
- B extensive
- C intensive
- D indigenous

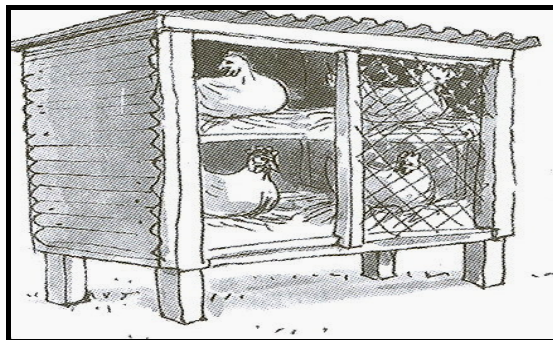
1.1.6 The following tool is used to handle large animals, such as cattle, which are stubborn and resistant to move in a handling facility:

- A Burdizzo
- B Prodder
- C Dehorning iron
- D Dosing gun

1.1.7 It is important to do ONE of the following when working with animals in a crush:

- A Be vigilant and aware of safety
- B Use dogs to calm the cattle
- C Whistle loudly
- D Make sudden movements

1.1.8 The illustrated structure below has been designed for usage above ground mainly for ONE of the following reasons:



- A Protection against wind
- B Removal of polluted air
- C To support adequate bedding
- D Prevention from infection by soil-borne organisms

1.1.9 Foot-and-mouth disease symptoms are common in ONE of the following animal species:

- A Horses
- B Poultry
- C Cattle
- D Dogs

1.1.10 The hormone which is released from a gland in the brain responsible for the milk let-down reflex:

- A Oxytocin
- B Oestrogen
- C FSH
- D Progesterone

(10 x 2) (20)

1.2 In the table below a description and TWO possible answers are given. Decide whether the description in COLUMN B relates to A only, B only, both A and B or NONE of the answers in COLUMN A and make a cross (X) in the block (A–D) next to the question number (1.2.1–1.2.5) on the attached ANSWER SHEET.

Example:

COLUMN A		COLUMN B
A:	lucerne hay	the feed that is the most cost-effective source of carbohydrates for livestock
B:	oatmeal	

Answer:

The statement refers to:			
ONLY A	ONLY B	A AND B	NONE
A	B	C	D

COLUMN A		COLUMN B
1.2.1	A: molasses	increase(s) the palatability and digestibility of poor roughage
	B: hormones	
1.2.2	A: shelter	protects livestock against cold, rain and strong wind
	B: shed	
1.2.3	A: chorion	protects the embryo against shock and serves as a lubricant during calving
	B: amnion	
1.2.4	A: stud breeder	utilise the beneficial effect of cross-breeding in livestock
	B: commercial farmer	
1.2.5	A: heart water	the cause of this disease is an internal parasite found in the digestive system of poultry
	B: gall sickness	

(5 x 2) (10)

