



STUDENT NUMBER

CENTRE NUMBER

HIGHER SCHOOL CERTIFICATE EXAMINATION

2000

AGRICULTURE

2/3 UNIT (COMMON)

SECTION I

(20 Marks)

*Total time allowed for Sections I, II, III and IV—Three hours
(Plus 5 minutes reading time)*

DIRECTIONS TO CANDIDATES

- Write your Student Number and Centre Number at the top right-hand corner of this page.
- Board-approved calculators may be used.

Section I

- Attempt ALL questions.
- Answer the questions in the spaces provided in this paper.

MARKER'S USE ONLY

Page	Marks
2	
3	
4	
5	

SECTION I

(20 Marks)

Attempt ALL questions.

Allow about 35 minutes for this Section.

MARKER'S
USE ONLY

QUESTION 1

Name ONE farm product you have studied.

Name of farm product

(a) Identify ONE market for the named farm product.

.....

(b) Describe TWO product specifications for this market.

(i)

.....

(ii)

.....

(c) Explain, using examples, what feedback the farmer may receive about the named product.

.....

.....

(d) Discuss how the farmer may use this feedback.

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.....

(e) Outline TWO off-farm activities involved with the handling of the named product.

(i)

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(ii)

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(f) Explain how the quality of the named product may be affected during one of these activities.

.....

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QUESTION 2

MARKER'S
USE ONLY

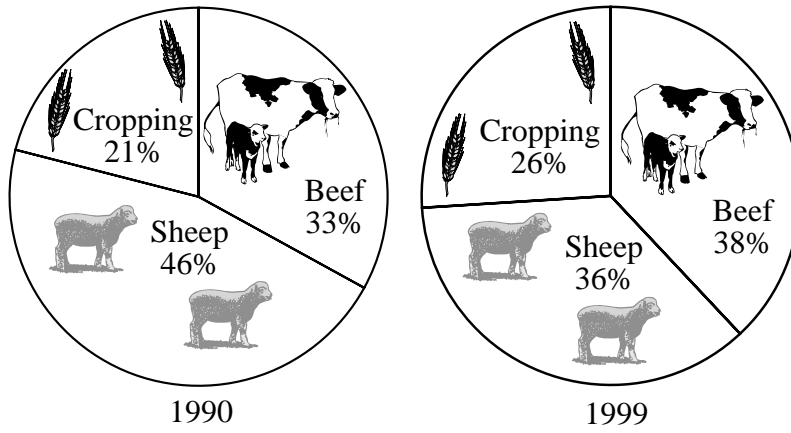


FIG. 1. ENTERPRISE MIX FOR LARGE AUSTRALIAN FARMS

(a) Describe the trends in enterprise mix in large Australian farms from 1990 to 1999 as shown in Figure 1.

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(b) Explain possible reasons for these trends.

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(c) Describe how the level of farm chemical use may have been affected by these trends.

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(d) Explain why the use of farm chemicals may be seen as undesirable.

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(e) Describe how TWO pieces of information found on chemical labels aim to ensure safe usage of farm chemicals.

(i)

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(ii)

.....

QUESTION 3

MARKER'S
USE ONLY

Researchers have developed a new product named *Hercules*.

Hercules contains food supplements to attract and increase the number of beneficial insects in cotton fields. These beneficial insects then attack damaging insects and therefore reduce the reliance on the use of pesticides. The results from research trials conducted on three cotton farms are shown in Figure 2.

