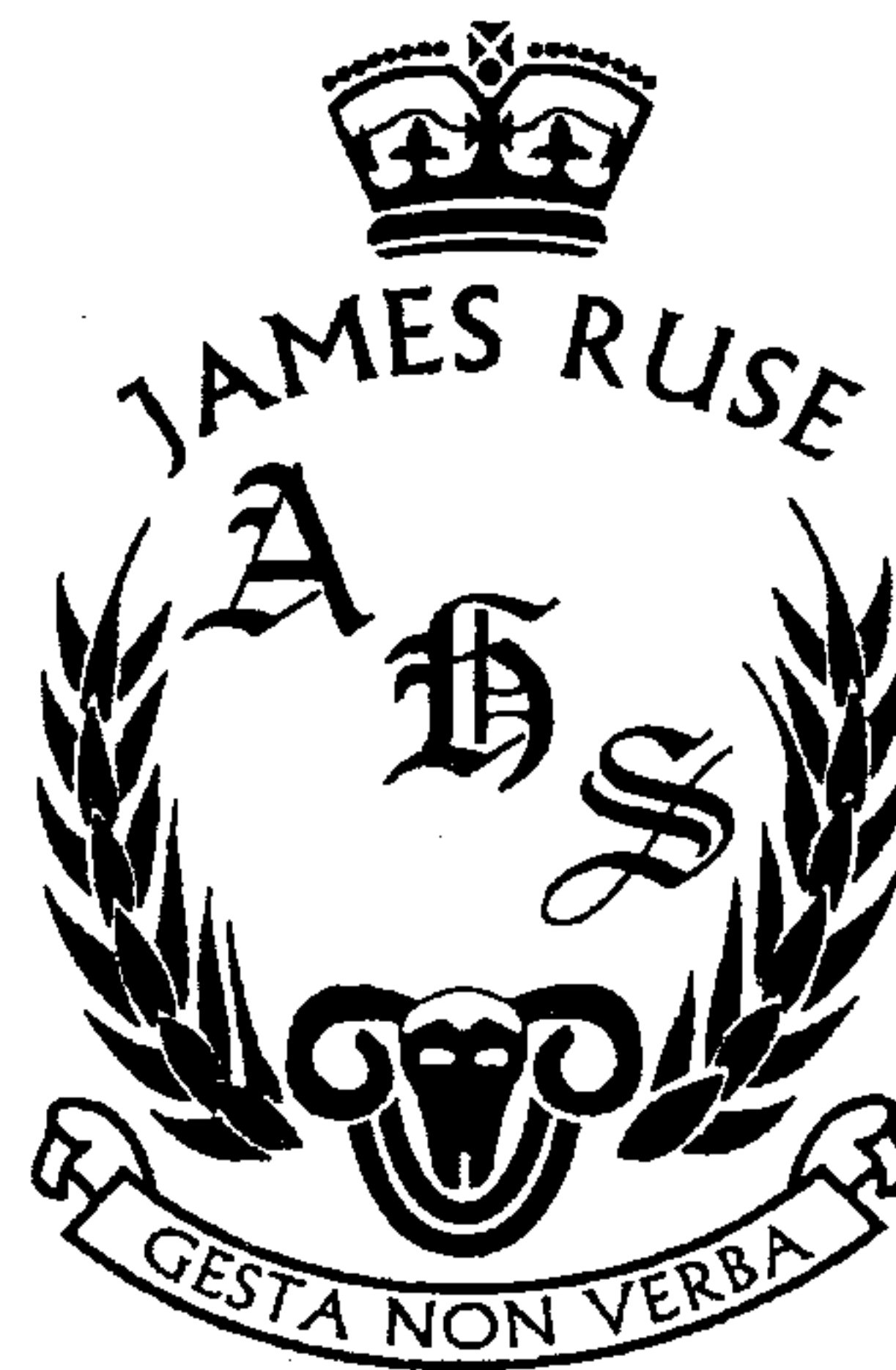


# Agriculture

## Paper 1



### General Instructions

- Reading time – 5 minutes
- Working time – 2 hours
- Write using blue or black pen
- Board-approved calculators may be used
- Write your Student Number at the top of this page

**Total marks - 70**

### Section I

Total marks (25)

- Attempt Questions 1 – 3
- Allow about 40 minutes for this section

### Section II

Total marks (30)

- Attempt Questions 4 – 5
- Allow about 50 minutes for this section

### Section III

Total marks (15)

- Attempt ONE question from Questions 6 – 9
- Allow about 30 minutes for this section

**DO NOT WRITE IN THIS BOOKLET - use your own paper**

<b>Recommended Response Length (this is a guide only).</b>	
<b>Value of the question (marks)</b>	<b>Recommended length of answer (number of lines)</b>
1	2
2	4
3	7
4	10
5	13
6	16
7	19
8	22

# Section I

**Total marks (25)**

**Attempt Questions 1 – 3**

**Allow about 40 minutes for this section**

---

Answer the questions in the spaces provided

**Question 1** (10 marks)

Name ONE farm product you have studied.

Name of product:
------------------

For the farm product you have named:

- (a) Name ONE market for the product. 1 mark
- (b) Outline ONE method a producer may use to sell the product from the farm. 2 marks
- (c) Compare the product that is sold from the farm to the product the consumer eventually buys. 3 marks
- (d) Explain the role of advertising and promotion in the marketing of the product. 4 marks

**Question 2** (7 marks)

Twenty day-old chickens were randomly divided into two groups, Group A and Group B. Each group contained ten chickens. The chickens in Group A were then reared under one system of management and the chickens in Group B under a different system of management. After twelve weeks each chicken was weighed. The results of the experiment are shown in Table 22.1.

