Agricultural Science marking guide and response

External assessment 2025

Combination response (106 marks)

Assessment objectives

This assessment instrument is used to determine student achievement in the following objectives:

1. describe and explain animal and plant production, agricultural enterprises, enterprise management, and evaluation of an agricultural enterprise
2. apply understanding of animal and plant production, agricultural enterprises, enterprise management, and evaluation of an agricultural enterprise
3. analyse evidence about animal and plant production, agricultural enterprises, enterprise management, and evaluation of an agricultural enterprise to identify trends, patterns, relationships, limitations or uncertainty
4. interpret evidence about animal and plant production, agricultural enterprises, enterprise management, and evaluation of an agricultural enterprise to draw conclusions based on analysis.

Note: Objectives 5, 6 and 7 are not assessed in this instrument.

Purpose

This document consists of a marking guide and a sample response.

The marking guide:

- provides a tool for calibrating external assessment markers to ensure reliability of results
- indicates the correlation, for each question, between mark allocation and qualities at each level of the mark range
- informs schools and students about how marks are matched to qualities in student responses.

The sample response demonstrates the qualities of a high-level response.

Mark allocation

Where a response does not meet any of the descriptors for a question or a criterion, a mark of '0' will be recorded.

Allow FT mark/s — refers to 'follow through', where an error in the prior section of working is used later in the response, a mark (or marks) for the rest of the response can still be awarded so long as it still demonstrates the correct conceptual understanding or skill in the rest of the response.

Marking guide

Multiple choice

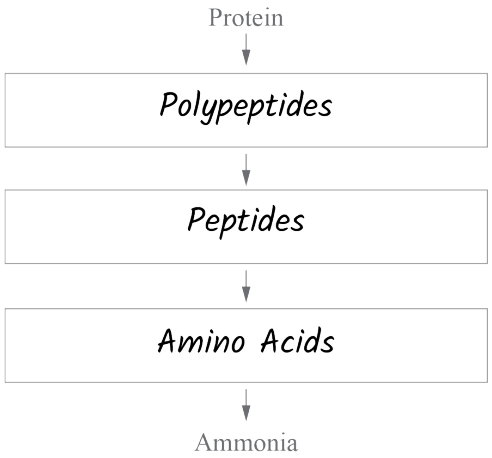
Question	Response
1	A
2	D
3	C
4	B
5	C
6	C
7	C
8	B
9	C
10	B
11	D
12	A
13	D
14	B
15	A

Paper 1: Short response

Q	Sample response	The response:
16a)	Growth curve 2	• identifies the correct growth curve **[1 mark]**
16b)	Both animals initially grow at the same rate, but animal A begins to fatten at a smaller live weight in contrast to animal B. As smaller framed cattle slow down in growth and begin to fatten, the larger framed breeds continue growing for a while before they begin to fatten.	• identifies similar initial growth **[1 mark]** • describes growth or development for animal A **[1 mark]** • describes growth or development for animal B **[1 mark]**

Q	Sample response	The response:
17	Animal ethics looks at whether the production system should be carried out by public perception, whereas animal welfare is measurable by using a set of standards. For example, in caged egg production systems, there is the public perception that this system should not be used to farm egg layers due to restrictions in space and interfering with the perceived animal rights of chickens. Animal welfare in caged egg production systems is where there is a set minimum standard of requirements (e.g. size for cages, water dripper numbers and feed areas available to the egg layer).	• identifies animal ethics issue in relation to their chosen industry **[1 mark]** • identifies animal welfare concept in relation to their chosen industry **[1 mark]** • explains the difference between animal welfare and ethics **[1 mark]**

Q	Sample response	The response:
18a)	The plant heights increase significantly over the first 21 days for each level of fertiliser application. Between 21 and 28 days, a small increase in growth is identified for 40 and 80kgP/ha fertilised plants.	• identifies relationship for growth from day 0 to day 21 **[1 mark]** • identifies relationship for growth from day 21 to day 28 **[1 mark]**
18b)	There is a statistical difference between the 28-day plant height for 80kgP/ha applied and plant heights with 40 and 120kgP/ha applied. There is not a statistical difference between mean values for plant heights at 0kgP/ha and 80kgP/ha applied.	• identifies a statistical difference between mean values for plant heights at 80kgP/ha and 40/120kgP/ha **[1 mark]** • identifies no statistical difference between mean values for plant heights at 0kgP/ha and 80kgP/ha **[1 mark]**

Q	Sample response	The response:
19a)		• provides polypeptides **[1 mark]** • provides peptides **[1 mark]** • provides amino acids **[1 mark]**
19b)	In the rumen, protein digestion occurs using microbes that produce microbial protein. In the small intestines, protein digestion occurs using pancreatic juices.	• describes a process for protein digestion **[1 mark]** • identifies where the process for protein digestion occurs in ruminants **[1 mark]** • describes a second process of protein digestion in ruminants **[1 mark]** • identifies where the second process of protein digestion occurs in ruminants **[1 mark]**

