AGRICULTURAL AND HORTICULTURAL STudies

Written examination

Wednesday 1 November 2006

Reading time: 9.00 am to 9.15 am (15 minutes)
Writing time: 9.15 am to 10.45 am (1 hour 30 minutes)

QUESTION AND ANSWER BOOK

Structure of book

<table>
<thead>
<tr>
<th>Number of questions</th>
<th>Number of questions to be answered</th>
<th>Number of marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>6</td>
<td>100</td>
</tr>
</tbody>
</table>

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners and rulers.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape.
- No calculator is allowed in this examination.

Materials supplied

Instructions
- Write your student number in the space provided above on this page.
- All written responses must be in English.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

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Question 1

a. Plant and animal environments may be modified in many ways to improve production.
   Specify one way each of the following changes could be made.
   i. Increase the temperature of a glasshouse
   ii. Decrease the humidity in a crop
   iii. Increase the drainage of a clay soil
   iv. Increase the water-holding capacity of a potting mix or soil
   v. Reduce the wind chill on sheep in a paddock
   vi. Increase the air-filled porosity of a potting mix or soil
   vii. Improve the structure of a compacted soil
   viii. Increase the pH of a soil or potting mix

8 marks
b. Often there are a number of ways to modify a specific aspect of a plant or animal’s growing environment.

i. What are the advantages and disadvantages of using a nitrogen fertiliser application instead of a clover/lucerne pasture crop to improve a soil’s nitrogen availability for future crops?

ii. What are the advantages and disadvantages of mulching with wood chips instead of using plastic sheeting between ornamental plants to conserve soil moisture?

3 + 3 = 6 marks
Total 14 marks
Question 2

a. Choose a pest or disease from the list provided in Table 1. Indicate your choice by placing a tick in the appropriate box.

Table 1. Selected pests and diseases

<table>
<thead>
<tr>
<th>Diseases</th>
<th>Pests</th>
</tr>
</thead>
<tbody>
<tr>
<td>mosaic virus</td>
<td>lice</td>
</tr>
<tr>
<td>damping off</td>
<td>red-legged earth mite</td>
</tr>
<tr>
<td>downy mildew</td>
<td>rabbits</td>
</tr>
<tr>
<td>grass tetany</td>
<td>sheep blow fly</td>
</tr>
<tr>
<td>pulpy kidney</td>
<td>aphids</td>
</tr>
<tr>
<td>Newcastle disease</td>
<td>slugs</td>
</tr>
</tbody>
</table>

i. Name a specific agricultural or horticultural industry that the pest or disease affects.

ii. Explain how a manager would prevent your chosen pest or disease from occurring.

iii. Explain how a manager would treat your chosen pest or disease when it does occur.

1 + 3 + 3 = 7 marks
b. Weeds can be a problem for all agricultural and horticultural businesses. Government legislation controls the management of some weeds.

i. State three ways weeds reduce production in an agricultural or horticultural business.

ii. Blackberry (*Rubus fruticosus*) is a regionally controlled declared noxious weed. What does this mean for landowners with blackberry on their property?

iii. Choose a weed that you are familiar with from Table 2. Indicate your choice by placing a tick in the appropriate box.

**Table 2. Selected weeds**

<table>
<thead>
<tr>
<th>Weeds</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>oxalis (<em>Oxalis spp.</em>)</td>
<td></td>
</tr>
<tr>
<td>blackberry (<em>Rubus fruticosus</em>)</td>
<td></td>
</tr>
<tr>
<td>Paterson’s curse (<em>Echium plantagineum</em>)</td>
<td></td>
</tr>
<tr>
<td>Cape weed (<em>Arctotheca calendula</em>)</td>
<td></td>
</tr>
<tr>
<td>wild oats (<em>Avena fatua</em>)</td>
<td></td>
</tr>
<tr>
<td>serrated tussock (<em>Nassella trichotoma</em>)</td>
<td></td>
</tr>
</tbody>
</table>

Describe an integrated management strategy for your selected weed.

\[3 + 1 + 3 = 7\] marks

Total 14 marks

TURN OVER
Question 3

Table 3. Selected agricultural and/or horticultural practices

<table>
<thead>
<tr>
<th>Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>modifying climate</td>
</tr>
<tr>
<td>modifying soil/growing media</td>
</tr>
<tr>
<td>modifying topography</td>
</tr>
<tr>
<td>water management</td>
</tr>
<tr>
<td>soil management</td>
</tr>
<tr>
<td>controlling weeds, pests and diseases</td>
</tr>
<tr>
<td>decision making</td>
</tr>
<tr>
<td>managing animals and their products</td>
</tr>
<tr>
<td>managing plants and their products</td>
</tr>
</tbody>
</table>

a. From the list in Table 3 select two practices for which there are innovations (new or emerging technologies, methods or developments) that you are familiar with. Place a tick in the box next to each selection.

i. Name an innovation used in one of the practices selected from Table 3 and describe how it works or how it is done.

