

# 2017 VCE Agricultural and Horticultural Studies examination report

## General comments

The 2017 Agricultural and Horticultural Studies examination assessed all parts of the study design.

Students showed an adequate understanding of the modification of climate and soils. They also showed an adequate understanding of their chosen weed, pest or disease in terms of signs and symptoms and prevention; however, many struggled to state biological or chemical control methods.

Students were generally able to identify the gases that contribute to global warming as well as various forms of land degradation. However, students struggled to outline management strategies to mitigate these problems. More emphasis on this aspect of the study design will strengthen students' overall understanding of management practices.

The selection of appropriate new and emerging technologies by students was concerning. The study design outlines succinctly the requirements for selection. Students need to ensure that they are researching the appropriate technologies.

Students' understanding of quality standards, value-adding of the product and environmental, financial and marketing risks, within a business context, requires improvement. When students start preparing their own business plan it is important that they understand these components in terms of real contexts such as a horticultural or agricultural commercial business.

Overall, the detail and complexity of students' answers to most questions was greatly lacking.

Students can use past examinations to practise responding to questions under examination conditions and compare their written responses to those given in the corresponding examination report.

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 2017 VCE Agricultural and Horticultural Studies written examination.

## 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 more or less than 100 per cent.

### Question 1

Marks	0	1	2	3	4	5	6	7	Average
%	0	2	11	17	18	28	19	6	4.4

Students were required to state **one** way plant and animal environments could be modified to improve production. One-word answers were not accepted.

Increase the temperature of a glasshouse

- install a heater (above or below ground), turn on a heater
- close the vents
- reduce shading
- reduce ventilation

Decrease the humidity in a crop

- reduce fogging or misting
- increase ventilation
- operate fans
- open vents
- have wider spacing between plants
- reduce foliage
- use drip irrigation rather than sprinklers

Reduce the effect of wind on a cut flower crop

- grow in a polyhouse
- have movable wire supports that can be raised as the crop grows
- plant a windbreak
- build a shade cloth fence

Reduce the wind chill on sheep in a paddock

- provide shade in the paddock, shade trees, shelter belts, sheds
- carefully time the shearing (not too bare but not too much heavy wool)
- maintain corridors of longer pasture

Reduce the turbidity or cloudiness of water in a dam that is used as a source of drinking water for livestock

- add alum
- prevent stock access to dam – install drinking troughs
- fence the dam to prevent stock access
- maintain a vegetation buffer zone around the dam

Improve the structure of compacted soil

- add organic matter
- add gypsum if the clay component is high
- reduce traffic (stock or machinery)

Deep ripping was not acceptable.

Increase the pH of a soil or a potting mix

- add lime (calcium carbonate)
- add dolomite (calcium magnesium carbonate)

Overall this question was answered well. Most students were able to state a modification to improve production. A common mistake was stating that deep ripping would improve soil structure.

**Question 2**

Marks	0	1	2	3	Average
%	6	15	36	42	2.1

Students were asked to outline three advantages of growing the cut flower crop in a polyhouse instead of in a field.

Advantages included better control over:

- temperature
- soil/growing medium moisture levels
- light levels
- humidity
- wind or air movement
- weeds, pests, vermin and some diseases
- spray drift from chemical/water application
- protected working environment
- protection from physical damage such as storms/hail/sunburn
- ability to extend growing season

Most students could state advantages in growing cut flower crops inside a polyhouse instead of in the field.

**Question 3**

Students were required to choose a weed, other than flickweed, from the prescribed list.

**Question 3a.**

Marks	0	1	2	Average
%	25	31	43	1.2

A description of two steps that could be taken to prevent the entry of the chosen weed into an agricultural or horticultural property was required. Examples of various methods include:

- Control pests such as foxes and blackbirds, which spread seed.
- Encourage neighbours to control their weeds.
- Ensure that animals and products that are brought on the property, such as grass hay, are not contaminated with weed.
- Ensure good hygiene of vehicles and humans coming on to the property – wash mud off vehicles, boots.

The majority of students showed some understanding of preventative measures to be undertaken to stop weeds from entering a property.

