

2023 VCE Agricultural and Horticultural Studies external assessment report

General comments

The 2023 VCE Agricultural and Horticultural Studies examination assessed content according to the *VCE Agricultural and Horticultural Studies Study Design 2020–2025*.

Students demonstrated a good understanding of quality assurance programs and applications of innovations and technology in Australian food and fibre production. They also had satisfactory knowledge of strategies for prevention and control of gorse and sustainable strategies in agricultural and/or horticultural industries to manage and conserve resources.

Areas for improvement include:

- proposing actions for prevention and control of environmental degradation
- knowing names (including year) and a summary of state and federal government regulations and policies affecting the sustainability of Australian agricultural and/or horticultural businesses
- analysing impacts of climate change on Australia's food and fibre production
- discussing strategies of prevention and control for common agricultural and/or horticultural pests, diseases and weeds
- knowledge of current Australian agricultural and/or horticultural research projects and/or partnerships that aim to find solutions to the challenges of climate change, waste of food produce, and increased demand due to population growth.

Students need to develop more detailed answers to questions, particularly questions that are worth four or more marks. Students need to consider the command words in each question and respond accordingly. Evaluation questions were not well answered.

In preparing students for the examination, teachers must refer to the current 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-management techniques and food and fibre industries.

Specific information

This report provides sample answers or an indication of what answers may have 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 of more or less than 100 per cent.

Question 1a.

Mark	0	1	2	Average
%	18	36	46	1.3

Most students were able to give one or two implications.

Answers included:

- fines
- reduced market opportunities/access
- loss of business
- loss of licences.

Question 1b.

Mark	0	1	2	3	4	5	6	Average
%	49	11	15	14	7	3	1	1.3

This question required students to explain two risks that affect the quality of a product **during** production in relation to food safety. Many of the answers reflected an incorrect interpretation of the question that was related to storage or transport or was unrelated to food safety and/or the quality of a product during production.

Answers included:

- water as a carrier of pathogens
- presence of foreign weed matter, especially toxic varieties
- chemical contamination – withholding periods not observed
- milk contamination such as manure.

Question 2a.

Mark	0	1	2	3	4	Average
%	13	13	23	33	18	2.3

In this question students needed to refer to the industry, not the farmer. It was a general question about climate change, and students did not need to know specifically about the potato industry to answer this well.

They needed to identify one negative impact, such as

- crop losses due to hail, flood or wind events during growth
- low production due to a change in rainfall patterns such as drought events or reduced rainfall leading to increased risk of diseases, pests and weeds.

Students had to analyse the effect of the impact on the economic sustainability of the potato industry.

Following is an example of a high-scoring response:

Increased frequency of very hot days in combination with decreased annual rainfall negatively affects potato production as plants experience wilting and heat damage and the quality and quantity of potatoes is reduced. This effects the industry as it results in a shortage of potato supply to

consumers meaning less sales and profits for the whole industry, which limit funding for research and development for potatoes.

Question 2b.

Mark	0	1	2	3	4	Average
%	28	10	37	12	14	1.8

Examples of strategies could be (any two of):

- Diversify land use through growing other crops and keeping livestock, which lowers the impact of a failed potato crop and makes it less important to the whole farm profitability.
- Increase water-use efficiency through water monitoring, soil water sensors, efficient water application processes and improved soil and organic matter.
- Use drought-tolerant species.
- Change production cycles to suit the change in weather conditions.

Question 2c.

Mark	0	1	2	3	4	5	Average
%	31	16	20	16	11	7	1.8

Students needed to discuss how the role of sustainable land management involves the enhancement of the resources for the desired industry and reduces practices that deplete those resources and have negative effects on the environment.

Well-answered discussion points included examples of good practices (e.g. soil management through paddock rotation, and breaking pest lifecycles which reduces the amount of chemicals required.) and practices to avoid (e.g. excessive cultivation leading to erosion and poor soil structure).

Following is an example of a high-scoring response:

Sustainable property management ensures that land and water are not negatively affected by the use of them to produce food and fibre. The sustainable use of land during production would imply the land isn't degraded further with erosion, salinity, compaction and other issues being controlled and reduced rather than being exasperated. In regards to the sustainable selection of land to be used for production, land should be selected if it fits the purpose and if the use of it doesn't cause negative impacts on the surrounding environments and ecosystems. Sustainable property management also ensures that biodiversity of the land isn't negatively impacted and that things like pests aren't introduced. All these factors contribute to the use of land for food production being more sustainable due to the role of sustainable management of the properties used for production.