Name ____________________________________________

Description ______________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

ii. Name an innovation used for the other practice you selected from Table 3 and describe how it works or how it is done.

Name ____________________________________________

Description ______________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

(1 + 3) + (1 + 3) = 8 marks

Question 3 – continued
b. For one of the innovations you described in part a. of this question, explain the advantages and disadvantages it has over previously used technologies.

3 marks

c. For the innovation you described in part b. above, explain the effect it will have on businesses that use it.

3 marks
Total 14 marks
Question 4

Table 4. Selected business types

<table>
<thead>
<tr>
<th>Cereal cropping</th>
<th>Design/construct a garden</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poultry for meat</td>
<td>Maintain an ornamental garden</td>
</tr>
<tr>
<td>Poultry for eggs</td>
<td>Plants in glasshouse</td>
</tr>
<tr>
<td>Beef cattle</td>
<td>Container-growing of ornamentals</td>
</tr>
<tr>
<td>Pigs</td>
<td>Field-growing vegetables, herbs or flowers</td>
</tr>
<tr>
<td>Sheep</td>
<td>Production of indigenous plants</td>
</tr>
<tr>
<td>Dairy cows</td>
<td>Hydroponic production</td>
</tr>
<tr>
<td>Grape vines</td>
<td>Fruit tree management</td>
</tr>
<tr>
<td>Fish or yabbies</td>
<td>Horses for recreation</td>
</tr>
</tbody>
</table>

From Table 4, choose an agricultural or horticultural business that you are familiar with in terms of its business management. Place a tick in the box next to your selection.

a. List **four** different aspects that need to be considered when developing a business plan for your chosen business type.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

4 marks
b. List four different aspects of your chosen business type that should be regularly monitored to ensure the business is operating successfully.


4 marks

c. Explain how a manager of your chosen business type could ensure quality control.


3 marks
d. Managers are unable to control all the things that influence the sustainability of a business.

i. List **three** factors that could affect sustainability of your chosen business type that the manager **cannot** control.

ii. For **one** of the factors listed in i. above, explain how you would minimise its risk to the sustainability of the business.

3 + 3 = 6 marks

e. Explain how the sustainability of your chosen business type should be evaluated.

3 marks

Total 20 marks
Question 5

Soil acidification

Soil acidification affects many areas of Victoria.

a. Describe two different land management practices that often lead to an increase in soil acidification.

   i. 

   ii. 


2 + 2 = 4 marks
b. Explain two ways the sustainability of a business is reduced by soil acidification.
   i. ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________
   ii. ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________

3 + 3 = 6 marks

c. Describe one method of treating and one method of preventing soil acidification.
   i. Treating soil acidification
      ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________
   ii. Preventing soil acidification
      ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________

2 + 2 = 4 marks
Total 14 marks
Question 6
On the following pages there are five case studies (Table 5) and their questions.
It is suggested that you read the two case studies you are most familiar with, then select one and answer the questions.
In Table 5 (below), place a tick in the box next to the case study that you are going to answer. (Answer only one case study. If you answer more, only the first one in the book will be marked.)

Table 5. Case studies

<table>
<thead>
<tr>
<th>Title</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Field- or container-grown plants (Pages 14–16)</td>
<td></td>
</tr>
<tr>
<td>2 Organic or non-organic crop management (Pages 17–19)</td>
<td></td>
</tr>
<tr>
<td>3 Shed-fed or open-grazed animal production (Pages 20–22)</td>
<td></td>
</tr>
<tr>
<td>4 Free-range or shed production (Pages 23–25)</td>
<td></td>
</tr>
<tr>
<td>5 Pasture management alternatives (Pages 26–28)</td>
<td></td>
</tr>
</tbody>
</table>
EITHER

Case study 1 – Field- or container-grown plants

Tran has a plant nursery growing English box (*Buxus sempervirens*). Most of the plants are grown and sold in 150 mm diameter pots. Some are planted out in rows in the field and allowed to grow larger.

The potted stock is kept on a gravel growing-on area. Drainage pipes in the gravel take any excess irrigation water off the property to a roadside drain.

The field-grown plants are grown on a slight slope that has a dam at its base. Water is pumped from this dam to irrigate the plants by overhead sprinklers. Weeds are controlled by regular cultivation between the rows.