	<i>Group A</i>	<i>Group B</i>
	1415	960
	1360	1755
	1415	1700
	1387	1980
	1444	1075
	1415	1190
	1472	850
	1330	1700
	1415	1472
	1500	1980
Mean or average weight per chicken	1415.3	1466.2

\* It was concluded from these observations that the system of management under which the chickens in Group B were raised was superior to the system of management under which the chickens in Group A were raised.



(a) Suggest how the random division of the chickens into the two groups A and B could take place 1 Mark

(b) Outline two factors in the experiment that should be standardised. 2 Marks

(c) State two (2) reasons why the conclusions \* may not be justified and suggest two alterations to the experiment to overcome these reasons. 4 Marks

### Question 3 (8 marks)

A chemical used on the farm has this labelling:

#### INDICATIONS:

AUSMECTIN Cattle Pour-On contains ivermectin, a member of the macrocyclic lactone family of drenches. For the treatment and control of ivermectin-sensitive gastrointestinal nematodes (including inhibited immature *Ostertagia ostertagi*), lungworms (*Dictyocaulus viviparus*), eyeworms (*Thelazia* spp.), sucking and biting lice, chorioptic and sarcoptic mange mites, buffalo flies (*Haematobia irritans exigua*) and cattle ticks (*Boophilus microplus*).

#### PERSISTENT ACTIVITY:

AUSMECTIN Cattle Pour-On applied at the recommended dose of 1 mL per 10 kg bodyweight controls infections of *Trichostrongylus axei* (stomach-hair worm) and *Cooperia* spp. (small intestinal worm) for up to 14 days after treatment; *Ostertagia* spp. (small brown stomach worm) and *Oesophagostomum radiatum* (nodule worm) for up to 21 days after treatment; *Dictyocaulus viviparus* (lungworm) for up to 28 days after treatment; *Haematobia irritans exigua* (buffalo fly) for up to 21 days after treatment.

Resistance may develop to any drench.

#### READ ENCLOSED LEAFLET BEFORE USING THIS PRODUCT.

#### DIRECTIONS FOR USE:

AUSMECTIN Cattle Pour-On is for external application to cattle only. Apply along the topline in a narrow strip extending from the withers to the tailhead. Dose the mob according to the heaviest animal by bodyweight in the group (cows, bulls, calves, heifers, etc.). Do not underdose. A representative sample of animals should be weighed with either scales or a weighband before treatment. Where there is a large variation in size within the group, draft into two or more lines based on bodyweight, to avoid excessive overdosing.

The dose rate is 1 mL for each 10 kg bodyweight.

Bodyweight (kg)	Dose Volume (mL)	Doses			
		1 L	5 L	10 L	20 L
50-100	10	100	500	1000	2000
101-150	15	66	332	666	1333
151-200	20	50	250	500	1000
201-250	25	40	200	400	800
251-300	30	33	166	333	666
301-350	35	28	142	285	570
351-400	40	25	124	250	500
401-450	45	22	110	222	444
451-500	50	20	100	200	400
501-550	55	18	90	181	362
551-600	60	16	82	166	332
601-650	65	15	76	153	306

Heavier animals (for example, mature bulls) should receive an additional 5 mL for each 50 kg over 650 kg.

Consult your veterinarian for assistance in the diagnosis, treatment and control of parasitism.

**NOT TO BE USED FOR ANY PURPOSE OR IN ANY MANNER CONTRARY TO THIS LABEL UNLESS AUTHORISED UNDER APPROPRIATE LEGISLATION.**

#### WITHHOLDING PERIODS:

**MEAT: DO NOT USE less than 42 days before slaughter for human consumption.**

**MILK: NIL.**

**TRADE ADVICE: EXPORT SLAUGHTER INTERVAL (ESI): DO NOT slaughter for export less than 42 days after treatment.**

#### PRECAUTIONS:

Use only in well-ventilated areas or outdoors. Close container when not in use. Cattle should not be treated when hair or hide is wet since reduced efficacy may be experienced. Rain falling on cattle in less than 2 hours after dosing may result in reduced efficacy. Cloudiness may result when AUSMECTIN Cattle Pour-On is stored at temperatures below 0°C. Allowing to warm at room temperature will restore the normal appearance without affecting efficacy. The antiparasitic activity of ivermectin will be impaired if the formulation is applied to areas of skin with mange scabs or lesions, or with dermatoses or adherent materials eg. caked mud or manure. This product is for application to the skin surface only, do not give orally or parenterally. AUSMECTIN Cattle Pour-On is not recommended for use in species other than cattle.

Treatment should not be repeated in less than 42 days.

#### SAFETY DIRECTIONS:

Poisonous if swallowed. Will irritate the eyes and skin. Avoid contact with eyes and skin. When using the product wear cotton overalls buttoned to the neck and wrist and a washable hat and elbow-length PVC gloves and goggles. If product in eyes, wash it out immediately with water. Wash hands after use. After each day's use, wash gloves, goggles and contaminated clothing.

#### FIRST AID:

If poisoning occurs contact a doctor or Poisons Information Centre. Phone Australia 131126, New Zealand 0800 764 766.

For further information, refer to the Material Safety Data Sheet available from International Animal Health Products Pty. Ltd.

#### PROTECTION OF WILDLIFE, FISH, CRUSTACEANS AND THE ENVIRONMENT:

Ivermectin is extremely toxic to aquatic species. Do not contaminate dams, rivers or streams or other waterways with chemical or used container.

#### DISPOSAL:

Break, crush or puncture and bury empty containers at a local authority landfill. If not available, bury the containers below 500 mm in a disposal pit specifically marked and set up for this purpose clear of waterways, vegetation and roots. Empty containers and product should not be burnt. Do not dispose of undiluted chemicals on site.

