EXAMINATION	NATIONAL SENIOR CERTIFICATE
GRADE	12
DATE	NOVEMBER 2024
SUBJECT	AGRICULTURAL SCIENCES
PAPER	1
MARK TOTAL	150
DURATION (HOURS)	2½
NUMBER OF PAGES	16

SOUTH AFRICAN COMPREHENSIVE ASSESSMENT INSTITUTE

SUID-AFRIKAANSE KOMPREHENSIEWE ASSESSERINGSINSTITUUT

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 make sure you answer only what is asked.
6. Number the answers according to the numbering system used in this question paper.
7. Staple your answer sheet for **SECTION A (QUESTION 1)** inside your **ANSWER BOOK**.
8. Write neatly and legibly, in **BLUE** pen only.
9. A non-programmable calculator may be used.
10. Show **ALL** calculations.

SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and make a cross (X) on the correct letter next to the question number (1.1.1 – 1.1.10) in the attached **ANSWER SHEET**, for example:

1.1.1	A	~~B~~	C	D

1.1.1 The … in fowl is responsible for the physical digestion.

A crop
B proventriculus
C caecum
D ventriculus (2)

1.1.2 It is important to feed roughage to a fully grown ruminant because it:

(i) prevents the accumulation of gases when grazing on lucerne
(ii) stimulates the development of the rumen
(iii) supplies bulkiness to the ration
(iv) ensures that digestion takes place properly

Choose the CORRECT combination:

A (i), (ii) and (iv)
B (i), (iii) and (iv)
C (i), (ii) and (iii)
D (ii), (iii) and (iv) (2)

1.1.3 During cellulose digestion in the rumen the end products are:

A acetic acid and propionic acid.
B butyric acid and amino acid.
C fatty acids and glycerol.
D propionic acid and glucose. (2)

1.1.4 The slightly alkaline succus entericus is secreted by the …

A liver
B crypts of Lieberkühn
C endocrine gland
D gall bladder (2)

1.1.5 The picture below illustrates ... as a reason for handling of farm animals.

A castration

B weighing

C trimming

D docking (2)

1.1.6 The following statements are TRUE regarding the use of foldable curtains in a broiler house:

(i) The effect of environmental temperature is controlled.
(ii) Efficient feed utilisation can be achieved.
(iii) It darkens the broiler house to increase feed consumption.
(iv) It is a necessary feature to reduce the effect of heat stress.

A (i), (ii) and (iii)

B (ii), (iii) and (iv)

C (i), (ii) and (iv)

D (i), (iii) and (iv) (2)

1.1.7 ONE of the following is correct regarding diseases that can be transmitted from animals to humans and vice versa.

A Infectious and zoonotic

B Non-infectious and zoonotic

C Non-infectious and chronic

D Infectious and metabolic (2)

1.1.8 … injections are introduced directly into the jugular vein.

A Intramuscular

B Intravenous

C Subcutaneous

D Intramammary (2)

1.1.9 … are the congenital defects in bulls leading to sterility.

A Prolapse and double cervical canal

B Cryptorchidism and an injured penis

C Sexual immaturity and diseases

D Hypoplasia and hermaphroditism (2)

1.1.10 The characteristic that is observed during the microscopic evaluation of quality of semen is …

A abnormalities

B volume

C colour

D density (2)

(10 x 2) = **[20]**

1.2 In the table below, a description and **TWO** possible answers are given. Indicate whether each of the following descriptions in **COLUMN B** applies to **A ONLY**, **B ONLY**, **BOTH A** and **B** or **NONE** of the items in **COLUMN A** and make a cross (**X**) in the appropriate block next to the question numbers (1.2.1 – 1.2.5) in the attached **ANSWER SHEET**.

Example:

COLUMN A		COLUMN B
A	Maize meal	An example of a concentrate that is rich in protein
B	Bone meal	

Answer:

The statement refers to:			
A ONLY	**B ONLY**	**BOTH**	**NONE**
	X		

COLUMN A			COLUMN B
1.2.1	A	Oatmeal	Contains a small percentage of total digestible nutrients and a high crude fibre content
	B	Oat straw	
1.2.2	A	Considers the most affordable feeding cost	Feed flow programme for a group of farm animals
	B	Focuses on the herd's nutritional needs	
1.2.3	A	Dipping	Chemical method to control parasites
	B	Dosing	
1.2.4	A	Anaemia	A metabolic disease that can be controlled with iron supplements
	B	Milk fever	
1.2.5	A	Oxytocin	Secreted by the corpus luteum in the ovary
	B	Follicle-stimulating hormone	

(5 × 2) = **[10]**

1.3 Give the **CORRECT AGRICULTURAL TERM** for each of the following descriptions. Write only the word/term next to the question number (1.3.1 – 1.3.5) in the attached **ANSWER SHEET**, for example, 1.3.6 Bile.