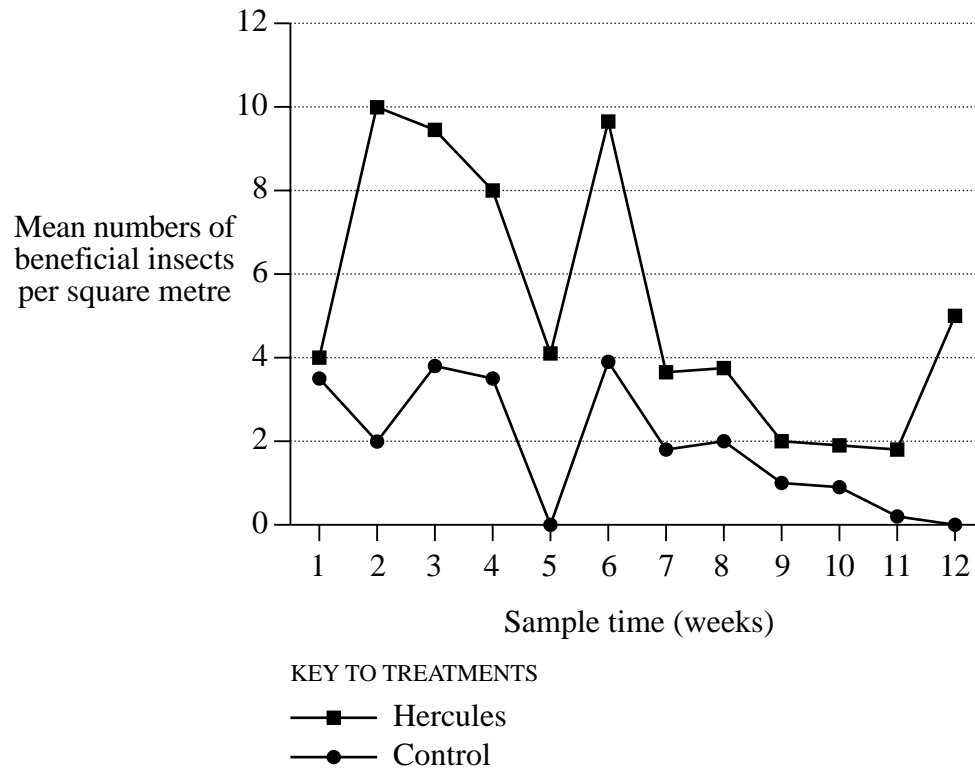


FIG. 2. MEAN NUMBERS OF BENEFICIAL INSECTS THROUGHOUT THE GROWING SEASON IN COTTON CROPS TREATED WITH HERCULES VS CONTROL

- (a) Calculate the difference in mean numbers of beneficial insects sampled from each treatment in week 2.

.....

- (b) Outline a possible reason for the decrease in beneficial insects for both treatments after week 6.

.....

- (c) Explain how the control could be used to determine the effect of *Hercules*.

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.....

QUESTION 3 (Continued)

MARKER'S
USE ONLY

(d) Describe how researchers should have collected data to ensure validity.

.....
.....

(e) Identify a method of data analysis the researchers may use before making recommendations for the use of *Hercules*.

.....

(f) Identify TWO additional pieces of information that may be required by a farmer before deciding to use *Hercules*.

(i)

(ii)

End of Section I

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AGRICULTURE

2/3 UNIT (COMMON)

SECTION II

(45 Marks)

*Total time allowed for Sections I, II, III and IV—Three hours
(Plus 5 minutes reading time)*

DIRECTIONS TO CANDIDATES

- Write your Student Number and Centre Number at the top right-hand corner of this page.
- Board-approved calculators may be used.

Section II

- Attempt THREE questions.
- Answer the questions in the spaces provided in this paper.
- Place a tick in the boxes on this page to indicate the questions you have attempted in Section II.

Question	Questions Attempted	Marker's Use Only
4		
5		
6		
7		

SECTION II

(45 Marks)

Attempt THREE questions.

Each question is worth 15 marks.

Allow about 80 minutes for this Section.

MARKER'S
USE ONLY

QUESTION 4

- (a) Income received by Australian farmers is termed ‘net value of farm production’ and is the result of subtracting costs from the ‘gross value of farm production’.

$$\text{Net value of farm production} = \text{Gross value of farm production} - \text{Costs of production}$$

TABLE 1. FARM PRODUCTION IN AUSTRALIA (\$ billion)

<i>Year</i>	<i>Gross value of farm production</i>	<i>Costs of production</i>	<i>Net value of farm production</i>
1995–1996	27.3	22.4	4.9
1996–1997	28.1	23.8	4.3
1997–1998	28.0	23.9	4.1
1998–1999	28.2	24.3	3.9
1999–2000	28.1		3.1

- (i) From the information in Table 1, calculate the costs of production in 1999–2000.

.....

- (ii) Describe the trend in ‘net value of farm production’ shown in Table 1.

.....

- (iii) Outline ONE reason for the trend in ‘net value of farm production’ from 1995 to 2000.