#### STORAGE:

Store below 30°C (Room Temperature). Store bottle in carton to protect from light. Unused product should be discarded if not used within 6 months of initially opening the container.

**DANGER**  
**GIVES OFF HIGHLY FLAMMABLE VAPOUR**  
**KEEP AWAY FROM HEAT, SPARKS,**  
**OPEN FLAME AND OTHER**  
**SOURCES OF IGNITION.**  
**KEEP CLOSED WHEN NOT IN USE.**  
**HIGHLY FLAMMABLE.**

UN1219  
iso-PROPANOL  
PGII



Ⓟ

Exp



Marketed by  
IAH Sales Pty Ltd  
A.B.N. 57 109 433 883  
18 Healey Circuit, Huntingwood, NSW, 2148  
Phone: (02) 9672 7944 Fax: (02) 9672 7988  
www.iahp.com.au

APVMA Approval No: 59900/1L/0406

© Ausmectin and the Australia/World Symbol are registered trademarks of International Animal Health Products Pty Ltd.  
© Copyright 2005. All Rights Reserved.

**CONDITIONS OF SALE:** This product is sold on the express condition that it must be used strictly in accordance with the manufacturer's instruction for use. No warranty, whether expressed or implied, is given for any and all damages, which may arise for goods not used in accordance with the manufacturer's instructions.



- (a) Outline how a farmer would correctly use this chemical. 2 Marks
- (b) Explain two safe practice recommendations found on the label. 2 Marks
- (c) Evaluate the continued use of this chemical on the farm. 4 Marks

<b>Recommended Response Length (this is a guide only).</b>	
Value of the question (marks)	Recommended length of answer (number of lines)
1	2
2	4
3	7
4	10
5	13
6	16
7	19
8	22

**DO NOT WRITE IN THIS BOOKLET - use your own paper**

## Section II

**30 marks**

**Attempt Questions 4-5**

**Allow about 50 minutes for this section**

Answer the questions in the spaces provided.

### Question 4 (15 marks)

- (a) Outline the process of photosynthesis in plants. 2 marks
- (b) Explain the advantages of using introduced pasture species in a pasture production system. 3 marks
- (c) Describe how TWO components of plant interference can impact on plant production systems. 4 marks
- (d) A variety of control measures are used for pest or disease control in plants. Discuss TWO such control measures used in plant production. 6 marks

**Question 5** (15 marks)

The table shows the effect of increasing liveweight of ewes at joining on the percentage of lambs born.

Joining weight of ewes kg	Lambs born per ewe %	
	Merino	Crossbred
40	92	No data
45	100	118
50	108	126
55	116	134
60	124	142

(a) Account for the difference in the lambs born at any one joining liveweight between the Crossbred and Merino ewes. 2 marks

(b) Explain one management technique that could be employed by farmers to manipulate the weight of ewes to ensure they are at optimum weight at joining. 3 marks

(c) Explain two factors that may affect the fertility of farm animals. 4 marks

(d) Evaluate a named breeding system used to improve animal production. 6 marks

Name of breeding system
-------------------------

**Section III**

**Total marks (15)**

**Attempt ONE question from Questions 6 – 9**

**Allow about 30 minutes for this section**

---

Answer on your own writing paper.

**Marks**

**Question 6** (15 marks)

(a) Describe a plant breeding technique used by plant breeders to develop new varieties. **5**

(b) Farmers managing plant production systems such as orchards, pastures, nurseries or crops attempt to manage the factors that limit the Net Assimilation Rate (NAR) of plants. **10**

Identify THREE factors that limit NAR and evaluate a management technique that can be used to manage each factor.

**OR**

**Question 7** (15 marks)

- (a) Describe the process of growth and development in farm animals in terms of the changing proportion of muscle, fat and bone. **5**
- 10**
- (b) Critically examine the practice of placing ruminant animals in lot feeding systems, highlighting the similarities and differences between ruminants and monogastrics.

**OR**

**Question 8** (15 marks)

- (a) Describe how the measurement of quality and quantity of a product from a production system can be used by the manager to assess its performance and make decisions. **5**
- 10**
- (b) Discuss, using examples, the processes involved in turning a named raw agricultural commodity into various forms to satisfy the consumer AND the nature and potential for value adding on the product.

**OR**

**Question 9** (15 marks)

- (a) Describe the financial pressures that have an impact on farmers. **5**
- (b) Discuss, using examples, risk management strategies that a farmer may use to reduce the impact of financial pressures. **10**

