



STUDENT NUMBER

CENTRE NUMBER

HIGHER SCHOOL CERTIFICATE EXAMINATION

1995

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.

EXAMINER'S USE ONLY

Page	Marks
2	
3	
4	
7	
8	

SECTION I

(20 Marks)

Attempt ALL questions.

Allow about 35 minutes for this Section.

EXAMINER'S
USE ONLY

QUESTION 1

Name ONE farm product you have studied.

Answer ALL parts in Question 1 about the product.

Name of farm product

(a) (i) List FOUR inputs needed to produce the farm product.

- 1.
- 2.
- 3.
- 4.

(ii) Describe TWO processes that can add value to the farm product.

- 1.
- 2.

(b) Figure 1 shows interactions, including feedback, between the farm, market, and consumer.

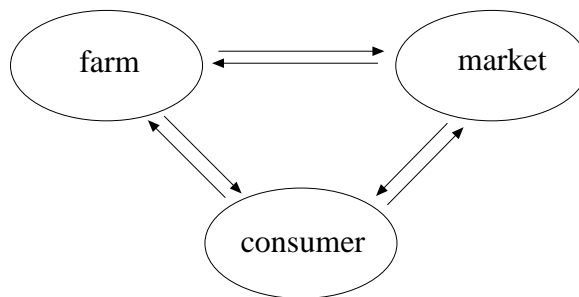


FIG. 1. MODEL OF INTERACTIONS BETWEEN FARM, MARKET, AND CONSUMER

State ONE example of feedback from:

(i) market to farm;

.....

(ii) consumer to farm;

.....

QUESTION 1. (Continued)

EXAMINER'S
USE ONLY

(iii) consumer to market.

.....

(iv) Choose ONE of the feedback examples above and describe how this off-farm information could be used to improve decision-making on the farm.

.....

.....

(c) Market specifications are a guide to what processors, manufacturers, or consumers will accept.

(i) State ONE market specification for your product. State why it is important for the market.

.....

.....

(ii) Describe ONE management decision a farmer could make to help the farm product meet the stated specification.

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QUESTION 2

(a) Outline an improvement in agricultural production that has resulted from scientific experimentation.

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(b) Describe a problem that has resulted from the application of scientific knowledge to an agricultural production system.

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.....

(c) Explain how land-management practices used since European settlement have accelerated erosion.

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.....

(d) As a result of severe drought through large parts of Australia, production in many areas has been severely affected. Suggest TWO changes that drought has on:

(i) rural communities;

- 1.
- 2.

(ii) urban communities.

- 1.
- 2.

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QUESTION 3

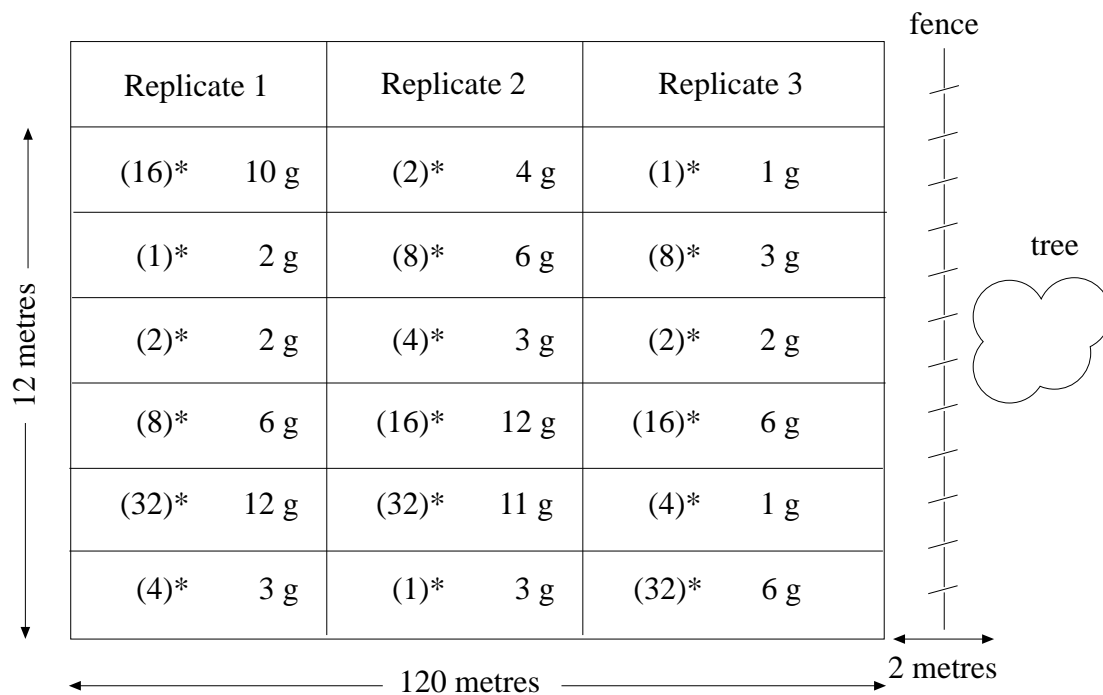
Many herbicides leave residues in the soil that break down with time. A safe interval needs to be left between applying the herbicide and sowing any crop. This interval is called the *plant-back period*.