Question 3a.

Mark	0	1	2	3	4	Average
%	38	30	30	2	0	1.0

This question required the students to describe two treatments for a 'down cow' with milk fever.

Answers required:

- calcium supplementation
- intravenous fluids
- physical therapy e.g. slings to assist standing
- pain management

Question 3b.

Mark	0	1	2	3	4	Average
%	51	22	18	5	4	0.9

Any of the following answers were acceptable with an appropriate discussion.

- monitoring cows during pregnancy, e.g. calcium levels, stress
- transition feeding to make the cow slightly calcium deficient, so that the cow can mobilise calcium from the bones ready for lactation.
- balanced diet
- genetic selection
- training and education for farmers

Feeding more calcium was a common answer that is incorrect for milk fever prevention.

Following is an example of a high-scoring response:

On the lead-up to calving, cows should be on low-calcium feed to stimulate the lack of calcium in their blood at calving, so that they access the calcium stores in their bones. Magnesium supplements can also be supplied to increase the level of magnesium in their bodies as it aids in calcium uptake and processing.

Question 3c.

Mark	0	1	2	3	4	Average
%	36	25	23	9	7	1.3

Most students were able to give at least one characteristic for metabolic disease.

- disruption in metabolic processes such as hormonal imbalances or altered energy metabolism
- clinical signs such as changes in behaviour, appetite, health
- not contagious

Question 4a.

Mark	0	1	2	3	Average
%	4	12	44	40	2.2

This question was generally well answered, with most students correctly referring to a before and after measure or some sort of trial.

Question 4b.

Mark	0	1	2	Average
%	7	24	69	1.6

This question was well answered with descriptions including:

- greater amount of crop available for harvest and less crop waste
- decreasing bird numbers that affect the crop.

Question 4c.

Mark	0	1	2	Average
%	13	15	72	1.6

High-scoring responses included:

- Upkeep of lasers is expensive and requires a specialist technician.
- Relies on power and may fail in power outages resulting in return of birds and damage to crops.

Question 5

The three Acts are listed in the study design, so students needed to have studied them and been able to link them to a dimension of sustainability and outline a positive effect on that sustainability.

Some students incorrectly thought that they had to list each Act to a different dimension of sustainability.

Question 5a.

Mark	0	1	2	3	Average
%	15	58	24	3	1.2

Environment Protection Act 1970

Dimension of sustainability: For example, environmental

Possible responses include:

- pollution prevention and control e.g. noise, air, fresh or ground water, soil
- waste minimisation and resource recovery e.g. recycling and conserving resources rather than being placed in landfill
- responsible waste disposal through preventing illegal dumping and littering.

Question 5b.

Mark	0	1	2	3	Average
%	10	15	50	25	1.9

Occupational Health and Safety Act 2004

Dimension of sustainability: For example, social.

Possible responses include

- supporting workplace safety and wellbeing
- providing workers with rights to safe work environments e.g. reduced work-related injuries and illness
- encouraging worker participation in workplace safety initiatives such as development of policies and risk assessments

Question 5c.

Mark	0	1	2	3	Average
%	32	35	25	9	1.1

Catchment and Land Protection Act 1994

Dimension of sustainability: For example, environmental

Possible responses include

- promoting responsible land management such as prohibiting the movement and sale of noxious weeds anywhere in the state.
- conserving biodiversity
- engaging communities in natural resource management/stewardship.

Following is an example of a high-scoring response:

Environmental Sustainability manages pests and diseases in ecosystems and prohibits the sale or distribution of all declared pests and diseases, hence contributing to the health of Australia's ecosystems and environment.

Question 6a.

Mark	0	1	2	3	Average
%	55	12	18	15	0.9

An understanding of risk of biosecurity is required. Some students talked about live animal imports from Indonesia which does not exist.

Some high-scoring answers related to the Australian government included:

- introducing mandatory footbaths into all airports, which reduced possible contaminants on passengers' shoes.
- imposing bans on food imports from countries such as Indonesia.
- Following is an example of a high-scoring response:

All goods arriving from countries where FMD is present must be disinfected and all passengers must undergo a footbath on arrival into Australia. This helps prevent the spread of FMD into Australia through goods/passengers by increasing biosecurity measures. Prevents FMD from impacting Australian agriculture/horticulture.