**Question 3b.**

Marks	0	1	2	3	Average
%	59	18	21	3	0.7

Students were required to name one biological control that could be used on their chosen weed and explain how it affects the weed.

Weed	Biological control and how it affects the weed
blackberry	<p>Grazing: heavy grazing by goats during late winter or early spring can control blackberry.</p> <p>Blackberry Rust Fungus (<i>Phragmidium violaceum</i>)</p> <ul style="list-style-type: none"> <li>• affects leaves, flowers, fruits – breaks down cell structure</li> <li>• defoliation, fruit abortion</li> <li>• reduces biomass and photosynthetic efficiency/capacity</li> <li>• reduces daughter plants</li> <li>• reduces cane length</li> <li>• reduces leafiness</li> <li>• reduces crown size</li> </ul>
capeweed	<p>Grazing</p> <ul style="list-style-type: none"> <li>• Heavy grazing during late winter or early spring can control capeweed.</li> <li>• Grazing will reduce the spread of the capeweed.</li> </ul>
ragwort	<p>Ragwort flea beetle (<i>Longitarsus flavicornis</i>)</p> <ul style="list-style-type: none"> <li>• The newly hatched larvae feed by mining into the leaf petioles, roots and plant crown, severely damaging or killing the plant.</li> <li>• Larvae also feed externally on the roots and crown, reducing plant vigour.</li> <li>• Feeding occurs from late summer until the end of the following spring.</li> </ul> <p>Ragwort stem and crown-boring moth (<i>Cochylis atricapitana</i>)</p> <ul style="list-style-type: none"> <li>• the caterpillars' mining thickens young stems and suppresses flowering</li> <li>• kills older stems</li> <li>• kills root crowns of rosette plants</li> </ul> <p>Ragwort plume moth (<i>Platyptilia isodactyla</i>)</p> <ul style="list-style-type: none"> <li>• larvae tunnel into the stem and crown, severely damaging the plant</li> <li>• can kill the plant</li> <li>• reduces plant vigour</li> <li>• reduces the number of flowers and seeds produced</li> </ul> <p>Other biological control agents include the Cinnabar Moth.</p>
serrated tussock	<p>Grazing: goats can control infestations up to 20% ground cover.</p> <p>Trials have been done with three agents:</p> <ul style="list-style-type: none"> <li>• Rust fungus (<i>Puccinia nassellae</i>): can kill serrated tussock.</li> <li>• Smut (<i>Ustilago</i> spp.): a fungus that destroys the plant's seeds. It does not kill the plant but prevents it from reproducing.</li> <li>• <i>Corticium</i> spp. fungus: rots the crowns and roots of serrated tussock, causing the plants to die.</li> </ul>
wild radish	<p>Graze: graze prior to seed embryo formation</p> <p>Wild radish flower-gall midge</p> <ul style="list-style-type: none"> <li>• Classical biological control of wild radish is difficult because some important crop species are closely related but wild radish flower-gall midge seems the best option.</li> <li>• Wild radish flower-gall midge seems to be limited to wild radish.</li> <li>• The larvae of the gall midge develop inside flowers, which are transformed into galls. Thus reproduction of the radish is severely affected.</li> </ul>

This question was not answered well, with less than half of the students able to state one biological control method. When researching control of weeds, students need to make sure there is a readily available biological control.

**Question 3c.**

Marks	0	1	2	3	Average
%	82	5	5	8	0.5

The name of one chemical, other than Roundup (glyphosate), was required that could be used to target students' chosen weed. They also needed to explain when the chemical should be applied.