**End of Paper**

---

**DO NOT WRITE IN THIS BOOKLET – use your own paper**

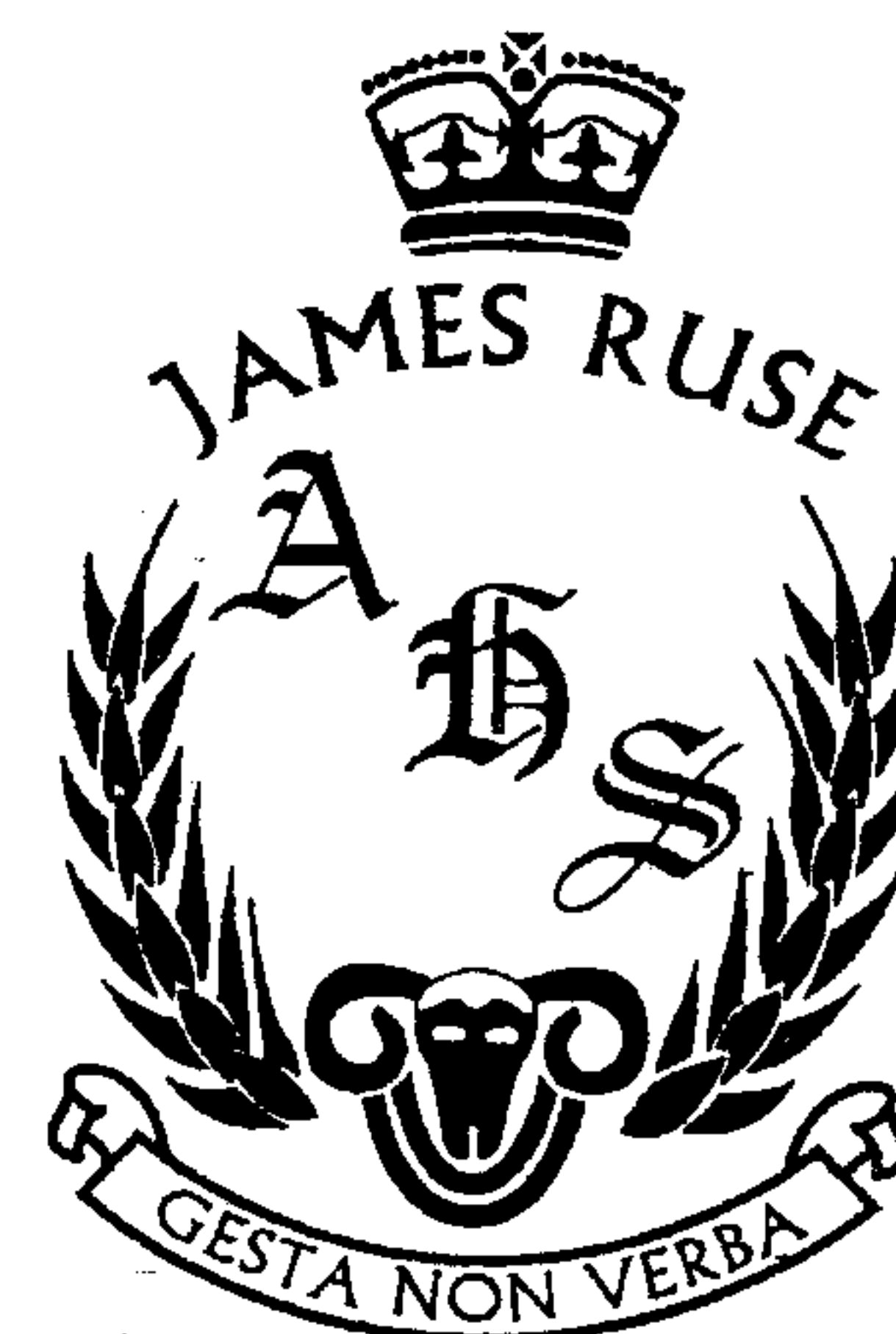
---



# TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION

## AGRICULTURE

### Paper 2



#### General Instructions

- Paper 2 should only be attempted by students who have studied Electives
- Reading time – 5 minutes
- Working time – 1 hour
- Write using blue or black pen
- Board-approved calculators may be used.

#### Total marks (30)

- Attempt TWO questions from Questions 1 – 6
- Allow about 30 minutes for each question

#### Total marks (30)

**Attempt TWO questions from Questions 1 – 6**  
**Allow about 30 minutes for each question**

Answer each question on separate paper. Use your own paper. Staple each question separately with Student No. and question at top of pages.

#### Marks

#### Question 1 – Agribusiness (15 marks)

- |  |   |
|--|---|
| (a) Outline the impact ONE international market may have on farm business.                                   | 3 |
| (b) Describe the findings of a study relating to the impact of a rural business on an agricultural industry. | 4 |
| (c) Evaluate the role farm advisory services play in a farmer's decision-making process.                     | 8 |

#### Question 2 – Animal Management (15 marks)

- |  |   |
|--|---|
| (a) Outline the role of objective measurement and heritability on the breeding program in one animal industry.   | 3 |
| (b) Describe how the results of a study relating to a current technique/technology could be used in advancing productivity in animal production systems. | 4 |
| (c) Evaluate management practices associated with disease control in animals.  | 8 |

**Question 3 – Horticulture (15 marks)**

- (a) Outline ONE way horticulture is important to the Australian economy. 3
- (b) Describe the experimental design that was used in a study relating to a technological innovation in a horticultural industry. 4
- (c) Evaluate the importance of management in balancing economic viability and environmental sustainability of a horticultural system. 8

**Question 4 – Innovation and Diversification (15 marks)**

- (a) Outline ONE legal or other institutional requirement associated with establishing an alternative agricultural system, enterprise or technology. 3
- (b) Describe the types of information or data that were considered in a study that has led to the implementation of an alternative agricultural system or technology. 4
- (c) Evaluate factors the farm manager should consider for the successful introduction of an alternative agricultural system or technology. 8

**Question 5 – Plant Management (15 marks)**

- (a) Outline the role of plant hormones in plant growth and development. 3
- (b) Describe the findings of a study related to the role of plant breeding or related research in advancing productivity in plant production systems. 4
- (c) Evaluate techniques used to manage temperature and pests and diseases to optimise plant production. 8

**Question 6 – Sustainable Land and Resource Management (15 marks)**

- (a) Outline ONE current recommended procedure to alleviate a soil degradation problem. 3
- (b) Describe the methods that were used to present data in a study related to the efficient use of water. 4
- (c) Evaluate the importance of various land management practices in causing one type of soil degradation. 8

**End of paper**



**Marking Guidelines**  
**JRAHS Agriculture Paper 1**  
**Trial HSC 2007**

**Section I**

**Question 1 (9 marks)**

For the farm product you have named:

(a) Name ONE market for the product

1

Outcomes assessed: H3.2

Criteria	Mark
Any appropriate market for the products named.	1

*Answers could include;*

*For Beef;*

*The domestic market – beef cattle are sold for consumption within Australia.*

*OR Japanese high quality grain fed market.*

(b) Outline ONE method a producer may use to sell the product from the farm.

