Education and Sport Development

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NORTH WEST PROVINCE

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P1

SEPTEMBER 2019

MARKS: 150

TIME: 2½ hours

This question paper consists of 13 pages.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of TWO sections, namely SECTION A and SECTION B.
2. Answer ALL the questions in the ANSWER BOOK.
3. Start EACH question on a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. You may use a non-programmable calculator.
6. Show ALL calculations, including formulae, where applicable.
7. 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 write only the letter (Aï D) next to the question number (1.1.1ï 1.1.10) in the ANSWER BOOK, for example 1.1.11 A.

1.1.1 Villi are structures found in the é

A stomach.
B oesophgus.
C small intestine.
D large intestine.

1.1.2 This process requires energy for the absorption of nutrients in the alimentary canal of farm animals:

A Diffusion
B Osmosis
C Passive absorption
D Active absorption

1.1.3 The *Biological Value* is an index referring to the ...

A digestibility of protein.
B nutritive ratio of a ration.
C amino acid composition of protein.
D quantity of NPN in a ration.

1.1.4 A feed with a high fibre content can only be digested by the following farm animals:

(i) Cattle, sheep and pigs
(ii) Sheep, goats and cattle
(iii) Poultry, geese and dairy cattle
(iv) Cattle, horses and pigs

Choose the CORRECT combination:

A (ii) only
B (ii) and (iv)
C (i) only
D (i), (ii) and (iv)

1.1.5 The life cycle of a one host tick is illustrated by:

A The eggs hatch, form larvae and drop from cattle
B The eggs, larvae and nymphs develop on the same animal
C The larvae and nymphs live on an intermediate host
D The nymphs develop into adults on various animals

1.1.6 The following statement is applicable to an intensive cattle production system:

A The environment is not controlled
B Pastures are harvested and fed to animals
C Rotational grazing is applied
D The system is not capital and labour intensive

1.1.7 As the environmental temperature decreases, cattle tend to é

A eat less and drink less water.
B eat more and drink less water.
C eat less and drink more water.
D eat more and drink more water.

1.1.8 A housing system for pigs includes the following:

(i) Drinkers in the pens with cement floors
(ii) Different age groups in the same pen
(iii) Bedding on cement floors
(iv) Easy to clean pens with protection against cold conditions

Choose the CORRECT combination:

A (i), (iii) and (iv)
B (i), (ii) and (iv)
C (i), (ii) and (iii)
D (ii), (iii) and (iv)

1.1.9 The process where a sow produces 10 to 25 ova during one oestrus cycle is called é

A monotocus.
B ovulation.
C superovulation.
D anovulation.

1.1.10 The hormone é inhibits the release of milk from the udder.

A progesterone
B oxytocin
C prolactin
D adrenalin (10 x 2) (20)

1.2 Indicate whether each of the descriptions in COLUMN B applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN A. Write **A only**, **B only**, **both A and B** or **none** next to the question number (1.2.1ï 1.2.5) in the ANSWER BOOK, e.a. 1.2.6 B only.

COLUMN A			COLUMN B
1.2.1	A	Unsaturated	A condition where farm animals show excessive signs of water shortage
	B	Dehydration	
1.2.2	A	Nett energy	Energy required to keep farm animals alive
	B	Gross energy	
1.2.3	A	Ointment	Chemicals that kill ticks and mites in farm animals
	B	Anthelmintic	
1.2.4	A	Copulate	A bull that shows sexual interest in cows during oestrus
	B	Libido	
1.2.5	A	Corpus luteum	A structure that develops in the ovary
	B	Follicle	

(5 x 2) (10)

Give ONE word/term for EACH of the following descriptions. Write only the word/term next to the question numbers (1.3.1ï 1.3.5) in the ANSWER BOOK.

