

2020 VCE Agricultural and Horticultural Studies written examination report

General comments

The 2020 VCE Agricultural and Horticultural Studies examination assessed content according to the *VCE Agricultural and Horticultural Studies Adjusted Study Design for 2020 only*.

The study design requires students to specifically study the prevention and control of specific diseases, pests and weeds. It also requires students to develop an integrated management program for pests and weeds. More emphasis on this area of the study design will help students better demonstrate their understanding.

Generally, students need to develop more detailed answers to questions, particularly when asked to respond to questions requiring them to 'discuss' or 'justify'. The context of some questions seemed to be unclear to many students and this may have contributed to superficial responses, or responses that lacked the necessary detail and demonstration of understanding of relevant concepts. Students must take careful note of the command terms, such as 'explain', 'evaluate' and 'justify', and ensure that they guide the content of responses to questions. Interpreting tables of results is a skill that all students should ensure is practised well.

In preparation for the examination, students must refer to the current *VCE Agricultural and Horticultural Studies Study Design* and the examination specifications for Agricultural and Horticultural Studies. Students need to be able to apply their understanding to a range of land, plant and animal management techniques in agricultural and horticultural businesses throughout Victoria.

This report should be read in conjunction with the 2020 VCE Agricultural and Horticultural Studies written examination.

Specific information

This report provides sample answers, or an indication of what answers may have been included. Unless otherwise stated, these are not intended to be exemplary or complete responses.

The statistics in this report may be subject to rounding, resulting in a total more or less than 100 per cent.

Question 1a.

Marks	0	1	2	3	Average
%	35	20	29	16	1.3

This question required students to suggest one non-chemical option for controlling aphids and to discuss the sustainability of this option.

Appropriate options that were suggested include:

- using plants that attract, or introducing, ladybugs or other predatory insects
- using soapy water
- removal by hand
- using aphid-repelling plants such as garlic.

For the discussion of sustainability, students could have referred to the following:

- natural means may be generally better economically and environmentally, although in some cases may be labour intensive (not economically sustainable)
- little risk of resistance so better environmentally.

Question 1b.

Marks	0	1	2	3	4	5	6	Average
%	32	0	4	17	20	14	13	2.9

The three dimensions of sustainability of food and fibre production are environmental, social and economic.

Students needed to identify each of these and include an example.

Appropriate examples include:

- environmental – practices that do not degrade the land, soil, water, air or biodiversity.
- economic – practices that ensure income outweighs costs over time
- social – practices that support fair employment conditions, such as safe working environments.

Over half of students were able to show some understanding of the three dimensions of sustainability in relation to food and/or fibre production. Student need to ensure that they are familiar with all terminology, such as 'dimensions of sustainability', from the study design.

Question 1c.

Marks	0	1	2	Average
%	38	49	12	0.7

An appropriate explanation of the role of a vendor declaration in national farm security may have included:

- traceability of disease and pest outbreaks for control purposes
- promoting animal or livestock health
- declaring use of or lack of drenching and/or growth hormones
- not showing evidence of a pest or disease.

Question 2a.

Marks	0	1	2	Average
%	70	19	11	0.4

This question, which required students to outline practices farmers could undertake to mitigate the effects of climate change, was not well-answered. Many students gave answers related to reducing the production of greenhouse gases instead of stating practices that could alleviate the effect of climate change, for example, the problem of extended heat periods.

A description of practices may have included:

- planting trees for shelter and wind protection
- planting drought-tolerant and deeper-rooted plant varieties
- using shade cloth to reduce heat stress for livestock
- maintaining cover crops
- using minimum tillage.

Question 2b.

Marks	0	1	2	3	Average
%	75	13	8	5	0.4

Students were required to evaluate the property management practice identified in Question 2, part a.

In the context of growing a heat-tolerant crop, a student response may have included reference to maintaining production levels but with a lower moisture content during the year.

In the context of using shade cloth over yards, a student response may have referred to the likelihood of cattle that experienced lower heat stress and the increased likelihood of maintaining production levels.

Question 3a.