Following the use of a new herbicide, a field experiment was conducted to determine the plant-back period for wheat.

Six plant-back periods were compared (1, 2, 4, 8, 16, and 32 weeks) in an experiment with three replicates. The plants were sown in each plot on the same day, harvested six weeks later, dried, and weighed.

The field plan showing the layout of plots is given in Figure 2. Also shown on the plan are the weights of the plants after drying.

The soil is clay with a pH of 7.4.



* Numbers in brackets () refer to the plant-back period.

FIG. 2. FIELD PLAN OF PLANT-BACK-PERIOD EXPERIMENT WITH DRY-PLANT WEIGHTS

QUESTION 3. (Continued)

- (a) Table 1 below shows the dry-plant-weight results from the experiment. Complete the table by calculating the treatment means for the plant-back periods for 2 and 16 weeks.

TABLE 1. DRY-PLANT WEIGHT IN GRAMS FOR SIX PLANT-BACK PERIODS

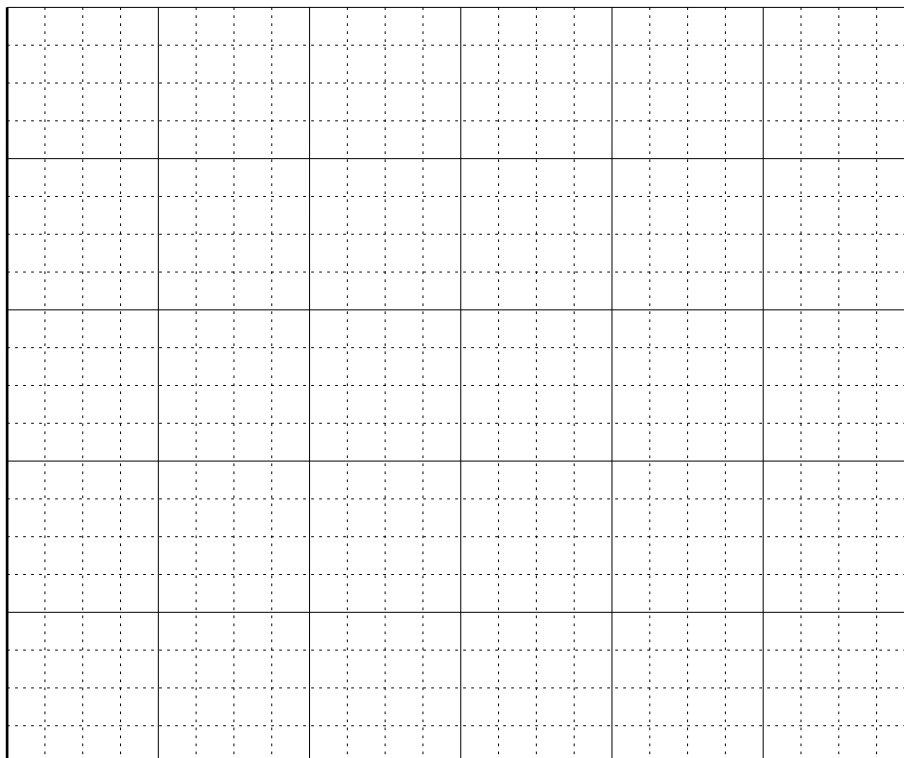
<i>Replicate</i>	<i>Plant-back period (weeks)</i>					
	<i>1</i>	<i>2</i>	<i>4</i>	<i>8</i>	<i>16</i>	<i>32</i>
1	2	2	3	6	10	12
2	3	4	3	6	12	11
3	1	2	1	3	6	6
Mean	2.0	<input type="text"/>	2.3	5.0	<input type="text"/>	9.7

- (b) Inspect the results and field plan (Figure 2) and draw conclusions about sources of variability in the paddock where the experiment was conducted.