Question 6b.

Mark	0	1	2	3	Average
%	18	34	34	14	1.4

This answer had to describe the link between the role of biosecurity and the agricultural and horticultural industry for full marks.

Biosecurity measures role include:

- reduce the risk of communicable diseases coming into Australia
- keeps the industry free of/helps prevent introduction of invasive weeds, pests and diseases and preserve the biodiversity of ecosystems
- protects the economic and social sustainability of agricultural and horticultural export industries
- maintains Australia's 'clean and green' image.

Question 7a.

Mark	0	1	2	Average
%	33	29	38	1.0

This question was about reducing the incidence of intestinal worms.

Strategies included:

- Using genetics to breed livestock that are more resistant to worms.
- Monitoring worm population through worm egg counts (WEC) and providing appropriate treatment..
- Management of worm burden, such as through rotational grazing or no grazing in low-lying wet paddocks.

Question 7b.

Mark	0	1	2	3	Average
%	29	32	29	11	1.2

This question required answers that included managing risk factors using an integrated approach. Any of the steps in the integrated approach could have been included such as:

- breeding animals for increased resistance to parasites such as intestinal worms
- employing pasture management practices to break the lifecycle of intestinal worms and reduce pasture contamination
- implementing a strategic deworming plan by monitoring intestinal worm levels and treating affected animals as needed.

Question 7c.

Mark	0	1	2	Average
%	39	36	24	0.9

Students needed to refer to the impact on the agriculture industry, not the impact on farmers, to obtain marks in this question.

Answers included:

- impact on the production efficiency of cattle herds, causing disease, reducing growth rates, and sometimes causing death.
- Less availability of product for consumers

Question 8a.

Mark	0	1	2	3	Average
%	6	21	42	30	2.0

For each resource, students needed to identify one conservation option or method.

Resource	Conservation option or method
Fuel	<ul style="list-style-type: none"> • bio energy/biofuel/solar-powered machinery/alternative (electric) machines/ • machine efficiency (fuel efficiency, newer machinery, robots, and drones)
Electricity	<ul style="list-style-type: none"> • solar panels/wind power/hydropower • waste-gas turbines/ • carbon farming offsets/
Water	<ul style="list-style-type: none"> • water tanks/efficient irrigation/drip irrigation/hydroponics/ • soil organic matter/soil moisture monitoring

Some students misinterpreted the question as one about how these resources cause climate change.

Question 8b.

Mark	0	1	2	3	4	5	6	Average
%	4	9	18	17	21	19	12	3.5

Students needed to propose one strategic approach to manage each of the types of environmental degradation listed in the table.

Environmental degradation	Strategy
Erosion	<ul style="list-style-type: none"> plant trees and shrubs to assist with erosion retain ground cover stubble retention fencing and stock tracks reduced stocking rates
Salinity	<ul style="list-style-type: none"> plant trees and shrubs: salt-tolerant crop and pasture species and varieties, deep rooted vegetation monitor low saline water sources (testing bore water prior to irrigation) irrigating based on land/soil type
Waterlogging	<ul style="list-style-type: none"> build water drainage systems plant trees and shrubs/ reduce compaction/ using paddocks to their conditions such as soil type, slope, drainage, and fertility cropping according to the contours of the land
Compaction	<ul style="list-style-type: none"> controlled traffic and fences sacrificing paddocks/creating laneways/ reduced stocking rates/ precision agriculture (minimal drilling)/ deep ripping/ applying gypsum
Soil acidity	<ul style="list-style-type: none"> soil pH test and add elements where necessary (e.g. gypsum/lime) control fertiliser rates and types
Turbidity	<ul style="list-style-type: none"> prevent effluent runoff /fence off water sources plant trees and shrubs/stabilising banks with plants don't allow livestock access to water reduce introduced fish species such as carp use irrigation methods that reduce movement of bottom particles

Following is an example of a high-scoring response:

<i>Environmental degradation</i>	<i>Strategy</i>
<i>erosion</i>	<i>Plant 'cover crops', which will prevent the erosion of topsoil during wet season by increasing soil structure</i>
<i>salinity</i>	<i>Plant deep rooted natives, which will lower the water table and reduce the salinity due to the high salt levels</i>

<i>waterlogging</i>	<i>Empty drainage ways at crop border which will hold excess water off plant roots</i>
<i>compaction</i>	<i>Deep rip the hard clay to reduce the foundation and impact of compacted soil</i>
<i>soil acidity</i>	<i>Add lime as a fertiliser to decrease the pH</i>
<i>turbidity</i>	<i>Plant vegetation near waterways to reduce the erosion of dirt bank walls into the water</i>

Question 9

Mark	0	1	2	3	4	Average
%	52	10	10	14	14	1.3

Research projects or partnerships are in Unit 3 Outcome 1 of the study design.