Marks	0	1	2	3	4	Average
%	47	32	17	3	0.7	0.8

Students needed to refer to past agricultural and/or horticultural initiatives, such as introduction of cane toads or prickly pear or over-use of chemicals, to evaluate the impact of using genetically modified bacteria on the honey industry. For example, examining if the bacteria have been tested for its effects on other organisms, such as native bees in the environment.

Question 3b.

Marks	0	1	2	3	Average
%	46	45	9	0	0.6

In the justification of Sam's willingness to use genetically modified (GM) bacteria in this context, student responses need to demonstrate an understanding of the concerns of consumers towards use of genetic modification in food production. For example:

- negative perceptions of GM technology in food production and impact on native fauna
- positive perceptions of GM technology and maintenance of a sustainable bee industry
- ethical concerns about potential destruction of hives, and bees including native hives and bees.

Question 4a.

Marks	0	1	2	3	Average
%	42	25	15	18	1.1

Students needed to identify practices that related to any of the dimensions of economic, environmental or social sustainability in reference to their business.

Examples may have included:

- value adding of products
- controlling of weeds
- minimising degradation such as limiting tillage, fencing off streams and planting trees or not overstocking
- following occupational health and safety requirements.

Question 4b.

Marks	0	1	2	3	4	Average
%	47	18	21	11	2	1.0

Students needed to identify one business practice and discuss in relation to ethical considerations. Student responses could have included the following:

- Dehorning dairy cattle and debudding of calves is a practice that was carried out without pain relief but is now more ethical due to the use of anaesthetics and anti-inflammatory drugs.
- free range meat bird production is a practice that allows birds to exhibit more positive behavioural attributes, however they may be more prone to pests, diseases and predators in the open.

Question 5a.

Marks	0	1	2	Average
%	39	36	25	0.9

Most students were able to identify at least one of the two main causes of salinity in agricultural and horticultural systems:

- removal of trees/vegetation (dry land salinity)
- over irrigation/watering (irrigation salinity).

Questions 5bi. and 5bii

Marks	0	1	Average
%	59	41	0.4

Marks	0	1	2	Average
%	85	8	7	0.2

Students were required to propose one action that could be taken to slow or prevent their selected type of salinity from having an impact on food and fibre production and describe how this action would be implemented.

While most students could identify the cause of dryland or irrigation salinity, many were not able to suggest practices that could either prevent or control salinity. The study design specifically outlines the various forms of land degradation that need to be studied.

The following table contains examples of appropriate responses for each of the two causes of salinity.

Type of Salinity	Proposed action to prevent salinity	Description of how this action could be implemented to control salinity
Dry land	Maintain native vegetation cover in recharge area at all times, or minimise removal of deep-rooted trees	Plant native trees and/or fence off recharge area to restrict livestock access so native vegetation will use rainwater and minimise it leaking into ground, preventing rising groundwater that causes salinity
	Maintain ground cover on slopes	Plant deep-rooted, salt-tolerant perennials, such as tall wheat-grass, to prevent rising groundwater that causes salinity
Irrigation	Efficient irrigation of pasture or crop (do not over irrigate)	Laser level the paddock to improve water application efficiency
	Mulching to reduce the amount of water required (for vineyards or orchards)	Mulching reduces evapotranspiration and stops the top of the soil drying out. This reduces the need for irrigation and decreases the likelihood of excess water entering the aquifer

Question 5c.

Marks	0	1	2	3	4	Average
%	47	25	16	8	4	0.9

The question was not well answered. Students need to know about types of environmental degradation, which includes dryland salinity and irrigation salinity, as well as techniques for the prevention of environmental degradation and the rehabilitation of land.

Appropriate responses may have included:

- Visual inspections: Seeing salt on the surface, reduction of crop growth
- Chemical monitoring: Electrical Conductivity (EC) test in the root zone
- Test Bore/Ball: Measuring depth of water table to see if it has changed over time
- Satellite or drone imagery: Measuring the extent of expansion or reduction of salt affected land
- Using salt indicator species: Sea barley grass, Spiny rush and other species are indicators of salinity and only grow in high salt soils. But saltbush, Rhodes grass, couch, strawberry clover are acceptable as they can indicate salinity but do grow elsewhere.

Students needed to include in their answer that the monitoring was to be done over time to determine a trend.

Question 6a.