1.3.1 A plan showing the balance between the quantity of feeds available on the farm and the real feed requirements of the farm animals

1.3.2 The production system where broilers are kept in a deep litter house

1.3.3 Cells responsible for the nutrition of sperm cells in bulls

1.3.4 The specific part in the reproductive canal of a cow where fertilisation takes place

1.3.5 The structure that attaches the embryo to the uterus (5 x 2) (10)

1.4 Change the UNDERLINED WORD(S) in each of the following statements to make them TRUE. Write only the answer next to the question numbers (1.4.1ï 1.4.5) in the ANSWER BOOK.

1.4.1 The semi-liquid acidic grey mass formed after mechanical digestion is called <u>pulp</u>.

1.4.2 Cattle have <u>aerodynamic</u> vision except for a small area directly behind the animal.

1.4.3 <u>Milk rosettes</u> refer to the small opening where milk passes through during sucking or the milking process.

1.4.4 <u>Oogenesis</u> refers to the process whereby male reproductive cells develop and mature in the seminal vesicles.

1.4.5 The <u>ampulla</u> is a funnel shape opening that catches the ovum during ovulation. (5 x 1) (5)

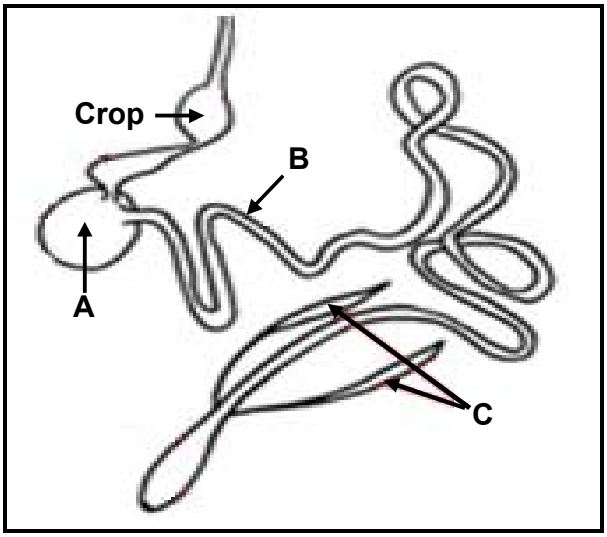
TOTAL SECTION A: 45

SECTION B

QUESTION 2: ANIMAL NUTRITION

Start this question on a NEW page.

2.1 Below is a schematic representation of the alimentary canal of poultry.



2.1.1 Identify part **A** and **B**. (2)

2.1.2 Name the part of the fowl that fit the following descriptions:

(a) The joint opening of both the digestive- and urogenital canals (1)

(b) Where digestion of food by enzymes occurs (1)

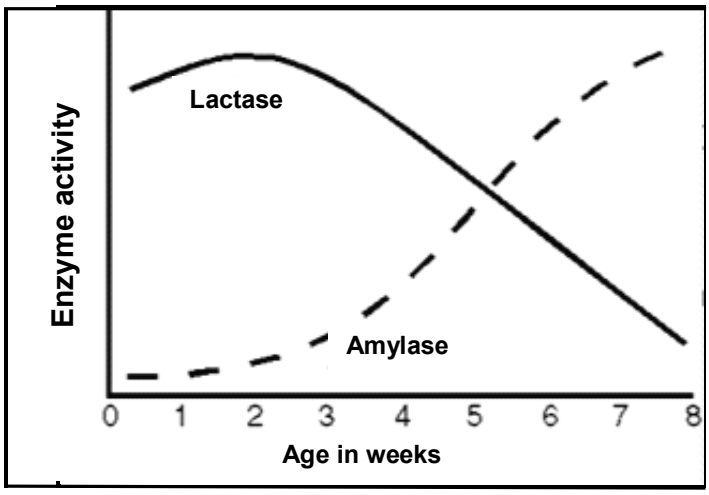
2.2 The TDN value of a feed is influenced by the energy content as energy is needed for the body functions of farm animals.

2.2.1 Give in full the abbreviation TDN. (1)

2.2.2 Define the term *Digestible Energy* (*DE*). (2)

2.2.3 Explain why the ME increases in farm animals with an increase in growth. (2)

2.3 The graph below indicates the relationship between enzyme lactase and amylase activity at different ages of weaner pigs.