Weed	Chemical and application timing
Blackberry	<ul style="list-style-type: none"> <li>• Triclopyr (Garlon) or triclopyr + picloram (Grazon): when the blackberry is actively growing with good leaf area from October to April</li> <li>• Metsulfuron: Optimal application time of November to March</li> </ul>
Capeweed	<ul style="list-style-type: none"> <li>• 2, 4-D amine (e.g. Amicide 625): in autumn, winter or spring</li> <li>• Paraquat (e.g. Weedoff): at budding in spring for a number of years</li> <li>• Grazon: when plants are young (less than 100 mm wide) or by flowering to reduce seed set. Optimal application time of autumn/winter.</li> </ul>
Ragwort	<ul style="list-style-type: none"> <li>• 2, 4-D amine (e.g. Amicide 625): when plants are at the seedling or 'cabbage' stages</li> <li>• Clopyralid, Dicamba and Tordon 75-D: when plants are mature</li> <li>• Brush-Off</li> </ul>
Serrated tussock	Flupropanate; 2, 2-DPA and tetrapion for chemical control.
Wild radish	<ul style="list-style-type: none"> <li>• Brodal: in cereals, early control is required to gain the maximum yield benefits. Spraying at the three-leaf stage of wheat normally returns 4–5 times more yield than spraying at tillering</li> <li>• Diflufenican: will remain in the soil for some weeks and control later germinating seeds</li> <li>• Metosulam (e.g. Eclipse): when plants are larger, vegetative</li> <li>• Triasulfuron (e.g. Logran) plus oil is preferred: once the flowering stem has emerged</li> <li>• Diquat <ul style="list-style-type: none"> <li>– just before harvest, green radish can be desiccated with Diquat</li> <li>– Diuron plus MCPA is a useful alternative where resistance requires management</li> </ul> </li> </ul>

Students are required to know the control measures of all listed weeds. Few students had knowledge of a chemical control for their chosen weed. Of the students who did, only a small number could state the chemical and when to apply it.

**Question 4**

Students needed to select a pest or disease from the published list.

**Question 4a.**

Marks	0	1	2	3	4	Average
%	22	23	37	15	3	1.6

Students were asked to explain why an integrated pest management (IPM) plan is necessary and then describe two aspects that should be included in a typical plan.

High-scoring responses should have included:

- a reliance on one method of control is less likely to be effective/multipronged methods are more likely to be effective
- sustained use of chemical controls could lead to resistance of the pest/disease to the chemicals
- an IPM plan is likely to be more cost effective as controls will be better targeted
- an IPM approach may be more environmentally sensitive as there are likely to be fewer harmful chemicals released into the environment
- an IPM plan helps the farmer and workers to make informed decisions
- to make a more sustainable approach to pest management
- reduces the dependence on chemical control.

Students were required to state any two of the suggested responses below as part of a management plan:

- knowledge of pest/lifecycle/natural predators
- monitoring of pest
- economical threshold/action threshold
- biological/mechanical/chemical/cultural control (students needed to name the agent/procedure)
- cultural control, e.g. crop rotations, pruning, burning stubble, use of resistant varieties
- biosecurity plan
- timeline
- it helps the farmer identify the pest and give treatment options, and when and how to look for it
- helps the farmer to decide whether action is required (above or below economic threshold).

The topic of integrated pest management is important within the study design and increased focus is needed on this area of study.

**Question 4bi.**

Marks	0	1	2	Average
%	68	24	8	0.4

Students were required to explain the cause of milk fever.

Possible responses included:

- a low blood calcium level (hypocalcaemia)
- milk and colostrum production drain calcium (and other substances) from the blood, and some cows are unable to replace the calcium quickly enough before, during or after calving
- high producers are more susceptible because the fall in their blood calcium level is greater. Selecting cows for high production may, therefore, increase the problem with milk fever
- some individual cow families or breeds (for example, jersey) are more susceptible than others

- age is important. Heifers are rarely affected. Old cows increase in susceptibility up to the fifth or sixth calving because they produce more milk and are less able to replace blood calcium quickly
- excess calcium in the diet decreases the efficiency of absorbing calcium from the intestine and the efficiency of transferring calcium from the skeleton. Both become very sluggish and the chance of milk fever is greatly increased
- grazing pastures in southern Australian winter and spring results in alkaline blood, which creates conditions unfavourable for the availability of calcium in the body and predisposes the cow to milk fever
- fat cows are at a greater risk than thin cows. This is partly because their feed and calcium intake has been higher and partly because fat cows produce more milk at calving time.