Possible research project or partnership include:

- Food Bank
- Fight Food Waste CRC
- Odd Bunch
- OzHarvest
- Food is Free
- Cellysis.

Students need to provide an explanation of how the research project or partnership attempted to reduce food waste.

Following is an example of a high-scoring response:

'Path to Half', an Australian project to halve food waste by 2030. The project aims to education citizens on proper strategies to reduce waste both in and out of homes. By adding incentives to proper recycling and disposal of waste, people will follow the correct ways and reduce waste. Education for families and particularly kids who cause large amounts of waste at home and school will cause a change in practice, allowing less waste to occur. The education route allows people to spread the importance of food conservation to each other, increasing the amount of people following the proper guidelines.

Question 10a.

Mark	0	1	2	Average
%	59	18	23	0.6

Students needed to **describe**.

One of the following:

- broadening market access/many avenues for sale
- less dependence on domestic markets in case there is an oversupply of hay
- allows greater economies of scale

- good demand and provision of forward contract and pricing
- allows for a greater revenue and profits.

Question 10b.

Mark	0	1	2	Average
%	36	28	36	1.0

Students could have answered this question about other produce other than hay.

Answers could include:

- Different market: selling on domestic/local market or at farm gate/produce store
- Targeting niche markets, such as specialist livestock producers, e.g. horse hay.

Question 11a.

Mark	0	1	Average
%	51	49	0.5

In this question, students were asked for an example of a sustainable or ethical consumer demand.

Answers included:

- improved animal welfare
- less artificial chemical use
- locally grown food or fibre produce

Question 11b.

Mark	0	1	2	Average
%	28	39	33	1.0

Students were asked to describe the industry response to 11a.

Possible answers included:

- fair trade certification
- animal welfare standards such as free range farming, mulesing or debudding under anaesthetic or removing sow stalls in piggeries.
- using integrated pest management to reduce reliance on chemical pesticides.
- products from farms practising regenerative agriculture
- organic farming practices.

Question 11c.

Mark	0	1	2	3	4	Average
%	22	8	33	28	9	1.9

This was an 'evaluate' question.

High-scoring responses were able to give an advantage and a disadvantage as a result of the action they had described in 11b., and a judgement that referred back to 11b.

Question 12a.

Mark	0	1	2	Average
%	8	47	45	1.4

A well-answered question. Most students were able to outline at least one way that gorse can be dispersed such as seed dispersal by animals, human activities, wind or water.

Question 12b.

Mark	0	1	2	3	4	Average
%	9	14	28	26	23	2.4

This question asked students to explain strategies to control gorse.

Some strategies that explained were:

- herbicide control
- burning control
- biological control.

Following is an example of a high-scoring response:

Gorse can be chemically controlled through the use of glyphosate, which can be sprayed on the shoots to stop them growing. It can also be controlled through the use of the biological control of the gorse spider mite, which consumes and damages the shoots and plants so they can't grow or grow as efficiently.

Question 12c.

Mark	0	1	2	Average
%	28	49	23	1.0

Answers for this question needed to relate to the food or fibre industries, not the farmer. For example: 'Less availability of product for consumers because of the reduction in land that can be used for pastures and livestock due to infestations of gorse.'

Question 13a.

Mark	0	1	2	3	4	Average
%	15	12	41	15	18	2.1

Possible influences that convince producers to breed and milk cows that produce A2 milk include:

- increased income, paying more for A2
- reliable differentiated market allows for price premium and guaranteed market
- market drive, the need for the product, such as health benefits.

Students were required to provide an explanation of two influences.

Question 13b.

Mark	0	1	2	Average
%	45	21	34	0.9

One reason why some dairy farmers may not produce A2 milk could be:

- needing to create a separate herd for cows that specifically produce A2 milk.
- it takes some time to breed cows that produce A2 milk.
- farmers may not 'have the right cows', i.e. those that produce A2 milk.
- may not have access to these niche markets.