.....

.....

- (iv) Explain ONE strategy a farmer may implement at the farm level to overcome the problems illustrated in Table 1.

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QUESTION 4 (Continued)

MARKER'S
USE ONLY

(b) (i) Describe TWO possible effects on rural communities of declining farm incomes.

1
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2
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(ii) List TWO ways in which governments may intervene in agricultural production and marketing.

1
2

(iii) Explain, using an example, how government intervention has affected farm profitability.

.....
.....
.....

(iv) Describe ONE financial technique available to farmers that may assist in determining whether one enterprise is more profitable than another.

.....
.....

(v) Explain TWO reasons why a farmer may decide not to introduce an enterprise that appears to maximise farm income.

1
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2
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Question 4 continues on page 12

QUESTION 4 (Continued)

MARKER'S
USE ONLY

- (c) (i) Describe TWO components of interference that limit the productivity of plant production systems.

1
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2
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- (ii) Describe TWO recent technological advances that have increased the productivity of plant production systems.

1
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2
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QUESTION 5

MARKER'S
USE ONLY

- (a) Figure 3 illustrates the effects of rainfall on stocking rates of sheep on South Australian farms.

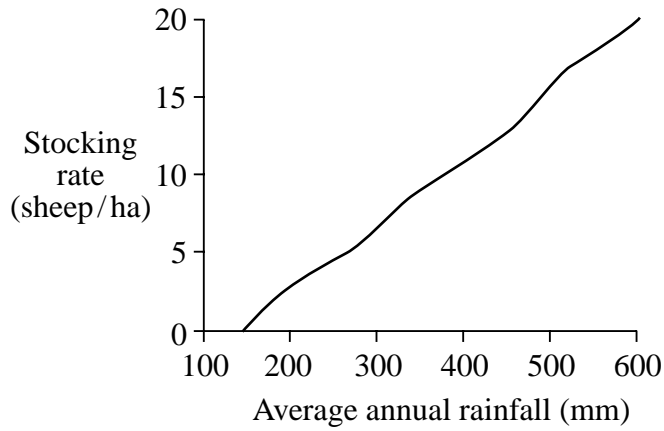


FIG. 3. EFFECT OF AVERAGE ANNUAL RAINFALL ON STOCKING RATE OF SHEEP ON SOUTH AUSTRALIAN FARMS

From Pasture Plus, pp 19–21, courtesy Kondinin Group

- (i) State the trend illustrated in Figure 3.
.....
- (ii) Account for the effect of annual average rainfall on stocking rate.
.....
.....
.....
- (iii) Outline how an environmental factor, other than rainfall, may affect stocking rates.
.....
.....
- (iv) Explain how overstocking may impact on the farm environment.
.....
.....
.....
- (v) Describe TWO management strategies that farmers may use to limit the effects of drought.
1
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2
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QUESTION 5 (Continued)

MARKER'S
USE ONLY

- (b) Figure 4 illustrates the typical regrowth phases of a heavily grazed pasture following removal of grazing animals at A.

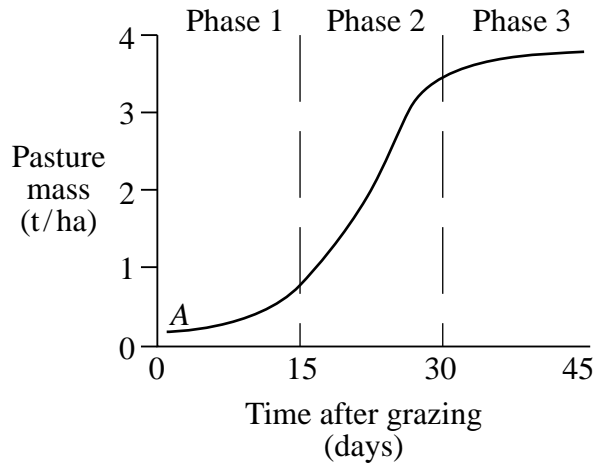


FIG. 4. RELATIONSHIP BETWEEN PASTURE MASS AND TIME AFTER HEAVY GRAZING

- (i) Describe the pattern of pasture regrowth over time.

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.....
- (ii) Explain why the reduction of leaf area due to grazing affects pasture growth during Phase 1.