2

Outcomes assessed: H3.2

Criteria	Mark
Outlines one method the farmer may choose.	2
Identifies a selling method.	1

*Answers could include;*

*Sale yard auction where farmer delivers cattle for sale to the sale yard and stock and station agent auctions them to buyers from meat companies.*

*OR Cattle may be sold over the hooks i.e. directly to the abattoir meat company. Farmer is paid according to the quality of his cattle.*

(c) Compare the product that is sold from the farm to the product the consumer eventually buys.

3

Outcomes assessed: H3.3

Criteria	Mark
The comparison shows at least two differences and/or similarities of the farm product and the consumer purchased product.	3-2
Identifies one difference/similarity of the product as it leaves the farm and as the consumer buys it.	1

*Answers could include;*

*Beef as it leaves the farm is in the form of a live animal and it will be in a condition that meets the specifications of the market it is intended for, whereas the product the consumer buys will be a cut of meat (rump steak) that has come from the carcass of the animal that has been slaughtered and cut up into different cuts of meat that the consumer can buy.*

(d) Explain the role of advertising and promotion in the marketing of the product.

4

Outcomes assessed: H3.1

Criteria	Mark
Explains how advertising and promotion are used in the marketing of the product giving specific examples to illustrate the answer.	3-4
Explains the role of advertising and promotion in marketing in general terms.	1-2

Answers could include;

Advertising and promotion of beef is undertaken by AML in the domestic market and internationally. For the domestic market TV advertisements such as the 'Eat Red Meat' campaign and printed material made available to the medical profession and people in general have promoted the health benefits of red meat with its high iron content, especially for women of reproductive age. For the international market such as Japan, AML has used TV advertising, magazine and newspaper advertising, in store leaflets and demonstrations and taste testing to promote the consumption of Australian beef. It has used the freedom from diseases such as mad cow disease as selling points in the health conscious Japanese market.

**Question 2 (7 marks)**

(a) Suggest how the random division of the chickens into the two groups A and B could take place 1 mark

Outcomes assessed: H2.2

Criteria	Mark
Suggests a suitable random method if dividing the chickens.	1

Answers could include:

*Have a blindfolded person grasp one chick at a time from a single box and place them alternately into two other boxes. The boxes could then be labelled A and B after deciding with toss of a coin and a call.*

(b) Outline two factors in the experiment that should be standardised. 2 Marks

Outcomes assessed: H2.2

Criteria	Mark
Outlines two suitable factors to standardise	2
Outlines one suitable factor	1

Answers could include:

- 1. Breed of chickens should be the same in both Group A and B.*
- 2. Type of feed should be the same for both pens.*

(c) State two (2) reasons why the conclusions \* may not be justified, and suggest two alterations to the experiment to overcome these reasons 4 Marks

Outcomes assessed: H2.2

Criteria	Mark
Suggests two alterations to the experiment which would allow conclusions to justifiably be made.	4-3
Suggests one alteration to the experiment.	2-1

Answers could include;

- 1. Ensure that all factors possible are standardised (except system of management) such as feed, water, temperature, breed of chicks.*
- 2. Perform a statistical test of significance on the final average weights eg comparing standard errors.*



**Question 3 (8 marks)**

(a) Outline how a farmer would correctly use this chemical.

2 marks

Outcomes assessed: H1.1

Criteria	Mark
Outlines suitable correct method of use as obtained from information on the label.	2
Mentions only part of label relating to correct use.	1

*Answers could include;*

*The farmer should weigh his cattle and apply at rate of 1ml/10kg body weight along the topline from withers to tailhead of dry animals.*

(b) Explain two safe practice recommendations found on the label

2 marks

Outcomes assessed: H1.1

Criteria	Mark
Explains two safe practice recommendations found on the label.	2
Names two safe practice recommendations from the label	1

*Answers could include;*

- 1. Avoid contact with eyes and skin by wearing cotton overalls buttoned up and P.V.C. gloves to the elbows and goggles to prevent farmer from being poisoned by the chemical.*
- 2. Do not use less than 42 days before slaughter for human consumption, as within 42 days is the time when the chemical is deemed to be a danger when eaten in the meat of the animal.*

(c) Evaluate the continued use of this chemical on the farm

4 marks

Outcomes assessed: H1.1

Criteria	Mark
Evaluates the continued use of the chemical, outlining advantages, disadvantages and a judgement.	4-3
Only mentions advantage and disadvantage.	2-1

*Answers could include;*

*+ Using the chemical means the farmer has an effective, fast working and relatively easy to apply treatment for worms in his cattle.*

*- However continued use may encourage build up of resistance in the worm population, and there is a cost involved in buying the chemical.*

*Judgement :- Continued use of the chemical would be most successful if it was used in rotation with other types of wormicides, and if used in conjunction with other methods of worm control such as rotation of grazing to different 'clean' paddocks after worming.*

## SECTION II

### Question 4 (15 marks)

(a) Outline the process of photosynthesis in plants

2 marks

Outcomes assessed: H2.1

Criteria	Mark
Clearly outlines the process of photosynthesis.	2
Identifies some components of photosynthesis	1

*Answers could include;*

*In photosynthesis, light energy is trapped by chlorophyll converted in chemical energy and used to combine carbon dioxide and water to form simple sugars, oxygen is also released into the atmosphere.*



(b) Explain the advantages of using introduced pasture species in a pasture production system

3 marks

Outcomes assessed: H2.1

Criteria	Mark
Provides 3 advantages of using improved pasture species	3
Provides 2 advantages of using improved pasture species	2
Provides 1 advantage of using improved pasture species	1

*Answers could include;*

*Improved pasture species have the capacity to:*

- *Produce large amounts of palatable, digestible feed for livestock*
- *Increase the carrying capacity of the land*
- *Aids in the increased production of animal products*
- *Increase soil fertility by the use of legumes*
- *Increase the level of organic matter in the soil*
- *Excess pasture production can be conserved.*

(c) Describe how TWO components of plant interference can impact on plant production systems.