**Question 4bii.**

Marks	0	1	2	Average
%	75	17	8	0.4

A method to treat milk fever was then required. These included:

- Use 300 mL, or more, of a 40% solution of calcium borogluconate or, preferably, a combined mineral solution such as 'three-in-one' or 'four-in-one'. Often 600 mL may be required.
- A mild case can be treated with Calcoral, given orally.
- The combined solution contains additional ingredients such as magnesium, phosphorus and glucose/dextrose (for energy), which may also be at low levels in the blood while cows have milk fever.
- Injection of the solution by farmers should be in several places under the skin on the neck or behind the shoulder, unless the cow is in a coma or there are other reasons for desiring a quick response.
- Injection into a vein should be left to a veterinarian as it can cause sudden death if not carried out properly. Veterinary assistance is also advisable if there is not a quick response to treatment, because other problems may also be present.
- Cows that are 'flat out' should be propped up into a normal resting position to relieve bloat.

This question challenged many students. Only one-third of students showed any knowledge of the disease and only a quarter knew of the method to treat it. This question highlights the need for students to know intimately pests and diseases on the prescribed list each year.

**Question 4c.**

Marks	0	1	2	Average
%	23	45	32	1.1

Students needed to choose one pest or disease, other than milk fever, from the prescribed list in the examination and explain how it affected their plant or animal.

Most students were able to state one effect that the disease or pest had on their chosen plant or animal.

**Question 4d.**

Marks	0	1	2	3	Average
%	21	29	32	18	1.5

Students needed to describe three steps a farmer could take to prevent the entry of their chosen pest or disease into an agricultural or horticultural property.

- Prevent entry that occurs by 'hitchhiking' on machinery, clothes or plant material by constantly adhering to hygiene practices.
- Reduce nearby weeds and other vectors that harbour the pest or disease.
- Quarantine new stock until you can be sure that they are not carrying an infestation.
- To prevent contamination from neighbours, fencing needs to be animal-proof at all times. Pay particular attention to boundary fencing, roadways, creek crossings, drains and timber plantations.

**Question 4e.**

Marks	0	1	2	Average
%	39	37	24	0.9

An explanation as to how a farmer could control the chosen pest or disease was required.

Students were generally able to state preventive and control measures for their chosen pest or disease. The complexity of the answers was generally poor as students needed to explain how their chosen pest or disease affects the identified plant or animal. Students needed to give specific ways, e.g. results in weight loss and anemia in animal.

**Question 5a.**

Marks	0	1	2	3	Average
%	10	21	33	36	1.9

Students needed to outline three things, in addition to providing food and water, that a manager could do to provide the animals with the optimum environment for animal welfare.

Three responses from the list below were required:

- shelter from sun
- protection from wind
- rotate pens to manage pathogens
- ensure good drainage
- control the number of animals in a herd/flock
- hygiene – cleanliness of the farm to reduce sickness and injury to animals
- ensure it is pest and disease free
- adequate, but not excessive, lighting
- protection from predators
- provide clean bedding
- reduce stresses such as loud noises
- provide fans or sprinklers.

**Question 5b.**

Marks	0	1	2	Average
%	19	34	47	1.3

Students were asked to state one advantage and one disadvantage of using animal manure to improve soil.



Advantages	Disadvantages
<ul style="list-style-type: none"> <li>improved soil structure and biological activity due to increased organic matter</li> <li>improved water-holding capacity</li> <li>improved porosity</li> <li>improved nutrient availability</li> <li>if available on the property can lower fertiliser cost</li> <li>recycling of waste approximates a natural system</li> <li>nutrient recycling</li> </ul>	<ul style="list-style-type: none"> <li>may burn the roots/leaves if too fresh</li> <li>may cause nitrogen binding/tie-up</li> <li>weed increase potential</li> <li>may spread disease</li> <li>smells – socially unacceptable</li> <li>slower response/release of Nitrogen</li> <li>pH change</li> <li>environmental contamination</li> <li>does not contain all required nutrients</li> </ul>

Modification of the environment, especially soils and climate, is a major component of the study design. The majority of students showed some understanding of modification of an intensively managed system and soils.

#### Question 6a.

Marks	0	1	2	3	4	5	6	Average
%	5	6	11	16	31	19	10	3.6

Students were required to name two greenhouse gases and, for each gas, describe the agricultural or horticultural activity that leads to the gas being produced.