Marks	0	1	2	Average
%	10	28	63	1.5

This question was very well answered, with the majority of students being able to recognise and attempt a description of one difference between the worm and bacterium shown in the diagrams.

Student responses may have identified any of the following differences:

- Footrot bacterium is microscopic and the black scour intestinal worm is visible.
- Black scour intestinal worm is a pest, while footrot bacterium is a disease.
- Footrot bacterium is an external condition while the black scour intestinal worm is an internal parasite.

Question 6b.

Marks	0	1	2	Average
%	50	32	18	0.7

Understanding of the similarities were not well demonstrated by many students.

Students needed to identify two similarities, for example:

- reduce the overall production of an animal
- cause a loss of condition
- can be introduced to a property by stock movement
- can live away from the host for a period of time.

Question 6ci.

Marks	0	1	2	3	Average
%	17	28	32	23	1.6

Most students could explain at least one way that the black scour worm affected the host.

Responses may have included any of the following explanations:

- reduces nutrient absorption (destroys the villi) and subsequent production (e.g. wool quality).
- loss of appetite and /or weight loss
- scouring
- fatigue and collapse and possible death.

Question 6cii.

Marks	0	1	2	3	4	5	6	Average
%	17	21	23	17	12	7	4	2.2

Students needed to be able to show an understanding of an integrated pest management plan for the black scour intestinal worm.

A high-quality response should have included management strategies, planning and prevention measures, such as:

- identifying the correct worm for chemical application
- monitoring either visually or through faecal worm egg counts (FWEC)
- getting a signed health statement for guarantee when purchasing new stock or quarantining any new stock and then undertaking a FWEC before introducing onto property
- monitoring the worm population and reviewing strategies.

Question 6ciii.

Marks	0	1	2	Average
%	46	43	11	0.7

Students needed to understand the consequence of warmer conditions on pest populations and their management.

Responses could have included the following:

- Due to hotter conditions in summer, there would be a higher worm kill rate on the pasture, reducing the worm burden, meaning less chemical use.
- More FWECs need to be done and drenches with different chemicals may need to be used.

Question 7a.

Marks	0	1	Average
%	49	51	0.5

Students needed to outline the 'no treatment' trial plot was the control trial plot and that it would be used to compare the results of other trial plots in the experiment. Many students were unable to clearly explain this purpose.

Question 7b.

Marks	0	1	2	3	Average
%	16	37	40	7	1.4

Most students were able to identify the anomalies in the data, however, few were able to give a reason for it to gain full marks.

Responses may have included the following:

- Weed control is observed in three no treatment trial plots (trial plots 1, 4 and 5) and possible reasons could relate to, spray drift, run off of chemical, residual in tank from previous application or residual left in soil from previous chemical application or outliers.
- Trial plot 3 for Chemical A has significantly different results and possible reasons: could relate to wrong application or resistant weeds.
- Results for Chemical A have larger variability and possible reason: could be weed resistance to Chemical A.

Question 7c.

Marks	0	1	2	Average
%	35	57	8	0.7

Most students could suggest one method to improve accuracy with only a few able to give two.

Responses may have included the following suggestions:

- Increase the number of trial plots.
- Ensure all variables related to each plot are the same.
- Repeat trial (replication) at other time.

Question 7d.

Marks	0	1	2	Average
%	4	48	49	1.5

Safety precautions may have included any two of the following:

- use correct personal protective equipment (PPE)
- read the label and follow instructions, using correct solvents, dosage and dilutions
- apply in correct weather conditions
- refer to safety data sheets (SDS) and material safety data sheets, i.e. documents that provide critical information about hazardous chemicals.

Almost all students were able to suggest at least one safety precaution.

Question 7e.

Marks	0	1	2	3	4	Average
%	33	36	22	6	3	1.1

A general outline of the steps to generate an integrated weed management plan for wild radish was required including: reviewing past actions and assessing the current weed status; identifying weed management opportunities and matching with various control options related to biological, cultural and/or chemical control and prevention; and observation/monitoring of weeds and chemical action control options over time.

Question 7f.

Marks	0	1	2	Average
%	11	73	16	1.0

Responses needed to explain that chemicals are harmful to the environment and that weeds can grow resistant to particular chemicals.

Question 8a.