4 marks

Outcomes assessed: H2.1

Criteria	Mark
Describes the impact of TWO components of plant interference on plant production. Includes examples.	3-4
Describes the impact of ONE component of plant interference on plant production.	1-2

*Answers could include:*

*Components of interference include:*

- *Competition*
- *Allelopathy*
- *Alternate host*
- *Growth habit*

*Competition occurs between plants for resources such as water, nutrients, sunlight and carbon dioxide. Competition usually occurs between crop plants, (potatoes) and weeds, (potato weed) If weeds are not removed (or controlled) the productivity (yield) of the crop plant will be greatly reduced.*

*Allelopathy is when plants release chemicals into their surroundings that affect (positively or negatively) the neighbouring plants eg the weed thornapple produces chemicals that adversely affect the germination and growth of wheat seeds.*



(d) A variety of control measures are used for pest or disease control in plants. Discuss TWO such control measures used in plant production. 6 marks

Outcomes assessed: H1.1

Criteria	Mark
States TWO advantages and TWO disadvantages for each named control measure	5-6
States ONE advantage and ONE disadvantage for each named control measure	3-4
States ONE advantage or ONE disadvantage for each named control measure	1-2

*Answers could include;*

*Control measures in plant production include: quarantine, crop rotation, companion planting, genetic, biological and chemical.*

*Eg Biological control is where the natural enemy of the pest is used to reduce pest numbers to an acceptable level.*

Advantages

*Long term control + host specific + safe to humans + safe to environment*

Disadvantages

*+ costly research + some production losses will occur + lengthy research*

### Question 5 (15 marks)

(a) Account for the difference in the lambs born at any one joining liveweight between the Crossbred and the Merino ewes 2 marks

Outcomes assessed: H2.2

Criteria	Mark
Accounts for the differences between the two breeds.	2
States the differences between the two.	1

*Answers could include;*

*At any liveweight eg 50kg, crossbred ewes have a higher lambing percentage because ewes of that breeding are more fertile than merino ewes.*

(b) Explain one management technique that could be employed by farmers to manipulate the weight of ewes to ensure they are at the optimum weight at joining. 3 marks

Outcomes assessed: H2.2

Criteria	Mark
Explains one management technique directly related to ewe liveweight.	3
Explains feeding as a management technique	2
Explains nutrition of livestock.	1

*Answers could include;*

*Growth of fodder crops and pastures combined with grazing management. Fodder crops like oats or ryegrass can be grown to provide extra feed at certain times of the year.*

*Ewes can be given access to all or some of these crops in accordance with their nutritional requirements. Their condition can be monitored regularly to determine whether they are gaining or losing weight. If the ewes are in condition score 1, they should be allowed more access to the fodder crops. If their body condition score is too high they should be placed on poorer pastures; and the fodder crops reserved for later use. Ewes at condition score 2 to 3 at joining is ideal.*



(c) Explain two factors that may affect the fertility of farm animals. 4 marks

Outcomes assessed: H2.2

Criteria	Mark
Explains two factors that affect the fertility of farm animals.	4
Explains two factors without relating to fertility.	3
Explains only one factor.	2
List one or two factors.	1

*Answers could include;*

*Nutrition has a marked effect on the fertility of animals as it affects the cycling of females and sperm production in males. The level of nutrition experienced by animals is reflected in their bodyweight which, in turn, affects their fertility. With a higher plane of nutrition, seasonally polyoestrous animals like sheep can release more than one egg per ovulation thus leading to a higher lambing percentage. With cattle, low bodyweight reduces their cycling and they are slower to return to oestrous after having their calf and they are harder to get back in calf. This problem affects dairy cattle in particular.*

*Breeding also affects the fertility of animals. Some breeds of animals are noted for their fertility. Eg Border Leicester sheep have a higher number of twins and triplets and hence a higher lambing percentage than merino ewes. In cattle, British breeds are more fertile than Bos indicus breeds. The selection of breeds in animal production enterprises is of great importance when considering the fertility required.*

(d) Evaluate a named breeding system used to improve animal production. 6 marks

Outcomes assessed: H2.2

Criteria	Mark
Evaluates a named breeding system	5-6
Describes a named breeding system	3-4
Names a breeding system.	1-2

*Answers could include:*

*Prime lamb breeding involves crossbreeding sheep over two generations in order to obtain the best combination of desirable characteristics in both the ewe and the prime lamb. The ewe has to be as fertile as possible with good milk production but needs to produce fleece each year as well. In times of high wool prices, the fleece from the first cross ewe is very important to the profitability of the enterprise and she is considered to be a dual purpose animal. However, when wool prices are low, the fleece is not so important and the merino percentage is of questionable value. The Border Leicester content of the first cross ewe is very important for fertility, milking ability and carcass quality of the prime lamb. The English short wool breed (usually Dorset) used as a terminal sire of the prime lamb provides a meaty carcass and a fast growth rate. The combination of these breeds in a prime lamb is very widespread and is a successful combination. The difficulty of obtaining replacement first cross ewes can sometimes limit the size of the enterprise.*