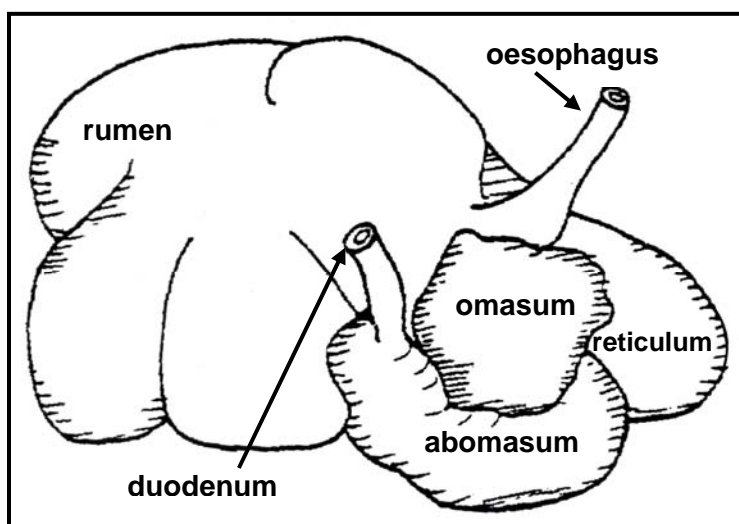
- 1.3 Give ONE word/term/phrase for each of the following descriptions. Write only the word/term/phrase next to the question number (1.3.1–1.3.5) on the attached ANSWER SHEET.
- 1.3.1 The true, glandular stomach of a fowl, in which enzymatic and hydrochloric acid digestion of food takes place
- 1.3.2 The gross energy value of a feed minus the value of energy that is lost in the manure
- 1.3.3 The instrument used to inject the semen into the uterus of the female animal during artificial insemination
- 1.3.4 The process during which the primary male sex cells undergo metamorphosis in the testis and develop into sperm cells
- 1.3.5 The administration of a vaccine into the animal body using a syringe and a needle (5 x 2) (10)
- 1.4 Change the UNDERLINED WORD(S) in each of the following statements to make them TRUE. Write the appropriate word(s) next to the question number (1.4.1–1.4.5) on the attached ANSWER SHEET.
- 1.4.1 The first two compartments of a ruminant stomach are collectively known as a true stomach.
- 1.4.2 For the highest sustainable production, stock farmers need to make minimal use of the natural resources available.
- 1.4.3 A vitamin A supplement is injected into ewes before mating to ensure a higher rate of copulation that results in more ova being released.
- 1.4.4 When animals are moved next to the road green flags are used to warn the road users.
- 1.4.5 Symbiotic bacteria secrete toxins that cause diseases in animals. (5 x 1) (5)
- TOTAL SECTION A: 45**

SECTION B

Start this question on a NEW page.

QUESTION 2: ANIMAL NUTRITION

2.1 The diagram below represents a compound stomach of a farm animal.



2.1.1 Select ONE example of a farm animal with a stomach similar to the one above from the following list:

goat; horse; ostrich; cattle; pig; poultry
--

(1)

2.1.2 Name the part of the stomach where swallowed food first gathers.

(1)

2.1.3 Give TWO reasons why the reticulum, rumen and omasum are normally underdeveloped in young suckling animals.

(2)

2.1.4 Explain why farm animals with the type of stomach shown above can be supplemented with non-protein nitrogen substances.

(2)

2.2 A cow was fed with oatmeal as part of the feeding programme. The oatmeal contains 71% of total digestible nutrients (TDN) and 9% of digestible protein (DP).

2.2.1 Classify oatmeal as a concentrate or as roughage.

(1)

2.2.2 Name a characteristic from the data above to support your answer to QUESTION 2.2.1.

(1)

2.2.3 Calculate, by using an appropriate formula, the nutritive ratio (NR) of oatmeal.

(4)

2.2.4 Give the appropriate production purpose of using oatmeal in animal nutrition. Motivate your answer. (2)

2.2.5 Calculate the ratio in which oatmeal and peanut oilcake meal need to be mixed to get a ration mix with a digestible protein (DP) value of 16%. Peanut oilcake meal has a digestible protein value of 32%. (5)

2.3 Feedlot industries have boomed in most of the outskirts of big cities. The productivity of a feedlot depends on the number of animals fattened and sent to the abattoirs.



2.3.1 Name the type of grazing system utilised in the above feedlot. (1)

2.3.2 Compare the protein requirements of mature and young animals for growth over a period of production. (2)

2.3.3 State a way in which the farmer possibly improved the digestibility of the feed/ration of the cattle in this feedlot. (1)

2.3.4 State TWO important functions of carbohydrates in the body. (2)

2.3.5 'The quality of protein in a ration of ruminant animals is less important than that of non-ruminant animals in a feedlot system.' Justify this statement. (2)

2.4 Chemical substances to improve growth are used in feedlots for beef and broiler production to increase the growth rate. Identify the most applicable chemical substance that can be administered to the animals or the organ in EACH of the following cases:

2.4.1 A substance administered to cattle in feedlots to calm them down (1)

2.4.2 The chemical that influences secretion of thyroxin which in turn influences the metabolism of an animal (1)

2.4.3 Name the specific organ or position on the animal body where growth hormones in a round pellet formulation are usually implanted. (1)

2.5 The two tables below show the biological values (BV) of high- and low-quality protein sources grouped as A and B.

A: HIGH BV SOURCES	
PROTEIN SOURCE	BV
Milk protein	95
Fish protein	90
Beef protein	76
B: LOW BV SOURCES	
PROTEIN SOURCE	BV
Maize	60
Wheat	67
Soybean	75