Q	Sample response	The response:
20a)	IPM focuses on long-term prevention and management of pests using a combination of techniques such as biological, cultural and genetic manipulation.	• identifies a longer time frame for control of pests **[1 mark]** • describes how IPM is a combination of different control techniques **[1 mark]**
20b)	A substance used to kill nematodes.	• provides the definition of nematicide **[1 mark]**
20c)	Turnip weed: Tillage/soil cultivation, either by hand or machinery, can be used to reduce the level of the plant pest turnip weed.	• identifies a plant pest **[1 mark]** • explains a physical control method relevant to the pest **[1 mark]**

Q	Sample response	The response:
21	The investigation launched by Country A and the subsequent tariff led to an initial increase in the importation of Australian wine followed by a decrease in the amount of wine imported from Australia after the tariff was introduced. The initial investigation resulted in customers in Country A purchasing wine through fear it was going to increase in price as seen by the value imported rising above $1.2 billion. The tariff resulted in a decline in the value of wine imported by Country A to a low of $0.6 billion in June 2021, as it would have increased the price of a bottle. This resulted in the 2021 Australian crush decreasing to 1500,000 t despite an increase in yield rising to 14 t/ha.	• draws a conclusion **[1 mark]** • uses a piece of evidence from the first graph to support the conclusion **[1 mark]** • uses a second piece of evidence from the second graph to support the conclusion **[1 mark]** • uses a third piece of evidence from either graph to support the conclusion **[1 mark]**

Q	Sample response	The response:
22a)	A livestock inventory and keeping a diary.	• identifies a method of record keeping for physical data **[1 mark]** • identifies a second method of record keeping for physical data **[1 mark]**
22b)	In a dairy, the number of dry cows needs to be regularly recorded in a livestock inventory to track how many cows are not producing milk in any month of the year. This will help monitor and manage the consistency of milk supply throughout the year.	• identifies an agricultural activity **[1 mark]** • describes the method of data collection **[1 mark]** • provides a reason for collecting this information **[1 mark]**

Q	Sample response	The response:
23	The role of biosecurity within an agricultural activity is to protect the plant and animal industries from pests, weeds and diseases. Protection is provided by border control and mandatory reporting.	• describes the general role of biosecurity **[1 mark]** • identifies an action **[1 mark]** • identifies a second action **[1 mark]**

Q	Sample response	The response:
24a)	The thigh showed greater variation in primary data collection. This could be seen by the larger calculated standard error values for each tissue type.	• determines thigh cut **[1 mark]** • identifies an example of statistical evidence **[1 mark]**
24b)	The thigh would provide better value for money. It has a lower proportion of bone in contrast to drumstick.	• draws a conclusion **[1 mark]** • provides justification **[1 mark]**

Paper 2: Short response

Q	Sample response	The response:
1a)	Meat Standards Australia classify meat cuts according to certain characteristics of the meat to ensure that the meat cuts are appropriate for a specific market.	• identifies meat characteristics/attributes **[1 mark]** • describes the role of the MSA **[1 mark]**
1b)	All the characteristics of the steer are included in the domestic supermarket.	• identifies domestic supermarket **[1 mark]**
1c)	The steer could be sold straightaway into the domestic feeder market, but it would be above the P8 market specification. If it was to meet the market specifications for the domestic supermarket, it would need to be given a ration less in energy and higher in protein to promote liveweight gain but minimise the level of fat deposited at the P8 site.	• identifies a market option for the steer **[1 mark]** • explains a strategy to meet one of the minimum requirements for the market option **[1 mark]** • explains a strategy to meet a second of the minimum requirements for the market option **[1 mark]**

Q	Sample response	The response:
2a)	Animals should be treated with a tickicide during the moulting stage.	• identifies moulting stage **[1 mark]**
2b)	Two benefits of using different chemicals include minimal resistance problems and being able to target the control of cattle ticks at different stages of its lifecycle.	• describes one benefit **[1 mark]** • describes a second benefit **[1 mark]**
2c)	One strategy would be pasture management to decrease favourable conditions for cattle ticks (i.e. seed ticks) and a second strategy is quarantine of animals to prevent spread to other cattle.	• describes one strategy **[1 mark]** • describes a second strategy **[1 mark]**

Q	Sample response	The response:
3	Advantage: Long term planning allowing for the maintaining of family legacy. Disadvantage: Original owners need to accept new business ideas for the enterprise (potential for conflict between family members regarding decisions about future direction of the enterprise).	• describes an advantage of succession planning **[1 mark]** • describes a disadvantage of succession planning **[1 mark]**

Q	Sample response	The response:
4	The banning of the live cattle export trade would lead to an increase in the supply of cattle that would need to be processed which would initially depress domestic cattle prices. This would lead to a loss in farm income until alternative sources of income could be generated. It would lead to the loss of jobs in the beef cattle sector.	• identifies an example of a government decision **[1 mark]** • identifies an impact on the agricultural enterprise **[1 mark]** • identifies a second impact on the agricultural enterprise **[1 mark]**