1.3.1 The regurgitated bolus that is transported back to the mouth by means of retro-peristalsis

1.3.2 A permanent handling facility used to restrict the movement of a bull and lead it towards a loading ramp

1.3.3 The stage of pregnancy characterised by cell differentiation into tissues, organs, and systems

1.3.4 The process during which a spermatogonium develops into a spermatozoon

1.3.5 Condition that causes the vagina to protrude from the vulva, resulting in sterility of the cow

(5 x 2) = **[10]**

1.4 Change the **UNDERLINED WORD(S)** in EACH of the following statements to make them **TRUE**. Write only the appropriate word(s) next to the question numbers (1.4.1 – 1.4.5) in the attached **ANSWER SHEET**.

1.4.1 Food passes through the cardiac sphincter into the <u>abomasum</u> compartment of the ruminant stomach.

1.4.2 The segments of the bodies of tapeworms, known as <u>cysts,</u> are sacs filled with eggs.

1.4.3 The <u>prostate</u> is the primary reproductive organ of a bull where the hormone testosterone is secreted.

1.4.4 The cloned embryo is genetically identical to the <u>enucleated egg cell</u>.

1.4.5 The hormone that is released from a gland in the brain responsible for the milk let down reflex is <u>progesterone</u>.

(5 x 1) = **[5]**

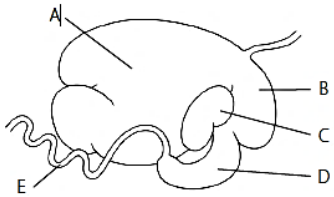
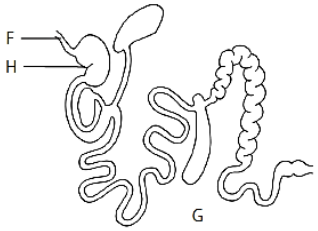
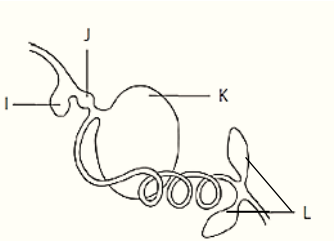
TOTAL SECTION A: [45]

SECTION B

QUESTION 2: ANIMAL NUTRITION

Start this question on a **NEW** page.

2.1 Study the following portions of the digestive tract of three different farm animals and answer the questions that follow.

DIAGRAM 1	DIAGRAM 2	DIAGRAM 3
		

2.1.1 Identify the type of farm animals from the portions of their digestive tracts depicted in DIAGRAM 1, DIAGRAM 2 and DIAGRAM 3. (3)

2.1.2 Explain the process of digestion in parts **H** and **K**. (4)

2.1.3 Discuss how part **A** is adapted to perform its function by referring to THREE adaptations. (3)

2.1.4 Give ONE function of part **L**. (1)

2.2 The value of a feed can be determined by calculating the digestibility coefficient. A cow ingested 16 kg of hay with a moisture content of 12% and excreted 4 kg dry material in the manure.

2.2.1 Calculate the digestibility coefficient of the hay. Show ALL your calculations. (5)

2.2.2 Define the term '*digestibility of a feed*'. (1)

2.2.3 Explain how the crude fibre content influences the digestibility of a feed. (3)

2.2.4 Name THREE methods to improve the digestibility of animal feeds. (3)

2.3 The table below represents the nutritional information of selected feeds.

FEED	CRUDE PROTEIN(%)	CRUDE FIBRE (%)	METABOLISABLE ENERGY (MJ/kg)
Lucerne hay	30,1	40,1	7,4
Maize meal	8,9	2,0	12,0
Silage	7,8	4,2	4,1

2.3.1 Select a feed from the table above that is most suitable for each of the following situations:

(a) A juicy roughage for the stimulation of milk production (1)
(b) For young growing ruminants (1)
(c) For fattening of pigs (1)

2.3.2 The farmer wants to mix concentrates for a ration of animals with a crude protein requirement of 16%. There is a sunflower oilcake meal available with a crude protein content of 37%. Use the Pearson square method to calculate the ratio in which maize meal and sunflower oilcake meal should be mixed to meet the requirements mentioned above. (5)

2.3.3 A feed mixture of 1200kg is needed by the farmer specified in QUESTION 2.3.2. Calculate how much of the sunflower oilcake meal and maize meal is needed for the mixture. (4)

[35]

QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

Start this question on a **NEW** page.

3.1 Choose an explanation from the list below that matches EACH of the following descriptions of observable animal behaviour. Write only the letter (A - E) next to the question numbers, (3.1.1 - 3.1.5), in the ANSWER BOOK.