2.5.1 Define the term *biological value (BV)*. (2)

2.5.2 Name the specific type of protein that is accepted as a comparative protein. (1)

2.5.3 Evaluate the suitability of fish meal as a protein source by referring to the data above. (2)
[35]

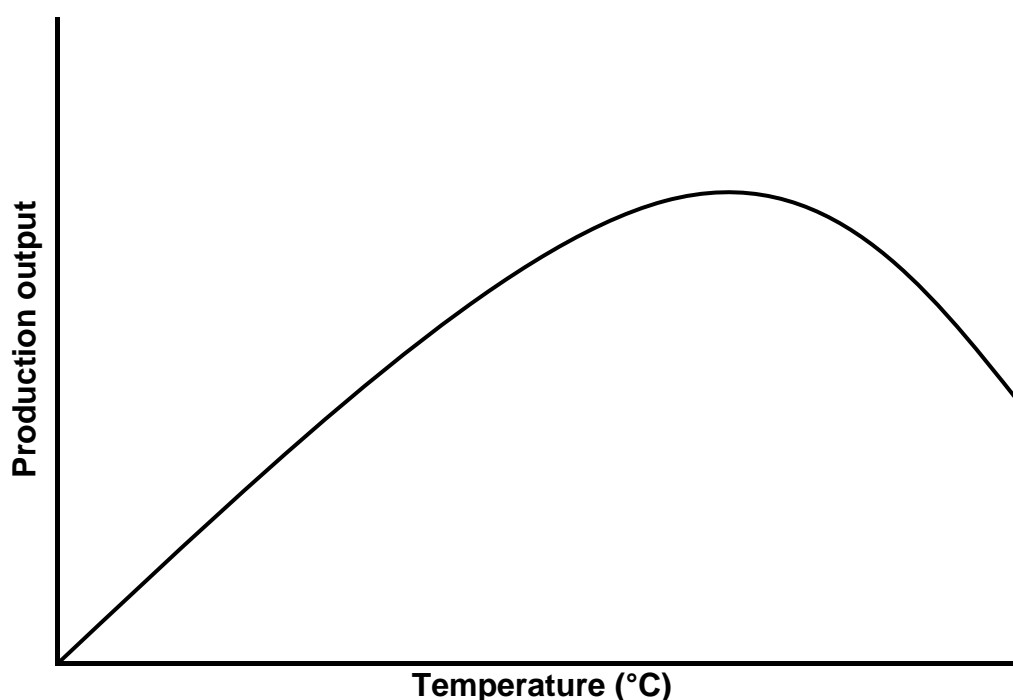
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QUESTION 3: ANIMAL PRODUCTION

3.1

Environmental control, breeding, nutrition and management are the main factors that influence the production output in any animal production system. Most farm animals are homoeothermic but react differently to temperature variations. Some ruminants have a lower optimum temperature and can produce normally at lower temperatures. This ability is related to the micro-organisms in their compound stomach.

The graph below represents the effect of temperature on production output in an animal production unit.



The table below illustrates the optimum temperature and heat production for farm animals performing at the most economic production levels.

FARM ANIMALS	OPTIMUM TEMPERATURE (°C)	HEAT PRODUCTION (kJ/h)
Dairy cows	10–15	2 500
Pigs	15–25	800

- 3.1.1 Describe the relationship between production output and temperature as reflected in the graph above. (2)
- 3.1.2 Give TWO reasons for dairy cows having a lower optimum temperature compared to pigs by referring to the data in the table above. (2)
- 3.1.3 Discuss TWO possible measures that the farmer can take to protect animals against the effects of extreme temperatures, as shown in the graph above. (4)

- 3.2 Losses arising from injury, bruising and death amongst cattle in transit between the farm and the abattoir are substantial. This must be avoided for legal, anti-animal cruelty and financial reasons. It is therefore imperative that cattle be handled sympathetically as much as possible to minimise these losses.

The diagrams below represent modes of transporting animals, marked **A** and **B**.