.....

.....

- (c) Draw a graph on the axes below relating dry-plant weight to plant-back period.



QUESTION 3. (Continued)

EXAMINER'S
USE ONLY

(d) Explain the need for randomization and replication in experiments like this.

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.....
.....

(e) What recommendations would you make to farmers on the basis of this experiment?

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.....



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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	Question Attempted	Examiner's Use Only
4		
5		
6		
7		

SECTION II

(45 Marks)

Attempt **THREE** questions.

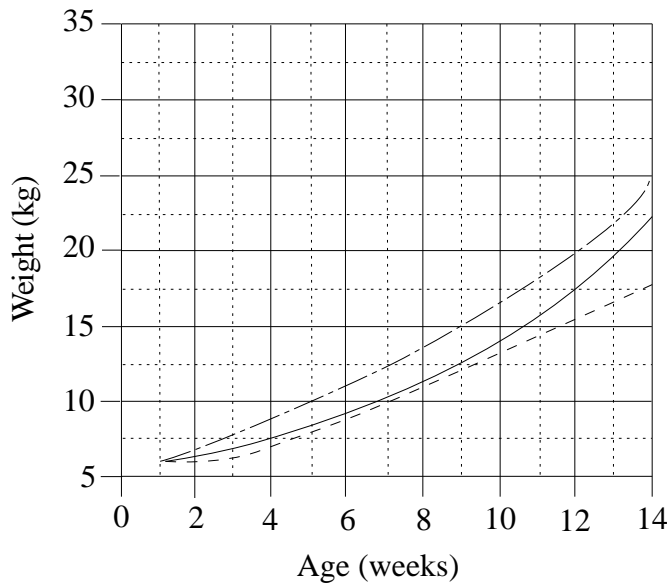
Each question is worth 15 marks.

Allow about 80 minutes for this Section.

EXAMINER'S
USE ONLY

QUESTION 4

(a) The following growth curves were obtained from prime-lamb flocks.



KEY

- Flock 1 average
- Regional average
- Flock 2 average

FIG. 3. GROWTH CURVES FOR PRIME LAMBS.

- (i) From Figure 3, state the difference in weight between the regional-average lambs and lambs from Flock 1 at nine weeks of age.
.....
- (ii) Lambs from Flock 2 performed well below the regional average. Give TWO possible reasons for this.
 - 1.
 - 2.

QUESTION 4. (Continued)

EXAMINER'S
USE ONLY

(iii) Describe TWO management strategies that could increase growth rates of farm animals.

- 1.
.....
.....
- 2.
.....
.....

(b) Compare the carcass composition of young animals with mature animals.

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

(c) (i) Describe how micro-organisms provide an interaction between the atmosphere and legume plants.

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

(ii) Outline a management strategy that could affect the interaction described in part (c) (i) above.

.....
.....

(d) Describe the changes in soil characteristics that can occur with the retention of crop residues.

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QUESTION 4. (Continued)

EXAMINER'S
USE ONLY

- (e) (i) Describe how ONE farming practice has led to soil erosion.

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.....

- (ii) Describe how ONE farming practice has led to soil salination.

.....
.....

- (iii) Describe management practices that can reduce salination of soil.

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

- (f) State TWO management practices that could improve soil structure.

- (i)

- (ii)

QUESTION 5

EXAMINER'S
USE ONLY

- (a) The long-term trend in the average grain-protein content of Australian wheat is shown in Figure 4.