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- (iii) Explain how the farmer may manage grazing to maximise pasture productivity.

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- (iv) Outline TWO reasons why legumes are included in pasture systems.

1

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QUESTION 5 (Continued)

MARKER'S
USE ONLY

- (v) Pasture phases may be used to increase organic matter content in cropping systems.

Describe TWO other techniques that may be used to increase soil organic matter levels.

1

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2

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Please turn over

QUESTION 6

MARKER'S
USE ONLY

- (a) Figure 5 illustrates the contribution of genotype and environment to animal production.

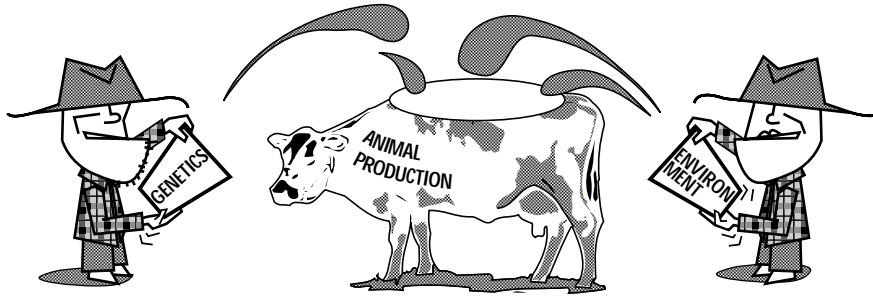


FIG. 5

- (i) State THREE environmental factors that interact with genotype to affect animal production.

- 1
- 2
- 3

- (ii) For ONE of these factors, explain how it affects animal production.

Factor

.....

- (iii) Explain TWO techniques available to farmers to maximise the genetic improvement of animal production systems.

- 1
- 2

- (iv) For an animal production system you have studied, explain how genetic improvement has affected farm profitability.

Name of animal production system

.....

QUESTION 6 (Continued)

MARKER'S
USE ONLY

- (b) Figure 6 illustrates how the energy requirements of a ewe change with stage of pregnancy and lactation (milk production).

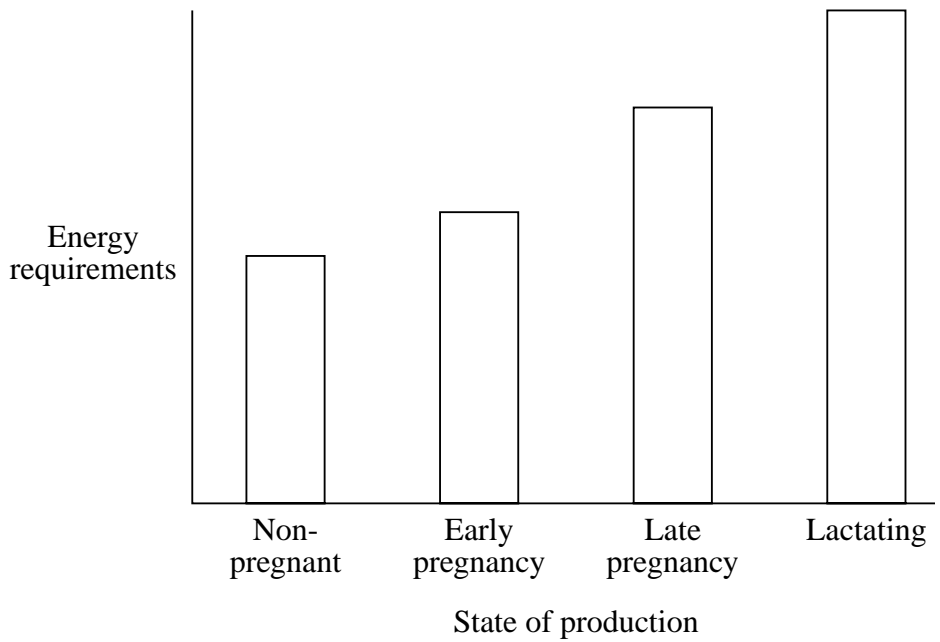


FIG. 6. ENERGY REQUIREMENTS OF A EWE

- (i) Account for the differing energy requirements of a non-pregnant ewe and a lactating ewe, as shown in Figure 6.