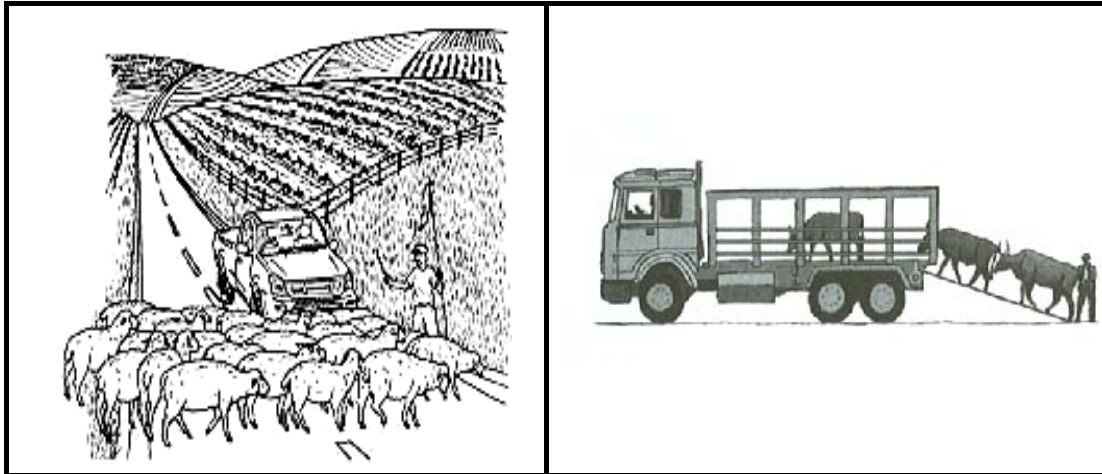


DIAGRAM A

DIAGRAM B

- 3.2.1 With reference to DIAGRAM B, give FIVE basic aspects to be considered when transporting beef cattle to the abattoir. (5)
- 3.2.2 Name TWO tools that must be used when animals are moved along the road, as illustrated in DIAGRAM A. (2)

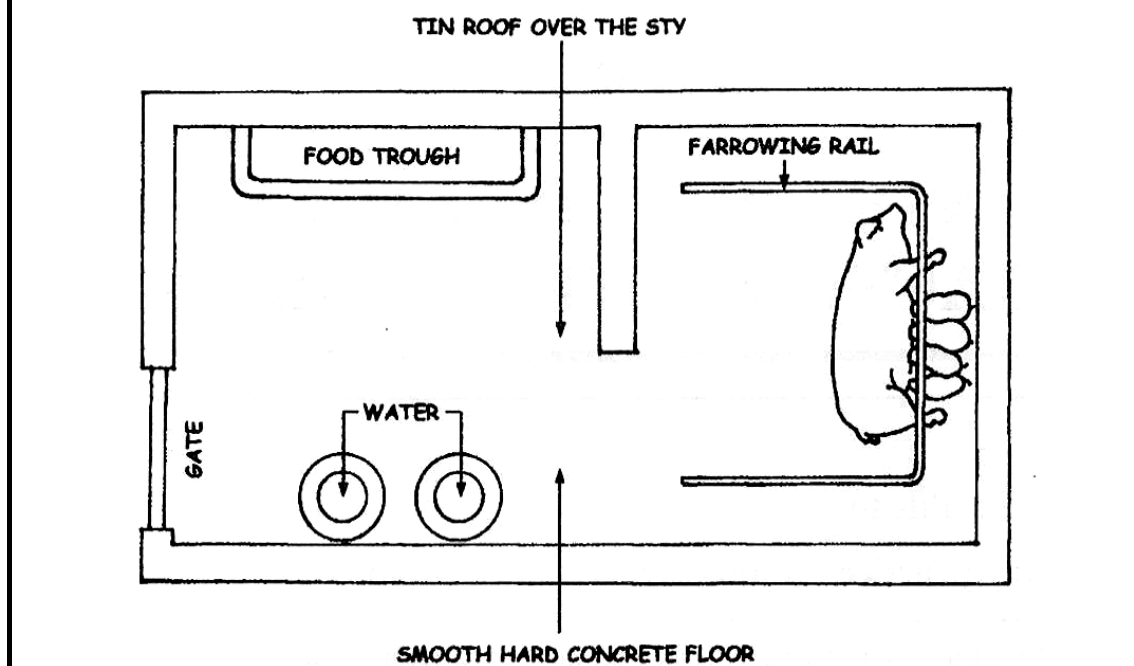
3.3

'Efficient use of feed and optimising growth are the main ingredients for maximising profits on pig farms,' says Dr Peter Evans.