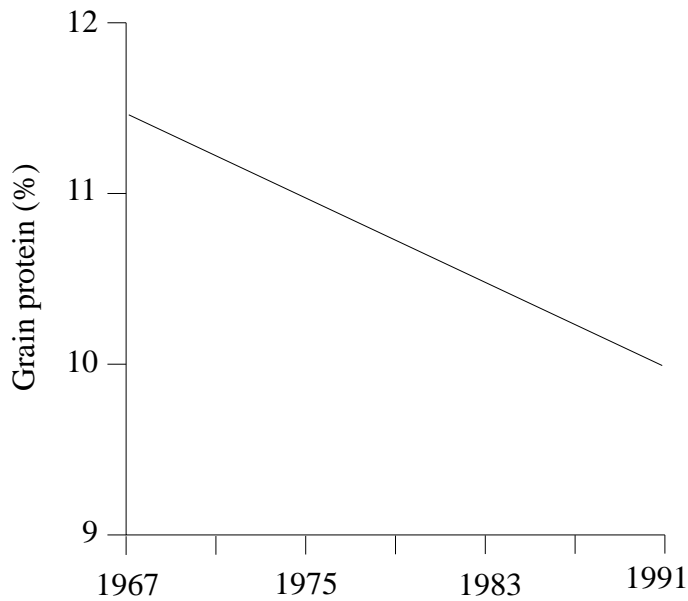


FIG. 4. TRENDS IN GRAIN PROTEIN OVER TIME.

- (i) Which changing soil factor could account for the trend in Figure 4?
.....
- (ii) List TWO farm practices that could be used to help increase grain protein.
1.
2.
- (iii) List THREE implications for sustainability of grain production in Australia if the trend in Figure 4 continues.
1.
2.
3.

- (b) Phosphorus is commonly deficient in Australian soils.
- (i) List THREE ways farmers might learn whether their crops or pastures would respond to phosphorus fertilizer.
1.
2.
3.

QUESTION 5. (Continued)

EXAMINER'S
USE ONLY

- (ii) Discuss how the use of superphosphate and poor farm management have contributed to degradation of river-water quality.

.....

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.....

.....

- (c) Outline the importance of timing in the performance of TWO farm operations. Use examples from a farm or industry that you have studied.

- (i)

.....

- (ii)

.....

- (d) Suppose a major overseas market has just banned the use of a particular fungicide. The fungicide is the only chemical that effectively controls a significant disease in the Australian plant industry.

- (i) Explain TWO ways in which this ban would be a threat to Australian farmers.

1.

2.

- (ii) How might the industry respond to this situation in the longer term?

.....

.....

.....

- (e) (i) Name ONE hormone that regulates animal reproduction.

.....

- (ii) Describe the role of the hormone named in part (e) (i) above.

.....

.....

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QUESTION 5. (Continued)

EXAMINER'S
USE ONLY

- (iii) Name ONE management strategy that regulates animal behaviour by manipulating hormone levels in the animal.

.....

- (iv) Describe how the management strategy in part (e) (iii) regulates animal behaviour by manipulating hormone levels in the animals.

.....

.....

.....

QUESTION 6

EXAMINER'S
USE ONLY

- (a) A farmer carried out a trial using varying nitrogen levels on two maize crops. In the previous year, one crop had maize grown in the paddock, the other crop had a legume (soybeans). Figure 5 shows the results.

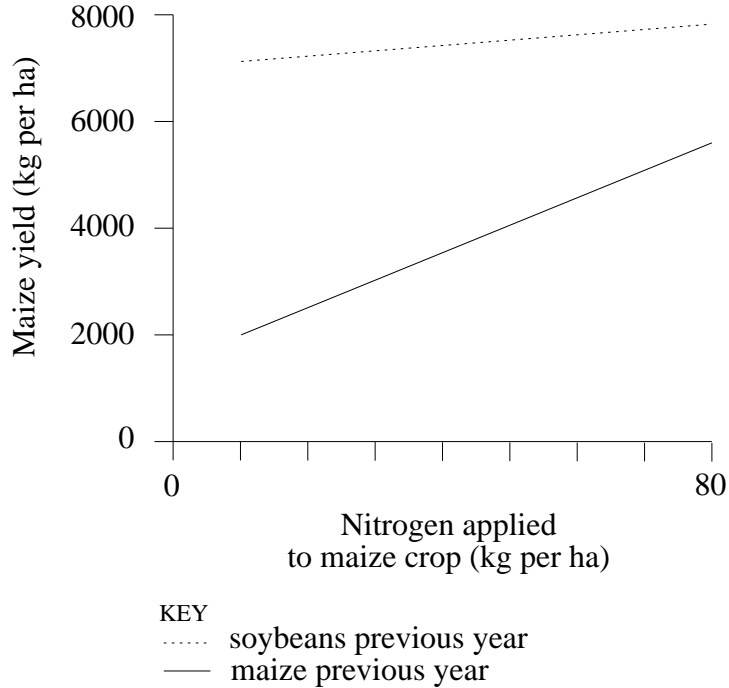


FIG. 5. THE YIELD RESPONSE TO NITROGEN OF MAIZE FOLLOWING EITHER MAIZE OR SOYBEANS.

