NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2017

AGRICULTURAL SCIENCES: PAPER I

MARKING GUIDELINES

Time: 2½ hours 150 marks

These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.

The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.

SECTION A

QUESTION 1

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

1.2

	A only	**B only**	**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~~

1.3

1.3.1	Corpus luteum
1.3.2	Virus
1.3.3	Uterus or shell gland
1.3.4	Silage/green feed/planted pasture
1.3.5	Papillae

1.4

1.4.1	Di-oestrus
1.4.2	Production
1.4.3	Isolation/separation/quarantine
1.4.4	Antibodies/immunoglobulins
1.4.5	Cobalt

SECTION B

QUESTION 2 ANIMAL NUTRITION

2.1 Voermol feed table

2.1.1 Roughage required with maintenance licks

All three rations contain high levels of urea that could lower the pH of the rumen. Roughage provides scratch factor that will cause the animal to ruminate allowing the saliva to buffer the pH. The urea will also feed the rumen microbes that will in turn digest the roughage as well as making higher levels of microbial protein.
Roughage – broken down for energy (1 mark).

2.1.2 Maintenance lick for lactating cow

Lick 3 because of the higher levels of calcium required during the production of milk.

2.1.3 Maintenance lick for poor quality roughage

Lick 1 has the highest protein and urea content that provide protein that is lacking in the poor quality roughage.

2.2 Digestibility of a feed

2.2.1 Digestibility coefficient calculation

Fodder: 12% of 25 kg = 3 kg moisture
Therefore 25 kg – 3 kg = 22 kg of dry matter

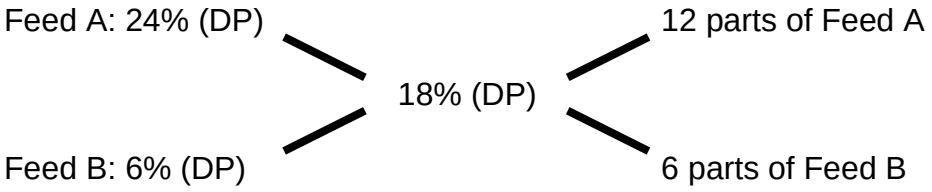
Digestibility coefficient

$$= \frac{\text{DM intake (kg)} - \text{DM of manure (kg)}}{\text{DM intake (kg)}} \times 100$$

$$= \frac{22\text{ kg} - 10\text{ kg}}{22\text{ kg}} \times 100$$

$$= 54{,}5\%$$

2.2.2 Pearson square ratio calculation



2.3 Nutritive ratio

2.3.1 Calculation of ratio

$$NR = 1 : \frac{62\% - 25\%}{25\%}$$
$$NR = 1 : 1{,}48 \text{ or } 1 : 1{,}5$$

2.3.2 Type of nutritive ratio

Narrow/protein rich

2.3.3 Suitability of Lucerne

Not suitable for fattening because Lucerne has a narrow NR, which means it does not have enough carbohydrate/energy required for fattening.

2.4 Importance of vitamins

2.4.1 Vitamin A

- Necessary for healthy bones
- Provides resistance to bacterial infections
- Necessary for normal reproduction
- Maintains healthy epithelial tissue and mucous membranes
- Ensures good vision

(Any 2)

2.4.2 Vitamin D

- Helps with the absorption of calcium and phosphorus
- Ensures healthy teeth and bones
- Ensures good growth

(Any 2)

QUESTION 3 ANIMAL PRODUCTION, PROTECTION AND CONTROL

3.1 Foot-and-mouth disease

3.1.1 TWO control measures

- Quarantine animals
- Isolate infected animals
- Control movement of infected animals
- Kill infected animals
- Report to the veterinarian or stock inspector
- Vaccination
- Disposal of dead animals

(Any 2)

3.1.2 **THREE main types of affected livestock**

- Cattle
- Sheep
- Goats
- Pigs
  (Any 3)

3.1.3 **THREE symptoms**

- Sores in the mouth, on the tongue and between hooves
- Excess saliva (spit) secreted from the mouth
- Animals eat less food/decrease in appetite
- Animals walk as if they have sore feet
- Animals are weak
  (Any 3)

3.2 3.2.1 **Production system**

Broiler production
Intensive production

3.2.2 **Biosecurity measures**

- Broilers kept in a house to prevent contact with wild birds
- Workers in protective clothing
- Hairnets worn to prevent contamination in the house
- Area is fenced around the houses
- All the broilers are the same age
  (Any 3)

3.2.3 **Labour intensity**

Labour intensive
- Manual feeders and drinkers
- Curtains opened manually

3.2.4 **Brooding**

Potential problem

(a) Keeping the young birds warm

Solution to the problem

(b) By brooding or providing heating for the chicks

3.3 3.3.1 Breeds of sheep

(a) Indigenous breeds

- Damara
- Pedi
- Persian
- Van Rooy
- Nguni/Zulu sheep
  (Any 2)