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- (ii) Explain why higher levels of energy are required for a ewe in late pregnancy, compared with one in early pregnancy.

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- (iii) Describe TWO management practices that may be implemented to ensure that adequate energy is available to breeding ewes.

1
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2
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QUESTION 6 (Continued)

MARKER'S
USE ONLY

(c) (i) Describe what is meant by the term *Feed Conversion Ratio*.

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(ii) Account for the differences in feed conversion ratios of monogastric and ruminant animals.

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(iii) Describe a possible benefit of feeding a non-protein nitrogen source, such as urea, to ruminant animals.

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QUESTION 7

MARKER'S
USE ONLY

- (a) Thistle seeds can survive in the soil for a number of years. Effective weed control aims to prevent thistles from seeding in order to reduce the number of thistle seeds in the soil. Table 2 shows the effects of three weed control strategies used over five years.

TABLE 2. THE EFFECTS OF WEED CONTROL STRATEGY ON NUMBER OF THISTLE SEEDS IN SOIL

<i>Weed control strategy</i>	<i>Number of thistle seeds in soil (millions/ha)</i>		
	<i>1995</i>	<i>1997</i>	<i>1999</i>
Sheep grazing	12	30	30
Goat grazing	11	4	4
Herbicide application	12	24	24

- (i) Outline a possible reason for the difference in numbers of thistle seeds per hectare when grazed by goats, compared with sheep.

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- (ii) Herbicide resistance may explain the poor effect of the herbicide control method. Explain how herbicide resistance may have occurred.

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- (iii) Identify TWO factors, other than resistance, that may limit the effectiveness of herbicide control methods.

1

2

Question 7 continues on page 20

QUESTION 7 (Continued)

MARKER'S
USE ONLY

- (iv) Integrated Pest Management (IPM) is a technique that can limit pesticide resistance. Each IPM system consists of a number of control methods, each of which plays a specific role.

Name an animal OR plant production system that you have studied.

Name of production system

- 1 Name a disease, pest or weed of the production system that can be controlled using IPM.

.....

- 2 Complete the following table for the named disease, pest or weed using control methods OTHER THAN CHEMICALS.

<i>Non-chemical control method</i>	<i>Specific role in the IPM system</i>	<i>Disadvantage or limitation</i>
.....
.....

- (b) (i) Explain how micro-organisms are involved in making nitrogen available to plants.

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- (ii) Describe TWO factors that a farmer may consider when deciding whether to use artificial fertilisers.

1

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2

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QUESTION 7 (Continued)

MARKER'S
USE ONLY

- (c) Figure 7 illustrates the market price received for an agricultural product over time.