Draw TWO conclusions about the way soybeans affect maize yield.

- (i)
-
- (ii)
-

QUESTION 6. (Continued)

EXAMINER'S
USE ONLY

(b) Chemicals are widely used in agriculture to control weeds, pests, and diseases.

(i) What potential hazards should be noted before using any chemical?

.....
.....

(ii) Using chemicals can be a costly business. Show how a gross-margin analysis could be used to decide whether the chemical should or should not be used.

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.....

(c) In any plant-production system, management practices are used to overcome pests and diseases. Name a plant-production system and a pest or disease of the plants.

Plant-production system
Disease or pest

For the stated plant system and the pest or disease:

(i) state a management practice that is planned to overcome the pest or disease;

.....

(ii) describe how the management practice affects the interaction between the pest or disease, the host, and the environment.

.....
.....

(d) In most situations, farmers are moving away from individual practices to control pests and diseases, towards integrated pest management (IPM). Describe an IPM program in a plant or animal industry you know about.

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QUESTION 6. (Continued)

EXAMINER'S
USE ONLY

- (e) Breeding programs are often developed to improve quality or quantity of plant products. Name a plant product.

Name of plant product

Describe an example of such a program and outline the key outcomes in terms of quality and quantity.

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- (f) An agronomist advised a cereal grower to reduce cultivation and retain crop residues. As a result, the farmer found many more earthworms in the soil.

- (i) Give THREE reasons for the increased earthworm population.

1.
2.
3.

- (ii) Outline THREE benefits of encouraging earthworms in the soil.

1.
2.
3.

- (iii) Name ONE management practice, other than retaining crop residues and reducing cultivation, that would improve the physical or chemical properties of the soil.

.....

- (g) Describe how ruminant animals are able to digest low-quality roughage and convert it to high-grade protein products.

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QUESTION 7

EXAMINER'S
USE ONLY

(a)

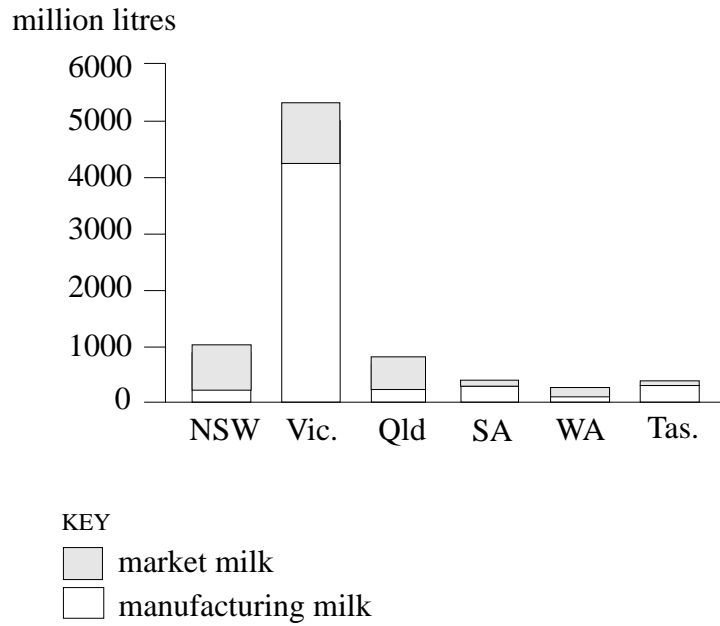


FIG. 6. MILK PRODUCTION IN AUSTRALIA BY STATE AND MARKET TYPES.

(i) From Figure 6, name two States where the production of manufacturing milk is more than half of the total production.

.....

(ii) Figure 6 shows that Victoria produces more than any other State. List FOUR factors that explain such regional patterns of agricultural development.

.....

.....

(b) Choose ONE industry that you have studied.

Name of industry

Explain why it is carried out in its existing location.

.....

.....

QUESTION 7. (Continued)

EXAMINER'S
USE ONLY

(c) Traditionally, most farmers have aimed at increasing farm outputs.

From an industry you have studied, name an animal product.

Name of animal product

(i) Describe TWO management strategies that could contribute to an increase in output of the named animal product.

1.

2.

(ii) Explain how knowledge of the market can assist the manager to relate management strategies to better marketing.

.....

.....

(iii) List TWO sources of market information that farmers use to achieve the best price for their product.

1.

2.