Growth rate and feed intake are closely linked. Feed intake is a function of social and environmental comfort, healthy pigs, high-quality rations and good systems and equipment.

Growth rate is measured in grams per day. The average daily gain (ADG) is determined by subtracting the initial weight from the final weight and dividing this by the number of days of monitoring.

[Adapted: *Farming SA*, April 2010]



- 3.3.1 Indicate the system of production practised in the illustrated diagram above. (1)
- 3.3.2 Identify TWO factors that will influence the growth rate of pigs in the above-mentioned case study. (2)
- 3.3.3 Select the measure which is used against the following. Write only the appropriate name, chosen from the diagram above.
- (a) Protection against rain (1)
- (b) Protection of the litter (1)

- 3.3.4 Calculate the average daily gain (ADG) for the following pigs by using the data in the table below and the information on the previous page. Show ALL your calculations.

PIG	INITIAL WEIGHT	FINAL WEIGHT	DAYS
A	46 kg	78 kg	35
B	48 kg	75 kg	35

(4)

- 3.3.5 Select the pig that would contribute more to the profit of the pig production system.

(1)

3.4

THE FUTURE OF SOUTH AFRICAN DAIRY INDUSTRIES

Big supermarkets' shelves had very low stocks of dairy products, especially long-life milk, in 2007. This has been attributed to the general shortage of milk products worldwide, drought, increased demand for dairy products and low producer prices locally. The data on milk production and average price trends for the years 2005 to 2010 is given below.

YEAR	PRODUCTION ('000 LITRES)	PRICE (CENTS/LITRE)
2005	1 500	820
2006	1 700	840
2007	1 900	860
2008	2 100	880
2009	2 100	840
2010	1 900	820

- 3.4.1 Draw a bar graph to compare milk production and the price of milk during the above time period.
- 3.4.2 From the milk production data in the table above, give the milk production tendency during the period 2005 to 2009
- 3.4.3 Suggest TWO factors from the data above, that can cause dairy farmers to quit this industry.

(6)

(2)

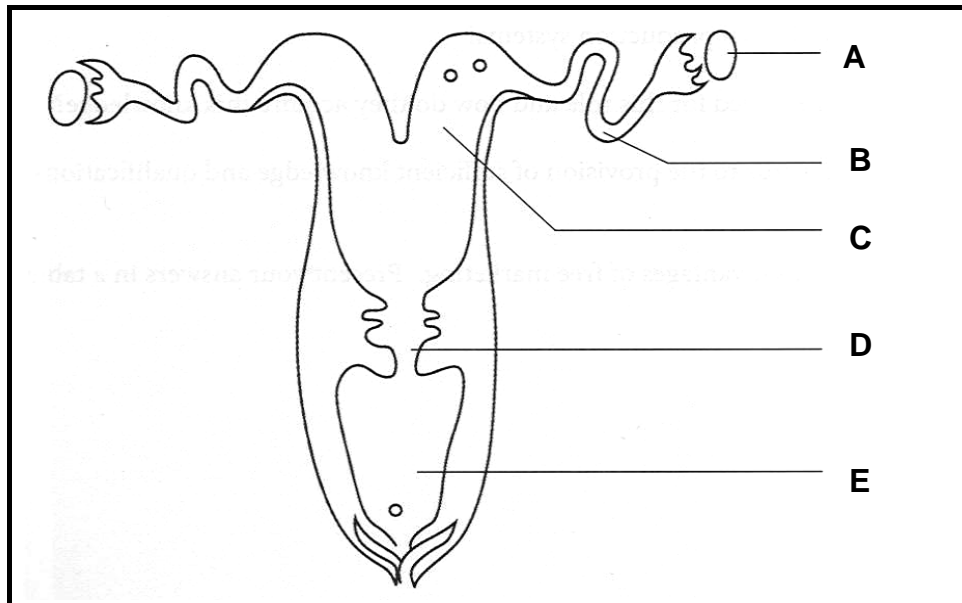
(2)