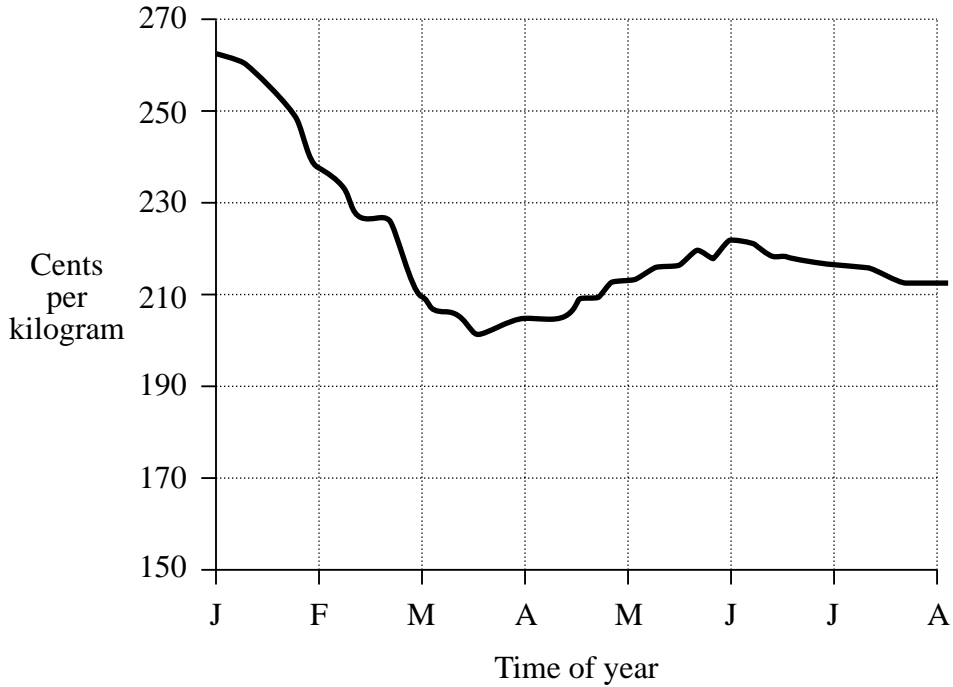


FIG. 7. MARKET PRICE OF AN AGRICULTURAL PRODUCT

- (i) Explain possible reasons why the market price for the agricultural product illustrated in Figure 7 fluctuates over time.

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- (ii) Explain how the farm manager could respond to the type of information shown in Figure 7 by manipulating production cycles.

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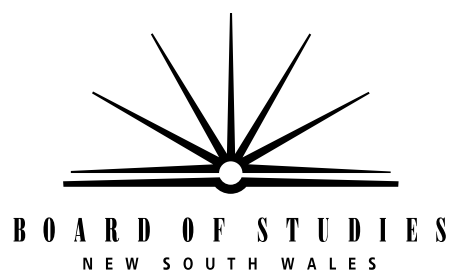
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End of Section II

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AGRICULTURE

2/3 UNIT (COMMON)

SECTION III*(20 Marks)***SECTION IV***(15 Marks)*

*Total time allowed for Sections I, II, III and IV—Three hours
(Plus 5 minutes reading time)*

DIRECTIONS TO CANDIDATES

- Write your Student Number and Centre Number at the top right-hand corner of this page.
- Board-approved calculators may be used.

Section III

- Attempt ONE question.
- Answer the question in the spaces provided in this paper.
- Place a tick in the box on this page to indicate the question you have attempted in Section III.

Section IV

- Attempt ONE question.
- Answer the question in a SEPARATE Writing Booklet.
- You may ask for additional Writing Booklets if you need them.

Question	Question Attempted	Marker's Use Only
8		
9		
10		

SECTION III

(20 Marks)

Attempt ONE question.

Each question is worth 20 marks.

Allow about 35 minutes for this Section.

MARKER'S
USE ONLY

QUESTION 8 Plant Production

- (a) (i) Describe TWO functions that a plant root may serve in plant production systems.

1

2

- (ii) In relation to ONE of the functions of roots mentioned above, explain how a farmer can manipulate the plant production system to maximise plant growth.

Name of function

.....

.....

.....

- (iii) Explain the physiological processes involved with water and nutrient movement around the plant.

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- (b) Outline the relationship between plant density and reproductive yield.

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QUESTION 8 (Continued)

MARKER'S
USE ONLY

- (c) (i) Describe a technology plant breeders use to produce or distribute new plant varieties.

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- (ii) Outline the arguments for plant variety rights.

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Question 8 continues on page 28

QUESTION 9 Animal Production

MARKER'S
USE ONLY

- (a) An extract from an article appearing in a rural newspaper is shown below.

**Heavy Akabane toll
spurs vaccine push**

NSW beef producers, hard-hit with serious calving casualties from the Akabane viral infection, have asked the State Agriculture Minister, Richard Amery, to reinstate a vaccine manufacturing program.

The Land, 14 October 1999

- (i) Explain how a vaccine acts to prevent a disease, such as Akabane.

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- (ii) Describe how the absence of a 'vaccine manufacturing program', as mentioned in the article, may impact on farm profitability.

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Question 9 continues on page 30

QUESTION 9 (Continued)

MARKER'S
USE ONLY

(b) (i) Describe TWO techniques that farmers may use to manipulate reproduction in farm animals.

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(ii) Describe how ONE modern reproductive technique used in animal production may impact on the welfare of the animal.

