

STUDENT NUMBER Letter

AGRICULTURAL AND HORTICULTURAL STUDIES

Written examination

Wednesday 11 November 2020

Reading time: 11.45 am to 12.00 noon (15 minutes)

Writing time: 12.00 noon to 1.30 pm (1 hour 30 minutes)

QUESTION AND ANSWER BOOK

Structure of book

<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
10	10	100

- 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 correction fluid/tape.
- No calculator is allowed in this examination.

Materials supplied

- Question and answer book of 17 pages

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.

Instructions

Answer **all** questions in the spaces provided.

Question 1 (11 marks)

Victoria’s food and fibre industries face several common challenges that must be overcome in order to ensure that animal welfare, sustainable production and biosecurity standards are met.

- a. A horticulturist is producing gerberas (a type of cut flower) in a glasshouse. To control aphids, the horticulturist is spraying sulfur (a chemical) on the plants once a week. The horticulturist is concerned about the health impacts of this practice on workers.

Suggest **one** non-chemical option that could be used to control aphids as part of integrative pest management and discuss the sustainability of this option.

3 marks

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- b. Identify three dimensions of sustainability of food and fibre production. Provide one example of how each dimension relates to food and/or fibre production. 6 marks

Dimension 1 _____

Example _____

Dimension 2 _____

Example _____

Dimension 3 _____

Example _____

- c. A vendor declaration must be provided by a seller of livestock.
Explain the role of a vendor declaration in national farm biosecurity. 2 marks

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Question 2 (5 marks)

- a. Describe a current agricultural or horticultural property management practice that you have studied this year that aims to mitigate the effects of climate change. 2 marks

- b. Evaluate **one** proposed solution of this property management practice in terms of making the effects of climate change less severe. 3 marks

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Question 3 (7 marks)

Sam manages a honey farm in Victoria with over 200 bee colonies that produce over 10 000 tonnes of honey each year. Sam is worried about one pest – varroa mite – that currently exists in other countries and could pose a significant threat to his bee colonies. The varroa mite reduces the life expectancy of honey bees, which contributes to colony collapse and a reduction in honey production. If the varroa mite is detected in bee colonies, the agricultural department will destroy this pest by destroying the bee colonies. In response, Sam is considering using a type of new and emerging technology – genetically modified bacteria – as a control for this pest. However, there are some concerns that these genetically modified bacteria may have an impact on native bees.

- a. The use of genetically modified bacteria is seen as an innovative approach to this biosecurity threat.

Referencing past initiatives used to manage threats, evaluate the impact of using genetically modified bacteria on the honey industry in Australia.

4 marks

- b. Justify Sam’s willingness to use genetically modified bacteria to control this pest, taking into account consumer demand for ethical and sustainable food production in Australia.

3 marks

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Question 4 (7 marks)

Choose one type of business within the food or fibre industries that you have studied this year or are familiar with.

Type of business _____

a. Identify three different sustainability practices that this type of business uses within its production. 3 marks

1. _____

2. _____

3. _____

b. Identify **one** business practice used by this type of business and discuss its ethical considerations. 4 marks

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Question 5 (9 marks)

Victoria’s present salinity problems have resulted largely from human activities, which, in the brief period since European settlement, have modified the natural distribution of salt in the landscape. The reason for most salinity problems of soil and water has been a rise in the level of saline water tables, bringing salt to the surface.

... After the Second World War ... there was a great demand for timber for housing and construction projects. Over 300 sawmills opened to meet the demand for timber. Removal of the deep-rooted native trees and grasses and the development of irrigation projects have allowed more water to move into the soil, raising the groundwater level.

Source: P Dixon, H Anderson and D Cummings, ‘Salinity explained’, information note, Agriculture Victoria, note number: LC0082, December 1999; © The State of Victoria, 1996–2020

A current example of environmental degradation is increasing salinity levels in the Murray River valley, along the Victorian and New South Wales state border. This has made formerly productive fields unusable for growing crops and has reduced native vegetation along the river.

- a.** Identify the two main causes of salinity in agricultural and horticultural systems. 2 marks

- b.** Choose one of the causes of salinity identified in **part a**.

Cause of salinity _____

- i.** Propose **one** action that could be taken to slow or to prevent this cause of salinity from having an impact on food and fibre production. 1 mark

- ii.** Describe how this action would be implemented to control salinity levels. 2 marks

- c.** Explain **two** ways in which a farmer can monitor salinity levels over time. 4 marks