2.3.1 Indicate the type of digestion where lactase and amylase are involved. (1)

2.3.2 Explain why the level of lactase enzyme activity is so high during the 2nd and 3rd week. (2)

2.3.3 Give TWO reasons why a protein concentrate is fed to young weaner pigs. (2)

2.4 The table below indicates a fodder flow plan for 50 beef cattle.

	MONTHS OF THE YEAR					
FEEDS	**JAN**	**FEB**	**MARCH**	**APRIL**	**MAY**	**JUNE**
Natural veld (ton)	160	160	140	120	80	60
Supplementary feed (kg/animal/day)	0	0	0	1	2	4
Feed requirements (ton)	140	140	140	140	140	140

2.4.1 Calculate the total shortage, without supplementation, for the whole period; January to June if surplus was stored in other months. (3)

2.4.2 Indicate:

(a) The month with the highest feed shotage (1)

(b) TWO sustainable measures a farmer could take to solve the problem of feed shortage (2)

2.4.3 Use the data from the table above to draw a combined bar graph of the feed available and the feed required for January to June. (6)

2.5 The table below represents feeds used by a farmer to compile a ration to fulfil the protein requirement of dairy cattle.

PROTEIN VALUE IN THE FINAL RATION (%)	FEED	DIGESTIBLE PROTEIN (DP) %
17	Maize meal	9
	Oli-cake-meal	44

2.5.1 Use the Pearson square method to balance the ration. (3)

2.5.2 Calculate the percentage of maize meal in this ration. (2)

2.6 The table below indicates nutrient levels of different feeds.

TYPE OF FEED	PROTEIN VALUE (%)	ENERGY VALUE (MJ ME)
Maize	9	14
Urea	75	0
Lucern	25	8
Barley	12	13

Identify, from the table above, the feed that is best:

2.6.1 as a natural source for young growing calves (1)

2.6.2 for finishing off old dairy cows (1)

2.6.3 available and cheaper energy source in the North West Province (1)

2.6.4 utilized as the most balanced feed (1)

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QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

Start this question on a NEW page.

3.1 Ticks are involved in the transfer of various diseases of farm animals and are responsible for various negative impacts on production.

3.1.1 List TWO other negative effects of ticks to a beef enterprise other than the transfer of diseases and loss of production. (2)

3.1.2 Classify, according to the life cycle the type of tick responsible for the following diseases in beef cattle:

(a) Redwater (1)

(b) Heartwater (1)