(d) For any agricultural product, the level of government intervention can affect farm production. Name an agricultural product that you have studied.

Name of product

Describe how the level of government intervention can affect farm production.

.....

.....

.....

QUESTION 7. (Continued)

EXAMINER'S
USE ONLY

- (e) (i) Name an animal *OR* plant production system you have studied.

Name of animal or plant production system

Name FOUR management practices in the calendar of operations of the production system.

- 1.
- 2.
- 3.
- 4.

- (ii) Describe how ONE positive and ONE negative climatic feature affect the agricultural production system in part (e) (i).

Positive

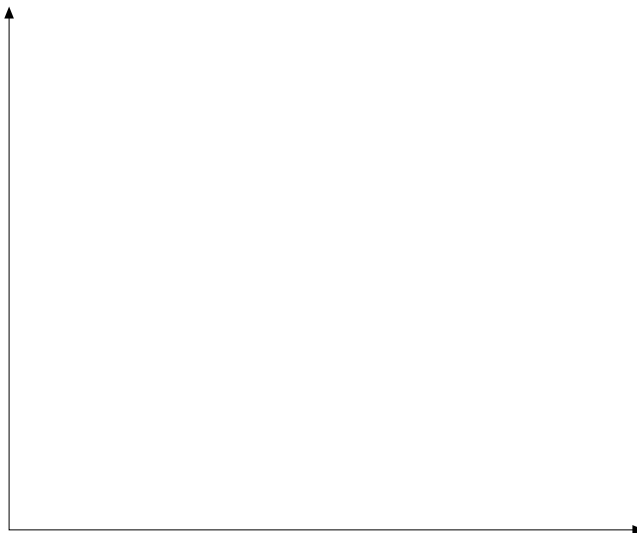
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Negative

.....

- (f) You are asked to present a talk on the effects of stocking-rate on animal production.

- (i) Draw and label a graph on the axes below to show the effects of stocking-rate on production.



QUESTION 7. (Continued)

EXAMINER'S
USE ONLY

- (ii) Explain the shape of the graph you have drawn.

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

- (iii) Describe the information a farmer might need to decide the stocking-rate on a particular farm.

.....
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1995

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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	Examiner'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.

EXAMINER'S
USE ONLY

QUESTION 8. Plant Production

(a) (i) Describe the photosynthetic process.

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(ii) Explain how the photosynthetic rate of a crop could be significantly increased in a controlled environment such as a glasshouse.

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.....
.....

(b) Explain how each of the following factors affects plant productivity.

(i) Pruning

.....
.....

(ii) Photoperiod

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.....

(iii) Plant density

.....
.....

QUESTION 8. (Continued)

EXAMINER'S
USE ONLY

(c) Describe the mechanism of water uptake in plants.

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.....
.....

(d) Outline how plant hormones can be used to manipulate plant production.

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QUESTION 9. Animal Production

An experiment was carried out to investigate the rates of growth in broilers. In the experiment, one group's dietary intake was unrestricted; the other group's dietary intake was restricted for 7 days early in its growth.