Recently a problem has developed with the water in the dam. It is a muddy colour. The colour is worse after it rains.

a. Discuss the advantages and disadvantages of growing plants in containers compared to growing them in the field.

b. Identify one change Tran could make to the drainage in the gravel growing-on area to make it more sustainable.
c. Tran is keen to make sure that the small business is sustainable.
   
i. What is the most probable cause of the muddy water?
   
ii. Describe one way of treating the muddy water to make it clearer.
   
iii. Explain two management practices Tran could use to prevent the muddy water problem.
   
Management practice 1

Management practice 2

1 + 1 + (3 + 3) = 8 marks
d. Tran is concerned with looking after the **land and water** resources of the property.

i. List two environmental indicators Tran should monitor for the field-grown plants.

   Environmental indicator 1

   Environmental indicator 2

ii. Describe what each of these indicators measures.

   Environmental indicator 1

   Environmental indicator 2

(1 + 1) + (2 + 2) = 6 marks

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e. Government regulations (Acts) exist concerning management of natural resources on privately owned land.

i. Name one such regulation (Act) of which Tran should be aware.

ii. Describe what effect this regulation (Act) has on the management of businesses such as Tran’s.

1 + 3 = 4 marks

Total 24 marks
OR

Case study 2 – Organic or non-organic crop management

Bruce owns a small vineyard and winery. The winery and associated buildings are located at the top of a small water catchment. Water runoff from the buildings and surface runoff from the winery are diverted away from the catchment to a nearby roadside drain.

The vines are grown on a slight slope that leads away from the buildings to a dam at its base. Water is pumped from this dam to irrigate the vines by overhead sprinklers. Weeds are controlled by regular cultivation between the rows of vines.

Bruce is concerned about a problem with the water in the dam. It is a muddy colour. The colour is worse after it rains.

The vineyard has been established with conventional, non-organic methods. Bruce is thinking of changing to organic methods to grow the vines.

a. Discuss the advantages and disadvantages of conventional, non-organic methods of growing crops compared to organic production.

b. Identify one change Bruce could make to the runoff from the winery and building area to make the business more sustainable.
c. Bruce is keen to make sure that the small business is sustainable.

i. What is the most probable cause of the muddy water?

ii. Describe one way of treating the muddy water to make it clearer.

iii. Explain two management practices Bruce could use to prevent the muddy water problem.

Management practice 1

Management practice 2

1 + 1 + (3 + 3) = 8 marks
d. Bruce is concerned with looking after the **land and water** resources of the property.

i. List two environmental indicators Bruce should monitor for the conventional non-organic vineyard.

   Environmental indicator 1
   
   Environmental indicator 2

ii. Describe what each of these indicators measures.

   Environmental indicator 1
   
   Environmental indicator 2

   (1 + 1) + (2 + 2) = 6 marks

e. Government regulations (Acts) exist concerning management of natural resources on privately owned land.

i. Name one such regulation (Act) of which Bruce should be aware.

ii. Describe what effect this regulation (Act) has on the management of businesses such as Bruce’s.

1 + 3 = 4 marks

Total 24 marks
OR

Case study 3 – Shed-fed or open-grazed animal production

Sarah has just purchased a dairy farm that has been milking 200 cows. It has not been looked after very well. Next to the dairy is a large shed that had been used for pigs. This shed and the dairy are located at the top of a small water catchment. Water runoff from the sheds is diverted away from the catchment to a nearby roadside drain.

Below the buildings, the catchment has a heavily grazed pasture paddock sloping into a dam. The water from the dam is pumped to the sheds to provide stock water and can be used to irrigate the pasture using a sprinkler system. Recently a problem has developed with the water in the dam. It is a muddy colour. The colour is worse after it rains.

To get the income Sarah needs from the farm she must double the number of cows milked. Sarah is currently trying to increase the stocking rate by increasing pasture production with increased fertiliser and irrigation applications. She is considering limiting the cows’ grazing time by housing them in the large shed for part of the time and feeding them purchased feed and dietary supplements.

a. Discuss the advantages and disadvantages of only paddock feeding compared with partial shedding and supplementary feeding.

b. Identify one change Sarah could make to the runoff from the shed and dairy area to make the business more sustainable.
c. Sarah is keen to make sure that the small business is sustainable.
   i. What is the most probable cause of the muddy water?

   ii. Describe one way of treating the muddy water to make it clearer.

   iii. Explain two management practices Sarah could use to prevent the muddy water problem.

   Management practice 1

   Management practice 2

1 + 1 + (3 + 3) = 8 marks
d. Sarah is concerned with looking after the land and water resources of the property.
   i. List two environmental indicators Sarah should monitor for her paddock-grazed cows.

   Environmental indicator 1
   
   Environmental indicator 2
   
   ii. Describe what each of these indicators measures.