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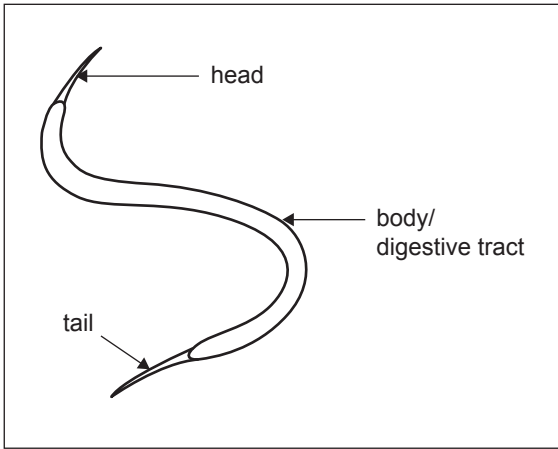
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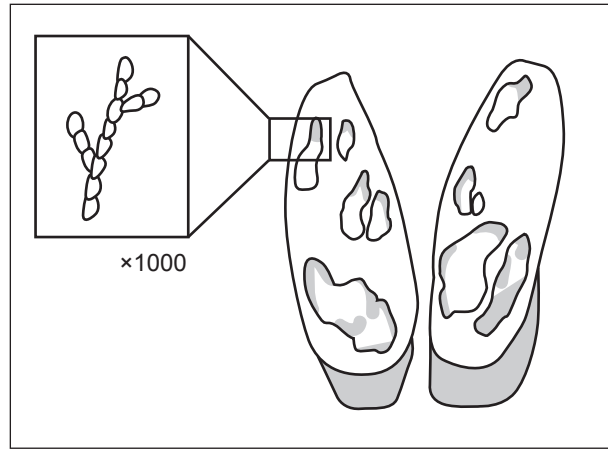
Question 6 (15 marks)

The diagrams below show a common pest and an organism that causes a common disease, both of which affect sheep, goats and other farm animals.

Black scour intestinal worm, 10–20 cm female



Footrot bacterium, microscopic view



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- a. Describe **one** difference between the black scour intestinal worm and the footrot bacterium shown above.

2 marks

- b. Identify **two** similarities between the black scour intestinal worm and the footrot bacterium shown above.

2 marks

c. i. Explain how the black scour intestinal worm would affect the host.

3 marks

ii. Describe an integrated pest management plan for the black scour intestinal worm. Your answer should include management strategies, and planning and prevention measures.

6 marks

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- iii.** Climate change affects the levels of pest and disease.

Explain how warmer conditions may have an impact on the integrated pest management plan described in **part c.ii.** for the black scour intestinal worm.

2 marks

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Question 7 (14 marks)

Igor runs a 100 ha orchard in central Victoria. The local agronomist suggests to Igor that a newly released herbicide will provide better weed control than the chemical he is currently using.

Igor designs a trial to compare the effectiveness of the chemical he is currently using to control weeds, Chemical A, with the new chemical suggested by the agronomist, Chemical B. The results of Igor's trial are shown in Table 1 below.

Table 1. Percentage effectiveness of Chemical A and Chemical B within trial plots

Trial plot	1	2	3	4	5
Chemical A	86%	87%	45%	92%	78%
Chemical B	75%	72%	76%	71%	75%
No treatment	0%	3%	2%	0%	0%

- a. Outline the purpose of the 'no treatment' trial plots. 1 mark

- b. Should Igor be concerned about any of the results in the table above? Give your reasoning. 3 marks

- c. Suggest **two** ways by which Igor might improve the accuracy of his results if he conducted the trial again. 2 marks

- d. Suggest **two** safety precautions that should be taken when applying chemicals. 2 marks

- e. Igor decides to use Chemical A to control wild radish.

Outline a 12-month integrated weed management program Igor could implement instead of only using Chemical A to control this weed on his property.

4 marks

- f. Explain the problems that can result from using only chemicals as a primary control of weeds. 2 marks

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Question 8 (15 marks)

The Johnson family runs a 45 ha biodynamic farm producing eggs on pasture, and free-range pork and lamb. The family lives 40 km from a major city centre. Until recently, most of the family’s business involved selling to restaurants and cafes. The family has diversified by developing a website advertising platform to try to grow its business through direct customer sales. The family has found that most of its customers are now people who travel from the city to purchase from the farm.

- a. Identify **one** strength and **one** weakness of direct customer relationships for small farms. 2 marks

- b. Considering the existing produce of the farm, suggest **one** value-added product that could be included in the range. Justify your answer. 3 marks

- c. A neighbour believes that the family’s marketing approach could increase the carbon footprint of the produce.
Discuss the carbon footprint implications of small farm gate sales. 3 marks

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- d. Identify **two** issues of food provenance that would lead to an interest in farm gate sales. 2 marks

- e. Describe **one** concern the family would need to consider in order to uphold biosecurity when operating farm gate sales. 2 marks

- f. Identify **one** occupational health and safety risk related to farm gate sales and explain how this risk may arise. 3 marks

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Question 9 (10 marks)

A plum orchardist is irrigating a crop by sprinkler at the base of each tree. The orchardist is concerned about the increasing cost of water. The orchardist also notices that there is significant run-off after irrigation and this water has been entering a neighbouring property.

- a. Outline **one** alternative irrigation practice to reduce water costs and run-off. 2 marks

- b. Describe **two** advantages of this alternative irrigation practice for the orchardist. 4 marks

- c. Discuss **one** possible economic issue for the orchardist if they switch to a new method of irrigation. 4 marks

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Question 10 (7 marks)

The introduction of genetically modified organisms (GMOs) in the food and fibre industries is expected to benefit Australian growers. However, there are different points of view, both for and against, about the use of GMOs in these industries.

Choose one food or fibre industry, other than the honey industry, that you have studied this year or are familiar with, which utilises GMO techniques.

Food or fibre industry _____

- a. Identify **one** issue that consumers may be concerned about when purchasing products containing GMOs. 1 mark

- b. Explain how the specific use of GMOs benefits the food or fibre industry that you have chosen. 3 marks

- c. Discuss **one** potential impact on the environment of using GMOs within this food or fibre industry. 3 marks

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