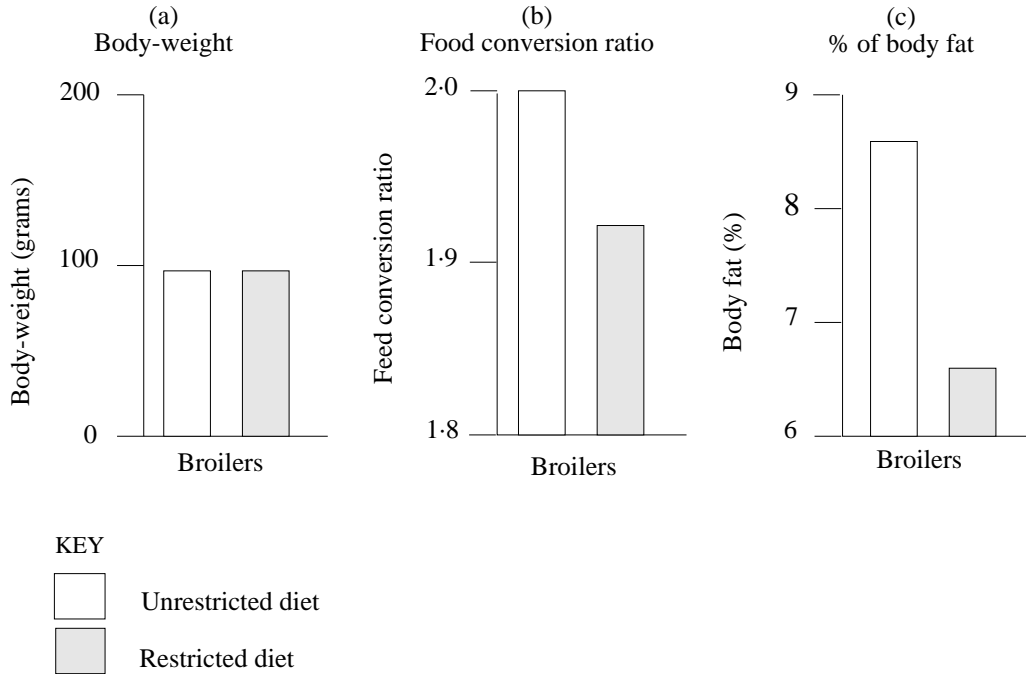


FIG. 7. A COMPARISON OF EARLY FEED RESTRICTION AND UNRESTRICTED FEEDING ON THE PERFORMANCE OF BROILERS.

(a) What conclusions can be drawn from Figures 7(a), 7(b), and 7(c)?

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QUESTION 9. (Continued)

EXAMINER'S
USE ONLY

(b) Describe a recently developed technology that has increased productivity in animal-production systems.

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.....

(c) (i) Name a management practice associated with disease control in animals.

.....

(ii) Describe *either* ONE advantage *or* ONE disadvantage of the management practice in part (i).

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(d) (i) Why is it important to know the metabolizable energy values of feeds when formulating rations?

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(ii) Describe how different conditions of animals such as age, pregnancy, and production affect their metabolizable energy requirements.

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(e) Using an example, describe how genetic manipulation can be used to improve animal-production systems.

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QUESTION 10. Land Management

The management of Australian soils requires an integrated approach in order to overcome the serious soil degradation that has taken place over the last two hundred years.

- (a) List FOUR types of soil degradation.

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- (b) Choose ONE of the soil degradation problems from part (a).

Soil degradation problem

Answer the following questions about the problem you have chosen.

- (i) Describe the farming practices that have led to the problem.

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- (ii) Explain in detail the processes that have led to the problem.

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- (iii) Evaluate current practices used to alleviate the problem.

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QUESTION 10. (Continued)

EXAMINER'S
USE ONLY

- (c) Discuss the suitability of current land use in an area you have studied. In your answer, refer to land-capability assessment.

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SECTION IV**Marks**

(15 Marks)

Attempt ONE question.

Each question is worth 15 marks.

Allow about 30 minutes for this Section.

QUESTION 11

- | | | |
|-----|--|----------|
| (a) | Describe the similarities and differences in the anatomy and physiology of ruminants and monogastrics. | 7 |
| (b) | Discuss how these differences affect: <ul style="list-style-type: none"> • dietary requirements • food-conversion rates • ration formulation • feeding-management. | 8 |

QUESTION 12

For thousands of years, farmers have cultivated soil as a part of crop-production systems. Mechanization and more intensive production have led to an increase in the amount of cultivation during this century. The trend today is to use less cultivation.

- | | | |
|-----|---|----------|
| (a) | Outline the main reasons for cultivation. | 2 |
| (b) | Discuss the long-term effects of cultivation on soils, and explain why many farmers are now cultivating less. | 5 |
| (c) | Discuss the technology that now enables crops to be grown successfully with little or no cultivation. | 5 |
| (d) | Comment on the sustainability of crop-production systems that use little or no cultivation. | 3 |

QUESTION 13

In any enterprise, the timing of operations is important.

- | | | |
|-----|---|----------|
| (a) | Explain, using examples, why the timing of operations is important in a calendar of operations for a plant enterprise. | 9 |
| (b) | Outline how the farm manager schedules plant-enterprise operations for the supply of primary products to the processor and/or the market. | 6 |

Please turn over

QUESTION 14**Marks**

Traditionally, technological innovations (including biotechnology) have focused on production aspects relating to yield. Recently, there has been a shift in emphasis away from production towards marketing. Technology and management is now aimed at improving the quality of products, product specification, objective measurement, post-harvest handling, and value adding.

Using examples:

- (a) describe some technological and management innovations that aim at improving the quality and marketing of agricultural products; **8**
- (b) explain how changing community attitudes and consumer preferences bring about marketing innovations. **7**