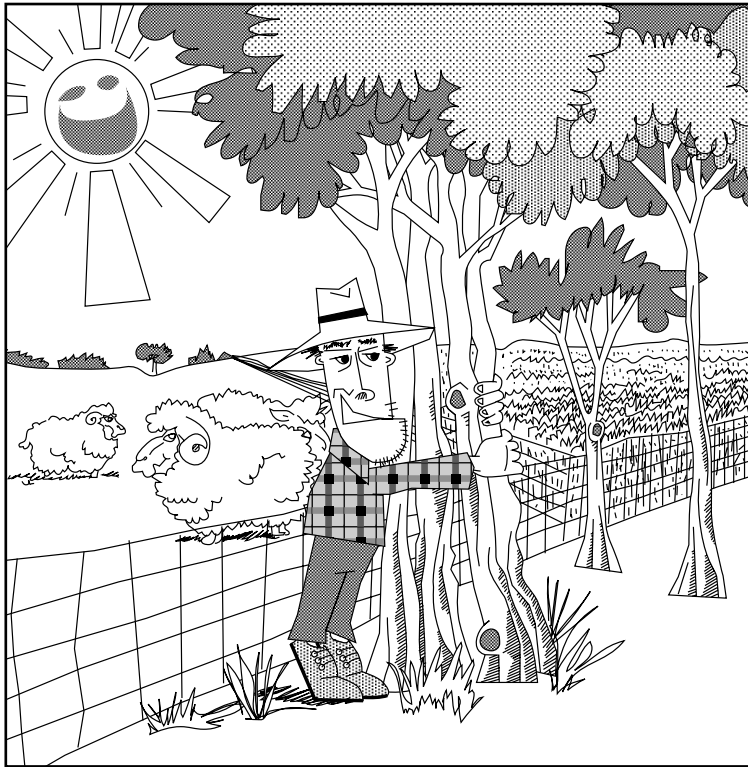
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(iii) Explain, using an example, why farmers must consider consumer health issues when choosing techniques that manipulate animal growth and development.

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QUESTION 10 Land Management

MARKER'S
USE ONLY



- (a) Worsening soil degradation problems are forcing landholders to plant and preserve trees on a large scale. With reference to ONE particular type of soil degradation, explain how trees can help reduce the problem.

Type of soil degradation

.....
.....
.....

- (b) (i) List TWO other forms of soil degradation.

1

2

QUESTION 10 (Continued)

MARKER'S
USE ONLY

- (ii) For ONE of the forms of soil degradation you have listed in part (b) (i), describe how farming practices have contributed to this degradation.

Type of soil degradation

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- (iii) Outline how this form of soil degradation impacts on agricultural productivity.

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- (c) (i) Describe how Land Care programs can help to promote sustainable agricultural practices.

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- (ii) Discuss the effectiveness of such programs in achieving sustainability in agricultural systems.

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Question 10 continues on page 34

SECTION IV**Marks**

(15 Marks)

Attempt ONE question.

Each question is worth 15 marks.

Allow about 30 minutes for this Section.

QUESTION 11

The selection of breeding stock, and the subsequent breeding system utilised, are critical factors in the improvement of product quality in any animal production system.

- (a) Describe techniques used to select animals for use in breeding systems. **4**
- (b) Outline TWO different breeding systems that may be used by animal producers. **4**
- (c) For a particular animal enterprise, discuss, using examples, how selection and breeding systems improve quality and quantity of the product. **7**

QUESTION 12

Without the chemical reactions of photosynthesis, life on earth would not be as we know it.

- (a) Describe the process of photosynthesis. **6**
- (b) Explain how the principal requirements for photosynthesis can be manipulated to improve plant productivity. **9**

Please turn over

QUESTION 13**Marks**

Australian society is becoming more culturally diverse, environmentally aware and health conscious. These trends have impacted on Australian agriculture.

- (a) Describe how Australia's cultural diversity has affected agricultural production. **5**
- (b) Explain how farmers have modified production techniques to improve environmental sustainability. **5**
- (c) Outline, using examples, how farmers can respond to consumer pressures for production of healthier foods. **5**

QUESTION 14

Soil is a complex substance composed of inorganic and organic components, air and water. These components determine the soil's characteristics. Before undertaking any soil management technique, a farmer must be familiar with the characteristics of soil.

- (a) Outline the roles of clay particles in the chemical and physical properties of soil. **4**
- (b) Describe the role of organic matter in the chemical and physical properties of soil. **4**
- (c) Explain, using examples, how soil characteristics can influence farm management. **7**

End of paper