   Environmental indicator 1
   
   Environmental indicator 2
   
   (1 + 1) + (2 + 2) = 6 marks


e. Government regulations (Acts) exist concerning management of natural resources on privately owned land.
   i. Name one such regulation (Act) of which Sarah should be aware.

   ii. Describe what effect this regulation (Act) has on the management of businesses such as Sarah’s.

   1 + 3 = 4 marks

Total 24 marks
Case study 4 – Free-range or shed production

Mario has a small poultry farm with a number of large sheds. It is on the edge of a town, within the town boundary. The buildings are located at the top of a small water catchment. Water runoff from the sheds is diverted away from the catchment to a nearby roadside drain.

Below the buildings, the catchment has a heavily grazed pastured paddock sloping into a small dam. The water from the dam is pumped to the sheds to provide stock water and can be used to irrigate the pasture using a sprinkler system. Recently a problem has developed with the water in the dam. It is a muddy colour. The colour is worse after it rains.

Mario runs caged battery hens for egg production. He is considering changing to free-range egg production. The space and sheds are available to run only one of these options.

a. Discuss the advantages and disadvantages of ‘free-range’ compared with ‘caged’/‘penned’ birds or animals.

b. Identify one change Mario could make to the runoff from the shed area to make the business more sustainable.
c. Mario is keen to make sure that the small business is sustainable.
   i. What is the most probable cause of the muddy water?

   ____________________________________________________________

   ____________________________________________________________

   ii. Describe one way of treating the muddy water to make it clearer.

   ____________________________________________________________

   ____________________________________________________________

   iii. Explain two management practices Mario could use to prevent the muddy water problem.

   Management practice 1 ________________________________________

   ____________________________________________________________

   ____________________________________________________________

   ____________________________________________________________

   Management practice 2 ________________________________________

   ____________________________________________________________

   ____________________________________________________________

   ____________________________________________________________

   1 + 1 + (3 + 3) = 8 marks
d. Mario is concerned with looking after the **land and water** resources of the property.

i. List two environmental indicators Mario should monitor if he changes to free-range egg production.

   Environmental indicator 1

   Environmental indicator 2

ii. Describe what each of these indicators measures.

   Environmental indicator 1

   Environmental indicator 2

(1 + 1) + (2 + 2) = 6 marks

e. Government regulations (Acts) exist concerning management of natural resources on privately owned land.

i. Name one such regulation (Act) of which Mario should be aware.

ii. Describe what effect this regulation (Act) has on the management of businesses such as Mario’s.

1 + 3 = 4 marks

Total 24 marks
OR

Case study 5 – Pasture management alternatives

Charlie has a small property that is used for agisting horses. It has a shed suitable for housing and grooming horses. The shed is located at the top of a small water catchment. Water runoff from the shed is diverted away from the catchment to a nearby roadside drain.

The catchment has been divided into a number of small paddocks for holding agisted horses. These are above a small dam. The water from the dam is pumped to the shed to provide stock water. It is also used to irrigate the pasture, using a sprinkler system. Recently a problem has developed with the water in the dam. It is a muddy colour. The colour is worse after it rains.

The paddocks have bare patches and some very bad weed infestations. Charlie has been trying to improve this by using fertiliser and herbicide. A local agronomist has suggested that grazing a small number of sheep and young cattle with, or in rotation with, the horses should control the weed problem and maintain a balanced pasture.

a. Discuss the advantages and disadvantages of maintaining a healthy pasture for animals by only using fertiliser and herbicide, compared with rotational grazing using alternative animals.

b. Identify one change Charlie could make to the runoff from the shed area to make the property more sustainable.
c. Charlie is keen to make sure that the small business is sustainable.
   i. What is the most probable cause of the muddy water?

   iii. Explain two management practices Charlie could use to prevent the muddy water problem.

   Management practice 1 __________________________
   
   Management practice 2 __________________________

   1 + 1 + (3 + 3) = 8 marks
d. Charlie is concerned with looking after the **land and water** resources of the property.
   i. List two environmental indicators Charlie should monitor when maintaining a pasture for grazing horses by only using fertiliser and herbicide.

   Environmental indicator 1

   Environmental indicator 2

   ii. Describe what each of these indicators measures.

   Environmental indicator 1

   Environmental indicator 2

   \[(1 + 1) + (2 + 2) = 6 \text{ marks}\]

e. Government regulations (Acts) exist concerning management of natural resources on privately owned land.
   i. Name one such regulation (Act) of which Charlie should be aware.

   ii. Describe what effect this regulation (Act) has on the management of businesses such as Charlie’s.

   \[1 + 3 = 4 \text{ marks}\]

**Total 24 marks**