A Shades in the path or vision area of animals
B Normal maternal behaviour
C Animal is healthy
D Animal might contract a disease
E Normal reproductive behaviour

3.1.1 Female animals in the herd mount other females and allow females to mount them. (1)

3.1.2 Animal is aggressive after giving birth. (1)

3.1.3 An animal has lost its appetite. (1)

3.1.4 A flock of animals graze on natural pasture. (1)

3.1.5 Animals do not want to enter a gate to a passage area. (1)

3.2 Study the pictures below and answer the questions that follow:

[Source: https://agriorbit.com/poultry-production-made-easy-construct-your-own-broiler-house/]

[Source: https://www.profitableventure.com/cost-start-a-poultry-farm/]

3.2.1 Identify the production system depicted in the pictures above. (1)

3.2.2 Identify THREE biosecurity measures used by this farmer. (3)

3.2.3 Classify the labour intensity of the operation illustrated in the pictures Justify your answer by referring to the pictures above. (3)

3.2.4 The pictures shown above were taken later in the production cycle of the chickens.

(a) Looking at the house in the pictures above, suggest a potential problem the farmer may have experienced early in the production cycle. (1)

(b) Suggest the solution which the farmer could have used to overcome the problem in (a). (1)

3.3 Maintaining animal health is an important part of livestock production.

3.3.1 Name FOUR economic implications of animal diseases. (4)

3.3.2 Explain the differences between the following two kinds of injections used to treat animals (refer to the technique and the part of an animal body best suited for administering the treatment).

(a) Intramuscular injection (2)
(b) Subcutaneous injection (2)

3.4 All animals and humans can be infected by parasites.

Table: Prevalence (in %) of different parasite diseases in livestock in the Eastern Cape Province over 6 years

	6 Years of study					
Type of parasite diseases	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
External parasites	25	17	38	20	0	3
Fly parasites	27	28	16	30	0	2
Haemoparasites (blood parasites)	8	12	18	22	28	4
Internal parasites	0	25	74	0	0	0
Protozoa	20	14	28	15	10	12

[Source adapted from: Article Open Veterinary Journal, (2022), Vol. 12(2): 204–211: A 6-year retrospective report of livestock parasitic diseases in the Eastern Cape Province, South Africa]

3.4.1 Draw a line graph to show the prevalence of external parasite diseases, haemoparasite diseases and protozoa diseases over 6 years. (8)

3.4.2 Give the term that refers to the disease which can be contracted by both animals and humans. (1)

3.4.3 Name a notifiable disease caused by an external parasite. (1)

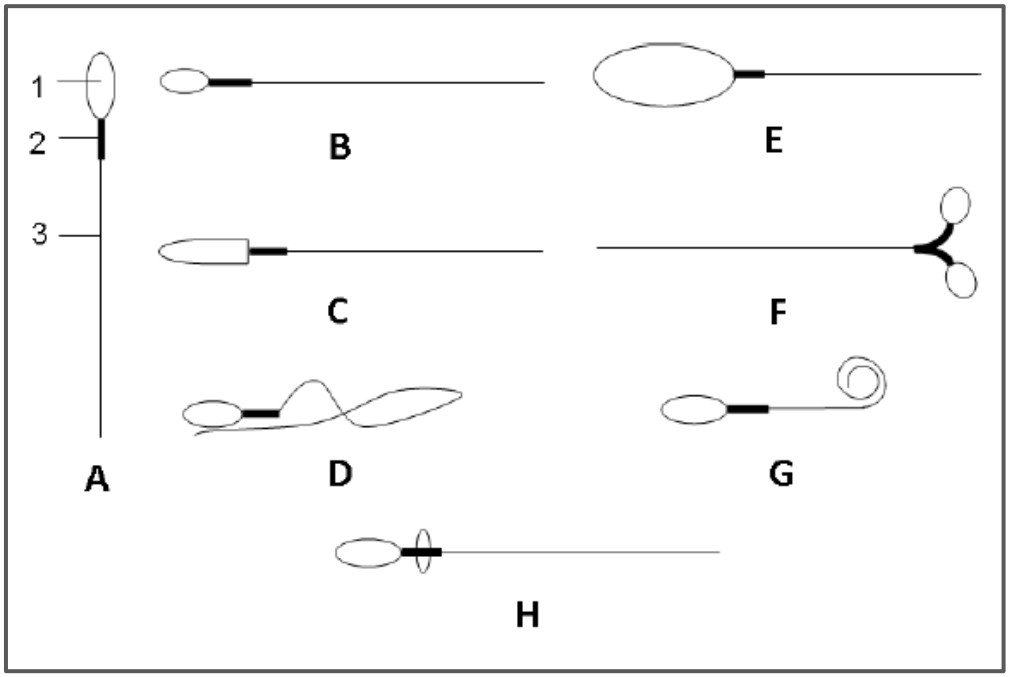
3.4.4 Discuss the role of the state according to the Animal Diseases Act No 35 of 1984, when the notifiable disease in QUESTION 3.4.3 is reported to the state veterinarian in the area. (3)

[35]

QUESTION 4: ANIMAL REPRODUCTION

Start this question on a **NEW** page.