Greenhouse gas	Description of the activity that leads to the gas being produced
methane	<ul style="list-style-type: none"> <li>decomposition of organic material, including dead animal decomposition and decaying plant material</li> <li>fermentation/bacteria, protozoa in ruminant stomach</li> <li>fermentation of dairy effluent and its decomposition</li> </ul>
carbon dioxide	<ul style="list-style-type: none"> <li>burning of fossil fuel, e.g. combustion engine, CO<sub>2</sub> emissions from vehicle/tractor/machinery</li> <li>burning stubble/plant waste</li> <li>CO<sub>2</sub> emissions from using electricity for farm processes</li> </ul>
nitrous oxide	<ul style="list-style-type: none"> <li>nitrogen fertiliser use</li> <li>wet soil releasing nitrous oxide</li> <li>animal urine (ammonia), dairy effluent</li> </ul>

A wide range of responses were given to this question. When specifically describing the activity related to carbon dioxide production, it was important for students to state that a fossil fuel was combusted or was burnt to gain full marks.

**Question 6b.**

Marks	0	1	2	3	Average
%	35	30	25	11	1.1

Students were required to select a greenhouse gas named in part a. and outline a management strategy that could be introduced to an agricultural or horticultural business to reduce its emission.

Greenhouse gas	Activity	Management strategy
methane	<ul style="list-style-type: none"> <li>decomposition of organic material</li> <li>fermentation in ruminant stomach</li> <li>fermentation of dairy effluent</li> </ul>	<p>Ruminant animals</p> <ul style="list-style-type: none"> <li>changing the diet to reduce dry matter/grain decomposition</li> <li>treat dairy effluent to reduce production of gas</li> <li>contain polluted water and filter through reed beds, settling ponds</li> <li>capture the gas and use it as a fuel</li> <li>use bull Australian Breeding Values (ABVs) for reduction in methane production</li> </ul> <p>Horticulture</p> <ul style="list-style-type: none"> <li>hot composting of organic waste to release less gas</li> </ul>
carbon dioxide	<ul style="list-style-type: none"> <li>burning of fossil fuel</li> <li>combustion engine – vehicle/tractor/machinery</li> </ul>	<ul style="list-style-type: none"> <li>use modern engines that release less emissions</li> <li>use direct drill of seed to reduce tractor use (minimum tillage practices)</li> <li>use solar/wind electricity to drive machinery where possible</li> <li>avoid burning stubble – stubble conservation</li> <li>plant trees to offset CO<sub>2</sub> production – agroforestry</li> </ul>
nitrous oxide	<ul style="list-style-type: none"> <li>nitrogen fertiliser use</li> <li>wet soil releasing nitrous oxide</li> <li>animal urine</li> </ul>	<ul style="list-style-type: none"> <li>use exact rates of nitrogen fertiliser</li> <li>don't over-fertilise</li> <li>soil test to reduce nitrogen application rates</li> <li>improve drainage to reduce waterlogging</li> <li>reduce over irrigation to reduce risk</li> </ul>

Many students were not able to state management strategies that could be introduced to an agricultural or horticultural business to reduce the emission of their chosen gas. More focus is needed on this area of the study design.

**Question 7a.**

Marks	0	1	2	3	4	5	6	Average
%	16	12	15	16	23	12	6	2.8

This question looked at climate change and how it will affect agricultural and horticultural operations in Victoria.

Students needed to choose one type of business from:

- cropping
- animal production
- plant nursery
- orchard.

Students were required to identify two key effects of climate change in Victoria for their chosen type of business and, for each effect, describe its potential impact on the business.

Some students demonstrated understanding of the potential impacts. Many students stated that the temperature will increase in Victoria. While this is often stated, it is more appropriate to state that the average annual temperature in Victoria will increase.

**Question 7b.**

Marks	0	1	2	3	Average
%	27	27	28	19	1.4

Students had to describe a potential management strategy that would help to maintain the production levels of their chosen type of business and overcome the problems associated with the effects of climate change.

Many responses lacked detail and showed minimal understanding, indicating a need for further understanding of potential management strategies.

**Question 7c.**

Marks	0	1	2	Average
%	60	27	13	0.6

Students had to explain how the management strategy they described in part b. would increase the sustainability of their chosen type of business and meet the challenges of climate change.