3.1.3 Name the fly species that attacks open wounds and tick bites in wool sheep. (1)

3.2 The illustrations below represent two production systems in dairy cattle.

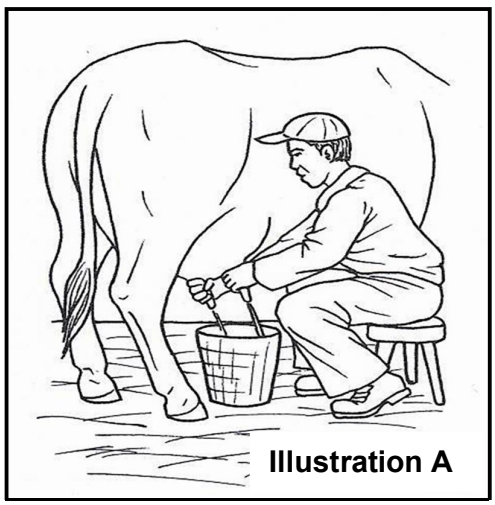


Illustration A

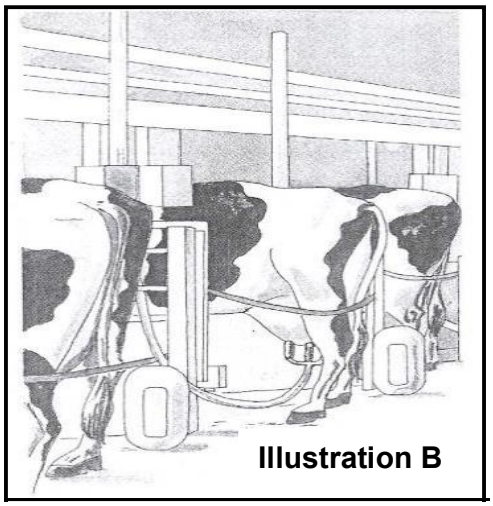


Illustration B

3.2.1 Identify the production system represented by **B**. (1)

3.2.2 Indicate the difference between production systems **A** and **B** in terms of production outputs. (2)

3.2.3 Provide ONE example each for production systems **A** and **B** applicable to beef cattle. (2)

3.3 Handling of animals when slaughtering, loading and transportation, have several effects on carcass and meat quality. Mortality, low carcasses yields, blood splashes, bruises, broken bones, skin blemishes and contamination are some of the effects of improper handling.

3.3.1 List, from the scenario above, TWO damages to the carcass that can occur as a result of improper and incorrect handling of farm animals. (2)

3.3.2 Name TWO requirements for loading ramps leading to the vehicles to load cattle for transportation. (2)

3.3.3 Give any TWO factors farmers should bear in mind with regard to the behaviour of cattle before handling them. (2)

3.4 The table below shows the yearly mortalities of livestock due to poor health.

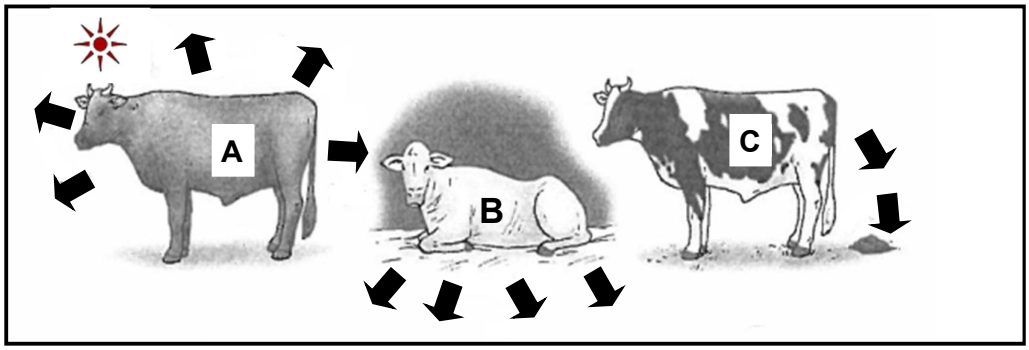
SPECIES	YOUNG ANIMALS	ADULT ANIMALS
Cattle	22%	6%
Sheep and goats	28%	11%
Poultry	70%	30%

3.4.1 List TWO symptoms of ill health in farm animals. (2)

3.4.2 Name TWO precautionary measures to be observed by the farmer before administering medication to livestock. (2)

3.4.3 Explain why only 6% of adult cattle die as compared to 22% of younger animals. (2)

3.5 The diagram below indicates the different ways in which farm animals loose heat.



3.5.1 Identify the different ways in which farm animals **B** and **C** loose heat energy. (2)

3.5.2 Name TWO signs of heat stress in farm animals. (2)

3.5.3 Suggest TWO management practices to reduce the heat stress in animal **A**. (2)

3.6 The table below shows information on farm animal diseases.

DISEASE	AGENT OF TRANSMISSION	KEY SYMPTOMS	TYPE OF ANIMAL AFFECTED/INFECTED
Rabies	**A**	Changes in their behaviour, grinding of teeth, aggression	Dogs
Anthrax	Bacteria	**B**	Farm animals
Anaplasmosis	**C**	High fever, restlessness, constipation, depression, sudden death	Farm animals
D	Fungus	Red, thick, scaly itchy ring like lesions	Cattle, sheep, pigs
Newcastle-disease	Virus	Respiratory distress, coughing, loss of appetite, sudden death	**E**