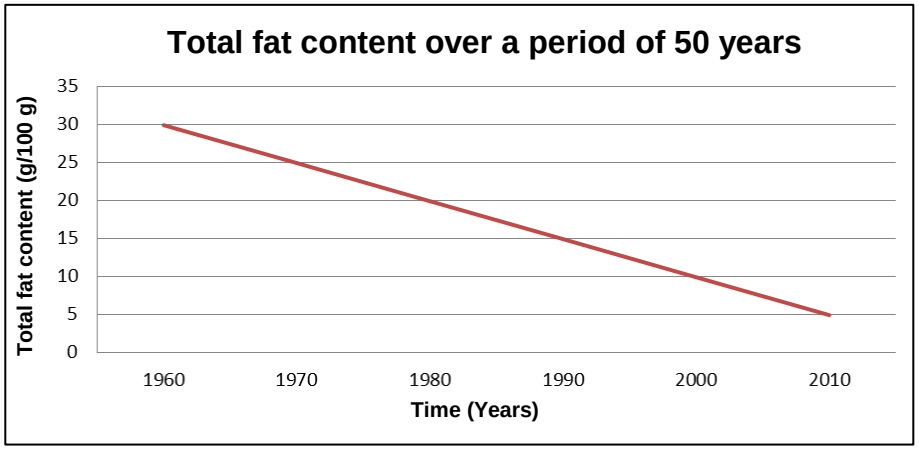
(b) Modern composite breeds with indigenous genetics

- Dorper
- Meatmaster

3.3.2 Reasons for even fat distribution

- Improved carcass quality
- Carcass will not be discriminated against at the supermarkets
- Higher prices for their product/higher income
- With more even fat content all cuts will have a bit of fat
  (Any 2)

3.3.3 Line graph



Marking graph with the following checklist:

Criteria	Yes: 1 mark	No: 0 mark
1. Line graph	1	
2. X-axis correctly labelled	1	
3. Y-axis correctly labelled	1	
4. Points are plotted correctly	1	
5. Correct heading	1	
6. Units are indicated on both axes	1	

3.3.4 **Fat trend**

- Fat content decreased
- Fat content changed from 30 g/100 g to 5 g/100 g
- An even decrease/rate of decrease was constant
(Any 1)

3.4 **Handling facilities**

- Sturdy construction
- Should be on a level area
- Allow water to run off and not pool in the crush
- Should be wide enough for the animal to move comfortably but not so wide as to allow the animal to turn
- Must be high enough to prevent animals trying to jump out and possibly injure themselves
- Must be easy to use, with gaps for you to see and have access to the animals
- Should have a holding area and with a funnel-shaped entrance to the chute to easily push animals into the crush
- The crush itself should be long enough to house a fairly large number of animals but not so long as to make loading the crush difficult
- Well ventilated
(Any 4)

QUESTION 4 ANIMAL REPRODUCTION

4.1 **Sperm diagram**

4.1.1 **Identification of parts**

2 – middle piece/body/mid-piece/neck

4.1.2 **Normal sperm**

A/B/C/E

4.1.3 **Number of the part**

(a) 3

(b) 1

4.1.4 **Structure where sperm are produced**

Testes/primary male sex organ

4.2 Signs of oestrus in cattle

- Bellowing at the fence as if looking for a lost calf
- Isolation from the herd
- Mounting other cows from behind
- Mounting cows from the front
- Bullying other cows
- Standing to be mounted by other cows
- Dirty flanks from being mounted
- Scuffed tail head
- Clear mucus coming from vulva
- Swollen reddened vulva
- Restlessness/Excitability
  (Any 5)

4.3 Hormone table

Hormone	Where it is produced	Function	Where is feedback to
Testosterone	Testes	– Development of testes and penis – Sperm production – Secondary sexual characteristics	Pituitary gland
Follicle-Stimulating Hormone	Pituitary gland	– Regulates growth & development – Pubertal menstruation – Reproductive processes – Stimulates ova and sperm production (Any 2)	Hypothalamus
Progesterone	Corpus luteum	– Maintenance of pregnancy – Prepare uterus for implantation – Regulates the menstrual cycle (Any 2)	Pituitary gland/ hypothalamus

4.4 Bull Fertility

4.4.1 Heat stress

Reduced fertility
Increase in temperature of testes and decreases the viability of sperm due to denaturation or deformed sperm
Reduced libido

4.4.2 Use of burdizzo

Reduced/no fertility
Burdizzo crushes the vas deferens and renders the bull sterile

4.4.3 **Poor nutrition**

Reduced fertility
Bull goes into survival mode and the production of sperm will be halted
Delayed onset of puberty

4.4.4 **Bull to cow ratio**

Reduced fertility
Overworking the bull during the mating season leads to a decrease in condition and hence a decrease in the sperm quality
Not enough time for sperm to mature
Bull too exhausted to mount

4.5 **Cow reproductive tract**

A Vulva
B Bladder
C Vagina
D Cervix
E Uterus
F Uterine horn
G Fallopian tube
H Infundibulum
I Ovary

Total: 150 marks