Only one-third of students showed any understanding of how the management strategy would increase sustainability. More focus is needed on this area.

Many of the effects are similar across the sectors in terms of the effects of climate change. These include:

- increase in mean temperature
- increased frequency of very hot days
- more frequent extreme natural events such as storms, heatwaves, drought or flooding
- decrease in average annual rainfall
- drier and warmer nights in winter
- drier spring
- summer storms with increased intensity
- fewer winter frosts – but may be more severe when they occur
- spring finishing earlier
- hotter, dryer conditions

- increased fire probability.

The impacts of climate change are also similar across sectors. These include:

- reduced yield
- potentially non-viable cropping
- increased potential for firefighter heat stress
- reduced frost damage
- change in pest and disease issues
- heat stress on plants, particularly at flowering

Management strategies vary between sectors; however, common approaches include:

- introduce more effective water application methods
- change range of potentially suitable crops
- change in crop-growing season timing
- water retention practices such as mulching and use of organic matter
- adoption of minimum tillage
- agronomic changes; sowing date, spacing
- improved erosion control required
- water retention practices improved
- select crops that have a shorter growing season
- improve shelter for stock
- improve electricity use efficiency
- breed or buy livestock that can tolerate/perform better under these conditions (animal genetics)
- reduce herd size
- buy/grow supplementary feed

How the management strategy will increase the sustainability included:

- maintains the soil moisture
- protecting the soil
- protecting the biodiversity
- reducing the carbon footprint
- controlling weeds/pest and disease
- reduces soil erosion.

### Question 8

Students were given a scenario where Fred and Sarah run a livestock and vegetable enterprise on an 80-hectare property. On the property, a number of environmental degradation issues exist. Students had to read the scenario and identify these issues and potential solutions.

#### Question 8a.

Marks	0	1	Average
%	27	73	0.8

Fred and Sarah could confirm that they have an acidity problem by undertaking soil pH tests.

Students were not given marks if they stated that the acidity or alkalinity of the soil could be tested.

**Question 8b.**

Marks	0	1	2	Average
%	23	48	30	1.1

Students needed to identify two practices on the property that could lead to soil acidification. These included:

- continually cropping in the same paddocks
- high nitrogenous fertiliser use
- removal of product from the farm, e.g. hay, vegetables, stock

**Question 8c.**

Marks	0	1	2	Average
%	40	37	23	0.9

A description of one management practice was then required that could help to prevent reduced yields and malformed plants in their crops.

Some suggested answers included:

- application of lime
- application of dolomite
- increase availability of soil nutrients
- rotate crops into other areas of the farm
- have soil test carried out to determine how much fertiliser they need to use
- use crops that tolerate lower pH soils, e.g. potatoes.

The predominant answer given was application of lime to increase the pH. Students who only stated 'add lime' without giving an explanation for its purpose received only one mark.

**Question 8d.**

Marks	0	1	2	3	Average
%	14	43	37	6	1.4

Students needed to list three possible land/soil degradations that could occur as a consequence of overstocking on the property. Some suggested answers included:

- compaction
- bank erosion
- sheet erosion
- rill/gully erosion
- wind erosion
- eutrophication of the water supply due to excess manure
- pugging
- turbidity/sedimentation in the creek.

Answers that stated 'erosion', 'soil erosion' or 'water erosion' without an explanation were not accepted.

**Question 8e.**

Marks	0	1	2	Average
%	47	29	25	<b>0.8</b>

An explanation as to how Fred and Sarah could rectify one of the degradation types listed in part d., other than by reducing stock, was required. Suggested answers included:

- fence creek access
- plant buffer zones around water bodies and creeks
- maintain pasture cover
- plant windbreaks
- fence off and plant native vegetation on affected areas
- fence off and rip compacted areas
- establish a feed lot/sacrifice paddock.

Many students had no knowledge of strategies to combat their selected degradation type. More focus is needed in this area.

**Question 9a.**

Marks	0	1	2	3	4	Average
%	11	18	19	26	26	<b>2.4</b>

Students were required to identify four new or emerging technologies that could provide some improvements to agriculture or horticulture industries.

Students are required to complete an assessment task on new and emerging technologies; however, students listed technologies that are not new or emerging. Only a quarter of students could identify four new and emerging technologies.