3.6.1 Refer to the table above and supply the missing information for the letters **A, B, C, D** and **E.** Write only the letters **(A–E)** and the answer in the ANSWERBOOK. (5)

3.6.2 Explain the role of the state to ensure good health in farm animals. (2)
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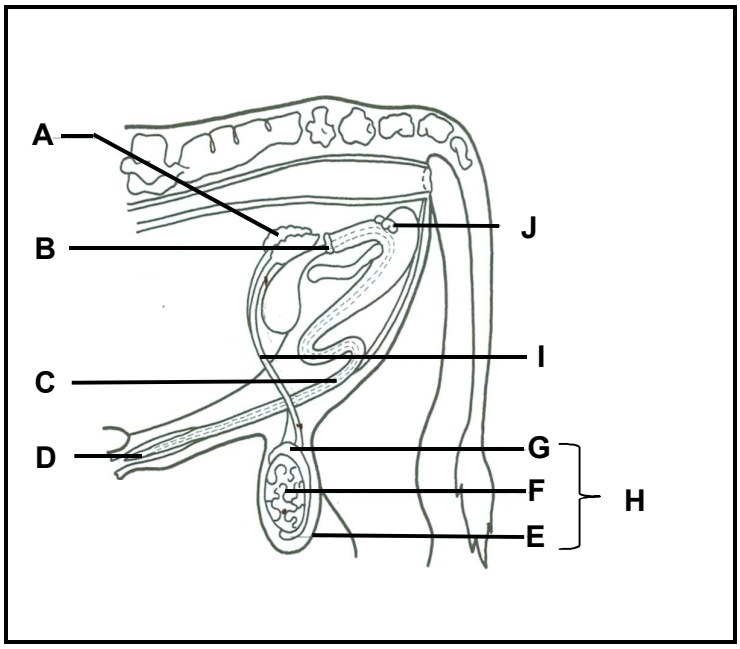
QUESTION 4: ANIMAL REPRODUCTION

Start this question on a NEW page.

4.1 The illustration below shows the reproductive system of a bull.



4.1.1 Identify the part labelled **I**. (1)

4.1.2 Provide a collective term for parts **A, B** and **J**. (1)

4.1.3 Give the letter of the part responsible for the secretion of a buffer. (1)

4.1.4 Name the condition that occurs in cattle if:

(a) Structure **H** remains in the body cavity of bulls (1)

(b) Structure **H** is also present in female animals (1)

4.1.5 Give the main function of structure **E**. (1)

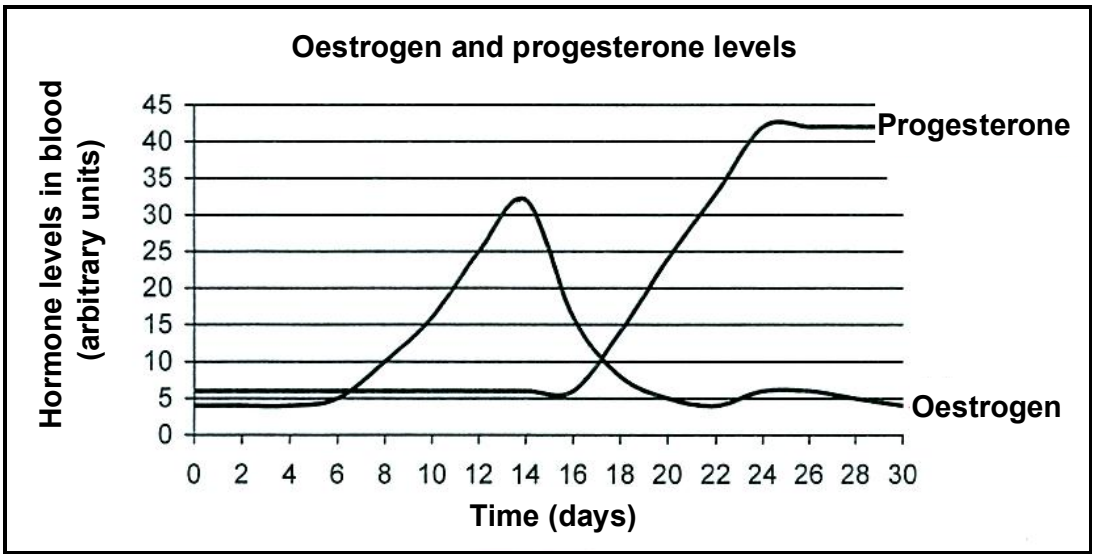
4.2 Successful reproduction entails knowledge of both the male and female reproductive systems and their proper functioning.