### Section III

#### Question 6 (15 marks)

(a) Describe a plant breeding technique used by plant breeders to develop new varieties. 5 marks



Outcomes assessed: H2.1

Criteria	Mark
Clearly describes the steps taken in a named plant breeding technique, using an example.	4-5
Briefly explains a plant breeding technique, using an example.	2-3
Names a plant breeding technique.	1

*Answers could include:*

*Plant Breeding Techniques: Producing a hybrid, wide crosses, Tissue Culture, Genetic Engineering*

*Genetic Engineering involves taking a segment of DNA and transferring into a plant to achieve rapid genetic gains.*

*The steps involved are: identification, isolation, cloning and transference.*

*A plant that has been genetically engineered or modified is Bt cotton, which has got increased resistance to the pest Heliothis.*

(b) Farmers managing plant production systems such as orchards, pastures, nurseries or crops attempt to manage the factors that limit the Net Assimilation Rate (NAR) of plants.

Identify THREE factors that limit NAR and evaluate a management technique that can be used to manage each factor. **10 marks**

Outcomes assessed: H2.1

Criteria	Mark
Identifies THREE limiting factors and evaluates one management technique used to control each limiting factor.	9-10
Identifies TWO limiting factors and evaluates one management technique used to control each limiting factor	7-8
Identifies ONE limiting factor and evaluates the management technique used to control the limiting factor.	5-6
Identifies 2-3 limiting factors and states the management technique used to control the limiting factors.	3-4
Identifies 1 limiting factor and states the management technique used to control the limiting factor.	1-2

*Answers could include;*

*Factors that limit NAR are those that limit photosynthesis and respiration. These include; water, temperature, CO<sub>2</sub> concentration, nutrient availability, light, genotype and stage of growth of the plant*

*Management techniques may include: water – irrigation nutrient availability – fertilizers and temperature – glasshouses.*

*Irrigation is used to overcome the limiting factor of water, which is an essential input in the photosynthetic reaction. Irrigation may be costly to purchase and install all of the equipment. There needs to be water available to use, which may require the purchase and installation of tanks or the building of dams to capture any run-off water.*

*Water is required for normal growth and development of the plant, if water is lacking the plant will wilt and die and will not be productive. The returns the farm manager receives from using irrigation should exceed the initial costs.*

*For a productive plant production system irrigation is highly recommended.*



**Question 7 (15 marks)**

- (a) Describe the process of growth and development in farm animals in terms of the changing proportion of muscle, fat and bone. 5 marks

Outcomes assessed: H2.2

Criteria	Mark
Describes G @ D with respect to the proportions of muscle fat and bone.	4-5
Describes D @ G not describing the proportions.	2-3
Defines growth and development.	1

*Answers could include:*

*Growth is the increase in weight over time and development is the change in proportions of various organs and tissues over time. Organs are developed in animals in the following sequence; nerves develop first in the foetus, followed by bone. At birth, the bones are still developing but other organs begin to develop at a faster rate. Soon after an animal is born the legs and the head are both relatively large in relation to the size of the torso. Bone development slows around the time of puberty and muscle tissue development quickly speeds up. By maturity, fat deposits are taking up an increased proportion of the animal's liveweight. When mature animals have put on enough fat they are said to be "finished".*

- (b) Critically examine the practice of placing ruminant animals in lot feeding systems, by highlighting the similarities and differences between ruminants and monogastrics.

**10 marks**

Outcomes assessed: H2.2

Criteria	Mark
Critically examines the practice in the light of the anatomical and physiological comparison.	9-10
Describes in detail monogastric and ruminant anatomy.	7-8
Describes ruminant digestion.	5-7
Describes lot feeding systems.	3-4
Lists ruminant and monogastric animals.	1-2

*Answers could include;*

*Both ruminant animals carry out mechanical digestion, involving chewing of the food in the mouth. Chickens (monogastric) use the gizzard for mechanical digestion. Gastric juices and HCl acid are produced in the stomach of both types of animals. Both have similar small intestines for the digestion and absorption of food. Here, enzymes are important agents of digestion. Amylases for digesting starch, proteases for digesting protein and lipases for digesting lipids and fats. The caecae are blind guts located at the junction of the small intestine and large intestines. They help in the fermentation of some food. Chickens have two caecae but other animals, monogastric and ruminant have only one. The large intestine in animals is mainly for absorption of water and the production of vitamins by micro-organisms.*

*The real difference between the two groups of animals is the three fore stomachs of ruminants. These are the rumen, reticulum and omasum. The rumen carries out fermentation of food by the action of micro-organisms, mainly bacteria, protozoans and fungi. This fermentation enables the production of microbial protein and the upgrading of dietary protein quality. The rumen also acts with the reticulum to perform rumination, whereby, undigested fibre is regurgitated for chewing. During regurgitation, eructation also occurs. This is the release of gases produced in the rumen by fermentation. These gases are mainly carbon dioxide and methane. The methane is a serious loss of energy for the ruminant animal.*



Rumen function is usually dependent on a fair proportion of the diet containing fibre. In feedlot situations, this fibre content is greatly reduced, being replaced by concentrates in the form of grains. A ration of mainly concentrates must be introduced to ruminants slowly otherwise digestive upsets can occur due to the excess production of volatile fatty acids. These can reduce the pH of the rumen from around pH 6 or 6.5 to pH 4. Acidity can stop normal rumen contractions and interrupt digestion.

Ruminants are also susceptible to bloat which can reduce their growth rate and even be fatal.