**Question 9bi.**

Marks	0	1	2	3	4	5	6	Average
%	27	5	15	18	13	13	10	<b>2.7</b>

Students needed to choose two of the technologies identified in part a. and describe how each technology works, its advantages and its impact on sustainability.

**Question 9bii.**

Marks	0	1	2	3	4	5	6	Average
%	31	4	11	18	15	14	6	<b>2.5</b>

Some students were able to describe how the new and emerging technology worked and how it had an impact on the sustainability of the agricultural or horticultural industry. Some students were not able to describe the specific technology effectively and instead gave very simplistic and broad generalisations as to how the technology worked.

**Question 10**

Students needed to choose one type of commercial agricultural or horticultural business from the list in the study design.

**Question 10a.**

Marks	0	1	2	3	4	Average
%	5	8	20	23	45	2.9

Having selected the agricultural or horticultural business, students needed to outline four factors they would need to consider when choosing a location for the business. Some suggested the following responses.

## Physical environment

- aspect/topography, soil, water, rainfall, sunlight, extremes, humidity
- requirements of the types of crops and stock and their growing structures
- influence of damaging pests, weeds and diseases

## Marketing

- location in relation to suppliers, customers and facilities that add value to the product, for example, an abattoir
- the media is available for the producer to gain knowledge about the product and about markets for the product
- price point based on target customer location

## Government policies and regulations

- permits and regulations for operation
- set up structures, zoning, use of chemicals, water management and retention, health and safety/WorkCover

## Community members affected by the business

- access to/for workers
- impact on neighbours
- local interest groups, unions
- animal welfare groups
- labour skill and availability

This question was answered fairly well, with many students showing a good understanding of factors they would need to consider when choosing a location for the business.

**Question 10b.**

Marks	0	1	2	Average
%	50	29	21	0.7

Students were required to identify one appropriate quality standard for the main product of their chosen business type and describe how it could be measured. Examples of possible responses included:

- extent of blemishes on fruit
- protein level in grain
- fat cover in livestock
- somatic cell count (dairy)
- weight of animal within market specification
- quality of packaging
- monitoring of somatic cell count in milk
- protein/fat content in milk.

Students struggled to identify a quality standard related to their selected business. Students are required in their business plan to state the quality standards their product needs to reach.

**Question 10c.**

Marks	0	1	2	3	4	Average
%	34	15	28	10	13	1.6

Students needed to describe two ways in which their chosen type of business could add value to its main product, for example, making sausages for meat producers, making jam for strawberry growers, different forms of packaging.

Value adding is also covered when preparing a business plan at the beginning of the year. Students need to realise that the principles that relate to their small business directly translate to a commercial business.

**Question 10d.**

Marks	0	1	2	3	4	Average
%	20	30	24	16	11	1.7

Students were given four broad types of risk that influence a business, as listed below. They were then required to describe how each risk could affect their chosen type of business. They were not to refer to occupational health and safety (OH&S) in their answer.

Suggested answers include the following.

Type of risk	How risk could affect your chosen type of business
environmental	<ul style="list-style-type: none"> <li>weather (wind, drought, flood)</li> <li>topography</li> <li>locust plague</li> <li>external disease factors</li> <li>waterlogging</li> <li>salinity</li> </ul>
marketing	<ul style="list-style-type: none"> <li>demand/supply fluctuations</li> <li>government regulation changes</li> </ul>
financial	<ul style="list-style-type: none"> <li>price fluctuations of inputs and outputs</li> <li>international monetary markets</li> </ul>
production	<ul style="list-style-type: none"> <li>equipment failure</li> <li>staffing problems</li> </ul>

Students found this question challenging. Again, the concept of risk is covered in the planning stage of the students' business plan at the beginning of the year.



**Question 10e.**

Marks	0	1	2	Average
%	33	37	31	1

This question required students to explain how their chosen type of business could have an impact on the environment. Students needed to discuss impacts related to:

- air
- water
- vegetation
- soil from pollution and contamination
- an alternative could be to consider the impact on the wider environment by considering the farm's contribution to climate change.

Many students had some understanding of the impacts on the environment. Many answers were simplistic in content.