4.2.1 Distinguish between *sterility* and *infertility* in bulls. (2)

4.2.2 Explain the effect of nutrition on the reproduction potential of cows. (2)

4.2.3 Mention the part in cows where hypoplasia normally occurs. (1)

4.3 The representation below shows the levels of the hormones oestrogen and progesterone over time.



4.3.1 Identify the day when the oestrogen level was the highest. (1)

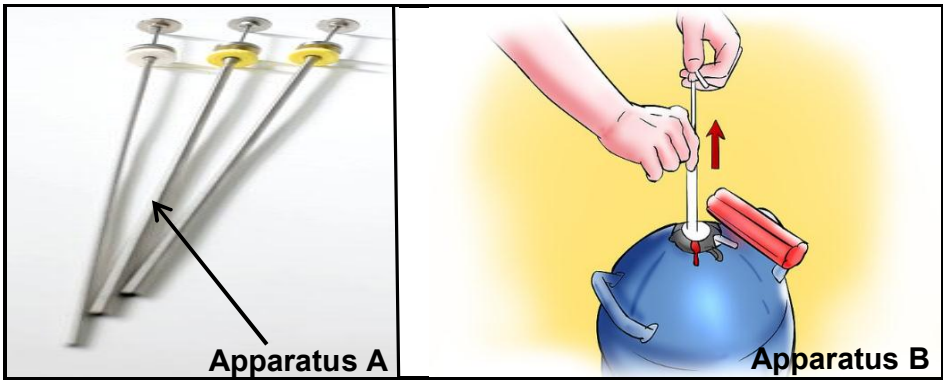
4.3.2 Proof with evidence, that the ovum was fertilized on day 26. (2)

4.3.3 Use the data in the representation above to predict the day when oestrogen will again reach peak levels if this cow is not pregnant. (1)

4.3.4 Give a reason for the answer in QUESTION 4.3.3. (1)

4.3.5 Indicate the hormone that works together with oestrogen, to facilitate the membrane to rapture and release the ovum during ovulation. (1)

4.4 Pictures of apparatus used during the process of artificial insemination (AI).



4.4.1 Identify apparatus **A** and **B**. (2)

4.4.2 Describe the concept *artificial insemination (AI).* (2)

4.4.3 Give the normal storage temperature of apparatus **B**. (1)

4.4.4 Explain the best time for insemination. (2)

4.5 Herd management includes the breeding and calving of cows. This means that farmers will attempt to let cows calve at least once a year.

4.5.1 Give the length of the gestation period of cows in days. (1)

4.5.2 If a cow was serviced in the beginning of March 2019, indicate the month when the farmer can expect the calf. (1)

4.5.3 Name the condition, especially in heifers, where they struggle to calve and need some assistance. (1)

4.5.4 Describe the term *colostrum.* (2)

4.6 Farmers use various techniques to improve reproduction in their enterprises. Below is a number of techniques that can be applied to accomplish these goals:

- Synchronisation
- Embryo-transfer
- Cloning

4.6.1 Choose, from the techniques above, the ONE that is best suited for EACH of the following:

(a) To bring a group of cows into oestrus at approximately the same time by using hormones (1)

(b) A viable embryo is removed from a donor cow (1)

(c) Somatic cells produce organisms that are genetic identical (1)

4.6.2 Give the purpose of synchronisation. (1)

4.6.3 List TWO disadvantages of the techniques mentioned above. (2)
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TOTAL SECTION B: 105
GRAND TOTAL: 150