The susceptibility of ruminants to digestive upsets, the loss of energy during fermentation and eructation of methane, means ruminants are not as well suited to concentrates as are monogastrics. They also have a higher feed conversion ratio, so they are more expensive to feed. They are better suited to grazing situations to which their digestive processes are better suited.

### Question 8 (15 marks)

(a) Describe how the measurement of quality and quantity of a product from a production system can be used by the manager to assess its performance and make decisions.

5 marks

Outcomes assessed: H3.4

Criteria	Mark
Describes in detail how a specific example of measurements for quantity and specific example of measurement of quality are used for assessment and decision making.	4-5
Describes briefly how a specific example of a measurement for quantity and a measurement for quality is used for assessment and decision making.	2-3
Lists measurements of quality and quantity.	1

Answers could include:

Measurement for quantity – live weight at market. This can be compared to the requirements of specific market e.g. domestic market requires a live weight of 200 to 250 kg. If this weight is not achieved (150kg) then the producer can use this feedback information to hold the animals back from market until they reach the desired weight.

Measurement for quality - the marbling score for a carcass which again can be compared to market specifications and if this is not being met the farmer can use this feedback information to adjust his production system. E.g. the Japanese high quality market requires a marbling score of 3 or better. If the feedback is below this, say 2, then the farmer can adjust his feeding in the short term increasing the grain content of the ration to promote marbling. In the long term he can use bulls that have been gene star tested and have shown to carry the genes for marbling.



(b) Discuss, using examples, the processes involved in turning a named raw agricultural commodity into various forms to satisfy the consumer AND the nature and potential for value adding on the product. **10 marks**

Outcomes assessed: H3.3

Criteria	Mark
Discusses in detail, using specific examples, the steps in the processes involved in turning the product into the forms that the consumer buys. Clearly demonstrates an understanding of value adding and how it might be used in the future for the product.	9-10
Discusses, using specific examples, the steps in the processes involved in turning the product into the forms that the consumer buys. Clearly demonstrates an understanding of value adding and how it might be used in the future for the product.	7-8
Discusses in broad terms the steps in the processes involved in turning the product into the forms that the consumer buys. Demonstrates an understanding of value adding and how it might be used in the future for the product.	5-6
Discusses in broad terms the steps in the processes involved in turning the product into the forms that the consumer buys. Demonstrates an understanding of value adding.	3-4
Discusses some of the steps in the processes of turning a product into forms the consumer buys.	1-2

*Answers could include:*

*For Beef.*

*The product leaving the farm is the live animal e.g. a 300kg steer. The steer is then processed as follows:*

- 1. Slaughtered at abattoir – stunned with bolt gun, throat cut, hung up by hind legs, skin removed, viscera removed, head and feet removed, carcass cut in half. Carcass sold to retail butcher or supermarket chain.*
- 2. Retailer – cuts up the carcass into the various cuts of beef e.g. scotch fillet, rump steak, skirt steak, and makes sausages out of waste meat, excess fat is trimmed from the cuts of meat. It may be packaged into meal portion sizes. Retailers may also add spices and sauces to the cuts of meat to make them more easily used by the consumer.*

*Value adding occurs at each step of the process. Each operation carried out changes the product so it is more attractive to the next step. E.g. abattoir changes live animal into carcass that the butcher can then use. The butcher then adds value by cutting up the carcass further into cuts of meat. Further value may be added by the addition of spices and sauces and preparing the beef even further so the consumer has to do very little but cook it before eating it.*

*Potential for value adding – it is in the area of further preparing beef making it even easier and quicker for the consumer to cook and eat the beef that there is potential for value adding. There is also potential in the area of marketing beef as fast food with more expensive cuts other than hamburger mince. The idea is to compete with the chicken fast food outlets with products other than hamburger mince.*



**Question 9 (15 marks)**

(a) Describe the financial pressures that have an impact on farmers. **5 marks**

Outcomes assessed: H3.1

Criteria	Mark
Describes financial pressures impacting on farmers (at least 3)	5-4
Describes two financial pressures	3-2
Names a financial pressure	1

*Answers could include:*

*Irregular nature of income makes the income of farms an unsure entity so that financial planning is difficult – the price he gets for his produce can fluctuate from week to week/season to season.*

*High expenditure on inputs like labour, agricultural chemicals, fertilizer make production costs expensive – quite often these costs need to be paid before he gets income from the crop/animals he sells.*

*The dynamic nature of markets ie markets fluctuate in the quantities they want and prices they pay for produce. This is influenced by public opinion (sugar, fat, organic foods, wool) and many other factors to change the market from week to week.*

(b) Discuss, using examples, risk management strategies that a farmer may use to reduce the impact of financial pressures. **10 marks**

Outcomes assessed: H3.1

Criteria	Mark
Discusses with examples five risk management strategies.	10-9
Discusses with examples four strategies.	8-7
Discusses with examples three strategies.	6-5
Outlines three risk management strategies.	4-3
Names two risk management strategies.	2-1

*Answers could include:*

*Diversification of farm production, where the farmer has more than one commercial subsystem, preferably not linked to the same market, so that if income from one enterprise falls, the other enterprises will still ensure income from elsewhere eg sheep and wheat.*

*Research markets so that he is sure there is a ready and suitable market for his goods, at reasonable prices. Eg source buyers and their reliability.*

*Invest extra capital in off-farm ventures such as buying property eg units so not all money is tied up in farming.*

*Secure contracts for produce so that he knows what income will be and can budget and produce to this sale eg weaned cattle to feedlot*

*Maintain sufficient reserves of money or fodder and water to allow survival during unfavourable times eg stored grain for droughts.*