Marks	0	1	2	Average
%	21	42	36	1.1

The strengths included in student responses may have included the following:

- the farmer can directly sell to customers, potentially increasing profits and/or decreasing cost of transportation
- customers may become aware of other products that the farm may sell
- supporting local community (social sustainability)
- customers know where their food comes from directly and that it has travelled less.

The weaknesses may have included:

- more potential exposure or risk to biosecurity of farm as more people will be directly coming to the farm
- a greater number of health inspections from industry.

Question 8b.

Marks	0	1	2	3	Average
%	73	4	17	6	0.6

Some possible value-added products include:

- making fresh or frozen products on site to sell, such as quiches and pies
- animal nursery/petting
- using waste products for processing and drying for dog treats
- selling dried and pelleted chook poo.

Question 8c.

Marks	0	1	2	3	Average
%	29	24	34	13	1.3

Student responses may have referred to the following points in their discussion:

- increase in use of fossil fuels/carbon dioxide emissions because more cars are coming from the city (rather than one truck)
- increase in carbon footprint.

Question 8d.

Marks	0	1	2	Average
%	41	31	28	0.9

Many students appeared not to understand the term 'food provenance' and were unable to provide a complete response to the question. Students needed to identify two issues related to food provenance that would lead to an interest in farm gate sales. Responses may have included:

- Buying at the farm gate may contribute to knowing how and where food is grown, caught or raised, and therefore a greater understanding of ethics of producers.
- Farm gates sales may contribute to belief that these foods contribute less to greenhouse gases as they have reduced transportation costs.
- Belief that food is fresher and more nutritious when purchased from the farm gates.
- Belief that you are supporting the local community (social sustainability) by purchasing from the farm gate.

Question 8e.

Marks	0	1	2	Average
%	28	47	25	1.0

Larger numbers of people coming to the farm increases the overall risk of biosecurity issues.

Question 8f.

Marks	0	1	2	3	Average
%	44	25	26	5	0.9

Students needed to identify one occupation health and safety risk that related to farm gate sales.

They may have included:

- sun/wind exposure
- slips, trips and spills (particularly if wearing inappropriate footwear)
- encounters with dangerous animals (farm animals, snakes or spiders)
- risk of food poisoning.

Student responses needed to include an explanation of how these risks may arise. Many students were unable to identify the risks, nor adequately explain this.

Question 9a.

Marks	0	1	2	Average
%	44	22	34	0.9

Responses may have included a description of:

- drip irrigation at the base of the trees
- catching runoff and recycling and/or collecting it
- variable rate irrigation and moisture probes.

Question 9b.

Marks	0	1	2	3	4	Average
%	50	12	18	9	12	1.2

Responses may have included a description of:

- saving on water costs
- more effective plant growth
- less weed growth because of drippers at root zone
- upholding the law and water not entering neighbouring property
- reducing erosion through runoff.

Question 9c.

Marks	0	1	2	3	4	Average
%	37	14	30	15	4	1.3

Responses may have included a discussion of:

- the time for trees to adjust to the new system which could impact yield
- the time to familiarise and optimise use of the new system, impacting on time spent on production of fruit.

Question 10a.

Marks	0	1	Average
%	38	62	0.6

Most students had some understanding of an issue related to the use of genetically modified organisms (GMO) in the food and fibre industries and were able to identify concerns, for example the process not being natural and possible effects on environment as well as the fear of long term health effects.

Question 10b.

Marks	0	1	2	3	Average
%	66	17	12	5	0.6

Responses to this question around the benefits of using GMOs may have include an explanation of:

- potential increase in, or efficiency of, production, including increased disease resistance
- potential decreased cost of production (e.g. fewer chemical costs, less water)
- increased disease resistance/tolerance.

Question 10c.

Marks	0	1	2	3	Average
%	72	16	9	3	0.4

Most students did not demonstrate an understanding of an issue related to the use of GMOs in the food and fibre industry that consumers could be concerned about. Many students were unable to clearly discuss how the introduced technology could benefit the industry and how it could impact the environment.

Potential impacts on the environment that may have been discussed include:

- biodiversity loss, including impact on non-targeted organisms
- consequences of a gene being transferred unintentionally from a genetically modified crop to another related crop or species
- less use of the chemicals.