4.1 The sperm cells shown have morphological defects in the diagrams below and are significant for healthy animal reproduction.



4.1.1 Identify the part labelled **2** in diagram **A**. (1)

4.1.2 Select the normal structure of a sperm cell from diagram **A** to **H**. (1)

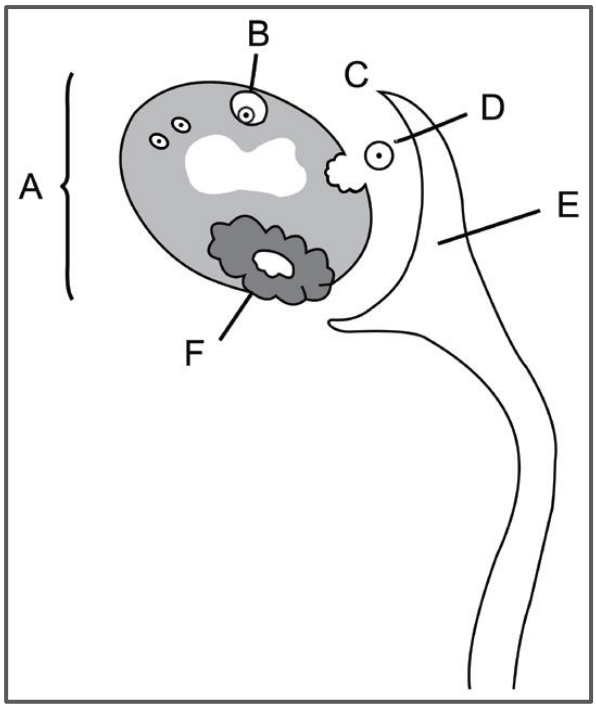
4.1.3 Give the number of the section of the sperm (from diagram **A**) that would be responsible for the following:

(a) Movement (1)
(b) Carrier of genetic information (1)

4.1.4 Give the name of the organ responsible for the formation of the structures shown in the above diagrams. (1)

4.1.5 State THREE congenital factors that may disturb the formation of sperm cells. (3)

4.2 The diagram below illustrates the section of a mammal's female reproductive tract.



4.2.1 Name structures **A**, **B**, **D**, **E** and **F.** (5)

4.2.2 Identify the process taking place at **C**. (1)

4.2.3 Give the name of the hormone associated with each of the following functions:

(a) Stimulating the development of structure **B**. (1)
(b) Stimulating process **C**. (1)
(c) Characteristic visible signs of oestrus. (1)
(d) Secreted by structure **F**. (1)

4.2.4 Describe how structure **E** is adapted to successfully capture structure **D**. (2)

4.3 Artificial insemination is becoming more popular in the beef and dairy industry in South Africa.

[Source: STRIDE Learning Unit 1 - Livestock Breeding Artificial Insemination https://peritumagri.com/stride/]

4.3.1 Explain why dairy farmers would prefer the practice of artificial insemination to purchasing a bull. (4)

4.3.2 Give THREE important factors that need to be controlled when handling semen. (3)

4.3.3 Describe FOUR signs of oestrus in cattle. (4)

4.4 The newborn of all mammals depend on their mothers for nutrition.

4.4.1 Give a definition for the term '*lactation*'. (2)

4.4.2 Describe what is meant by the '*dry period*' in the cow. (2)

[35]

TOTAL SECTION B: [105]

GRAND TOTAL: [150]

ANSWER SHEET: AGRICULTURAL SCIENCES PAPER 1
[STAPLE TO ANSWER BOOK]

SECTION A **TOTAL SECTION: [45]**

EXAMINATION NUMBER:

ID NUMBER:

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 × 2 = 20)

QUESTION 1.2

	A Only	B Only	Both A & 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 × 2 = 10)

QUESTION 1.3

1.3.1 _____

1.3.2 _____

1.3.3 _____

1.3.4 _____

1.3.5 _____

(5 × 2 = 10)

QUESTION 1.4

1.4.1 _____

1.4.2 _____

1.4.3 _____

1.4.4 _____

1.4.5 _____

(5 × 1 = 5)

_____
45

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