[35]

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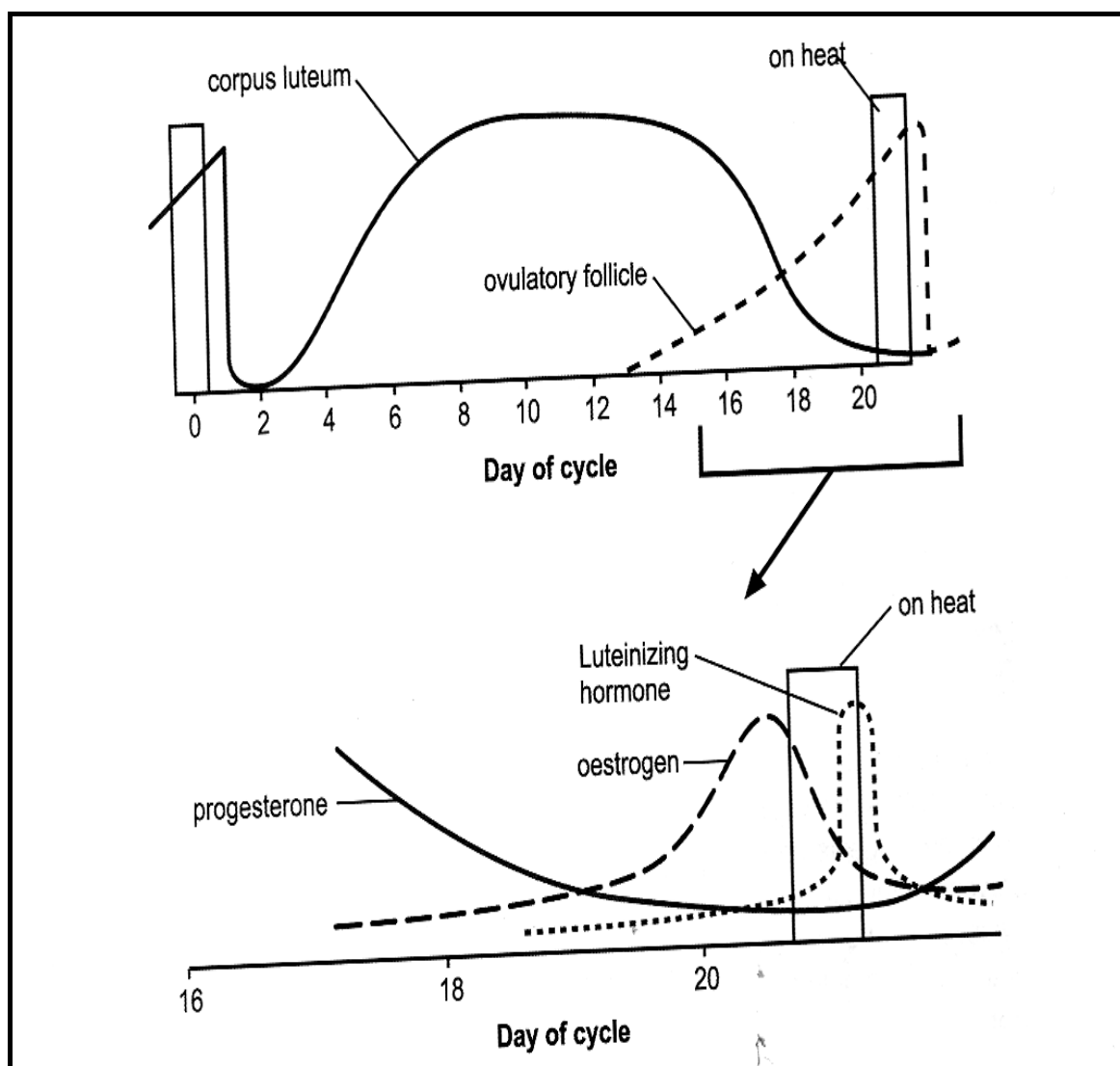
QUESTION 4: ANIMAL REPRODUCTION, PROTECTION AND CONTROL

4.1 The diagram below illustrates the female sex organs of a cow.



- 4.1.1 Identify TWO labels (**A–E**) that represent secondary sex organs from the illustrated diagram above. (2)
- 4.1.2 Indicate the labelled part (**A–E**) where the following will take place:
- (a) Site of fertilisation (1)
 - (b) Prevention of microbial infection of the uterus during pregnancy (1)
- 4.1.3 Briefly describe the function of the part labelled **D** in the diagram above. (1)
- 4.1.4 Identify the part of the fallopian tube that is responsible for catching the released ovum and name TWO adaptations for this purpose. (3)

- 4.2 The graphs below illustrate the hormonal changes in a typical oestrus cycle of a farm animal.



- 4.2.1 Identify the day when ovulation will take place. (1)
- 4.2.2 Indicate TWO hormones responsible for the process of ovulation. (2)
- 4.2.3 State TWO functions of each of the following hormones at their peak levels:
- (a) Luteinising hormone (2)
- (b) Oestrogen (2)
- 4.2.4 Name the change that occurs in the progesterone levels after successful mating. Explain the TWO effects of this change. (3)

4.3 The first milk produced by the cow, within the first three days of lactation, differs from the normal milk produced by the cow thereafter.

4.3.1 Identify the first milk released and describe TWO ways how it differs from the normal milk produced after three days. (3)

4.3.2 Name TWO negative impacts that would occur if the new-born calf does not receive this milk. (2)

4.4 Rift Valley fever is a disease that severely affected most farmers in the Free State due to high rainfall between January and February in 2010. The pathogen is transmitted by mosquitoes amongst the herds of livestock. According to Andre Ferreira, the chairperson of the Free State Red Meat Producers Organisation (RPO), its outbreak befits to be classified as an epidemic disease.

Thirty eight farms were confirmed infected and affected, nearly 100 000 animals in the same province were potentially infected whilst 23 000 animals were confirmed as affected. Farmers were warned to limit the movement of animals and dip them regularly with super methrine-based substances against mosquitoes. Human beings can be infected through the handling of meat, blood and organs of infected animals, as well as by drinking milk of the infected animals.

[Source: *Farmers' Weekly*, 9 April 2010]

4.4.1 Name the type of micro-organism that causes Rift Valley fever. (1)

4.4.2 Identify the specific vector that carries this pathogen. (1)

4.4.3 Rift Valley fever can be classified as an epidemic disease. Justify your answer by giving TWO reasons that support this statement. (2)

4.4.4 State TWO measures that farmers can apply to prevent the further outbreak of this disease. (2)

4.5 Mites are closely related to ticks, but are much smaller and most cannot be seen by the naked eye. Mites are found on less hairy parts on the bodies of cattle, sheep, goats, pigs and horses.

4.5.1 Give a reason from the above extract to proof that mites are external parasites. (1)

4.5.2 Identify TWO non-ruminants in the extract that are affected by mites. (2)

4.5.3 Mites cause a proclaimed disease called mange. Explain a characteristic of this disease and name TWO responsibilities of the farmer in this regard. (3)

[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150

ANSWER SHEET**SECTION A****CENTRE NUMBER:**

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EXAMINATION NUMBER:

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QUESTION 1.1

1.1.1	A	B	C	D
1.1.2	A	B	C	D
1.1.3	A	B	C	D
1.1.4	A	B	C	D
1.1.5	A	B	C	D
1.1.6	A	B	C	D
1.1.7	A	B	C	D
1.1.8	A	B	C	D
1.1.9	A	B	C	D
1.1.10	A	B	C	D

(10 x 2) (20)

QUESTION 1.2

	ONLY A	ONLY B	A and B	NONE
1.2.1	A	B	C	D
1.2.2	A	B	C	D
1.2.3	A	B	C	D
1.2.4	A	B	C	D
1.2.5	A	B	C	D

(5 x 2) (10)

QUESTION 1.3

1.3.1 _____

1.3.2 _____

1.3.3 _____

1.3.4 _____

1.3.5 _____

(5 x 2) (10)

QUESTION 1.4

1.4.1 _____

1.4.2 _____

1.4.3 _____

1.4.4 _____

1.4.5 _____

(5 x 1) (5)

TOTAL SECTION A: 45