Q	Sample response	The response:
5	Ladybirds. Ladybirds eat aphids and help keep the aphid population down. Ladybirds will eat aphids across a wide range of crops.	• identifies a beneficial organism for plant production **[1 mark]** • identifies one characteristic of a beneficial organism **[1 mark]** • identifies a second characteristic of a beneficial organism **[1 mark]**

Q	Sample response	The response:
6	An example of a value-added product is canned pineapple, which is made from the raw material, pineapple. Benefits of canning pineapple include extending the shelf life of the pineapple through packaging and being more profitable.	• identifies a value-added plant product **[1 mark]** • identifies the raw product from which the value-added product is derived **[1 mark]** • identifies one benefit of value adding **[1 mark]** • identifies a second benefit of value adding **[1 mark]**

Q	Sample response	The response:
7	The crop has a low tolerance of salinity in soil. Low levels of salinity can cause a reduction in plant yield. When compared to the control treatment, the smallest concentration of salinity resulted in a significant reduction in percentage germination and number of flowers, and an increase in germination time.	• draws a conclusion **[1mark]** • draws a second conclusion **[1 mark]** • uses evidence from the first graph to support a conclusion **[1 mark]** • uses evidence from the second graph to support a conclusion **[1 mark]**

Q	Sample response	The response:
8	The higher the concentration of ethylene, the faster the bananas ripen. As ethylene concentrations increased, weight loss of bananas occurred faster. E.g. at 0 ppm the bananas took 14 days to reach 20% loss, whereas at 1000 ppm concentration, they only took about 9 days. As ethylene concentrations increased, flesh firmness of bananas dropped faster. E.g. at 0 ppm the bananas took 14 days to drop to 0.2 kg/cm^2 firmness, but at 1000 ppm, they took only 9 days.	• draws a conclusion that higher concentrations of ethylene results in faster ripening **[1 mark]** • describes the trend between ethylene concentration and rate of change in weight loss **[1 mark]** • describes the trend between ethylene concentration and rate of change in flesh firmness **[1 mark]** • identifies evidence from the first graph to support the conclusion **[1 mark]** • identifies evidence from the second graph to support the conclusion **[1 mark]**

Q	Sample response	The response:
9	Most financially sustainable: The system that is most financially sustainable is the grain-fed system, as those animals had a much higher average total gain and less total variable costs. Most environmentally sustainable: The system that is most environmentally sustainable is the GF20 system, as it uses much less water and energy.	• determines the GR system as the most financially sustainable **[1 mark]** • provides two pieces of evidence to justify the response **[1 mark]** • determines the GF20 system as the most environmentally sustainable **[1 mark]** • provides two pieces of evidence to justify the response **[1 mark]**

Paper 2: Extended response

Question 10

Sample response	The response:
Prevention Management strategy 1: Selective breeding for worm resistance: Heritability for this trait is 25%, so, although progress may be slow, creating a herd that has a natural resistance to this parasite will reduce financial loss due to lost productivity in the animals and reduce reliance on drenches. Management strategy 2: Paddock rotation: Rotating the paddocks (ideally every 4 weeks) will help to break the life cycle of the pest, as the hatched larvae will not be ingested by sheep and will eventually die on the pasture as they are unable to complete their life cycle. **Preparedness** Management strategy 1: Maintain pasture lengths that are longer than 7-8 cm. This will reduce the chance of sheep ingesting the larvae, as they reside on the lower sections of the pasture. Management strategy 2: Drench ewes just prior to lambing, as this is the time when they are most susceptible to worm infestations. This will reduce the chance of them getting sick and the chance of their milk production dropping off, which would put the growth of their lambs at risk. **Response** Management strategy 1: Conduct faecal egg count test to establish the level of infection and to gain information on the most effective type of drench to use. Management strategy 2: Put the lambs on a feedlot to stop them from grazing on the ground and picking up larvae. **Recovery** Management strategy 1: Increase the feed given to affected animals to help them recover the body weight lost due to the infection. Management strategy 2: Buy in more ewes to replace the animals that died from the parasite in order to maintain breeding operations.	**Identification of strategies for Barber's pole worm**
	• identifies a strategy for prevention **[1 mark]**
	• identifies a second strategy for prevention **[1 mark]**
	• identifies a strategy for preparedness **[1 mark]**
	• identifies a second strategy for preparedness **[1 mark]**
	• identifies a strategy for response **[1 mark]**
	• identifies a second strategy for response **[1 mark]**
	• identifies a strategy for recovery **[1 mark]**
	• identifies a second strategy for recovery **[1 mark]**
	Justification of strategies for Barber's pole worm
	• justifies a strategy for prevention **[1 mark]**
	• justifies a second strategy for prevention **[1 mark]**
	• justifies a strategy for preparedness **[1 mark]**
	• justifies a second strategy for preparedness **[1 mark]**
	• justifies a strategy for response **[1 mark]**
	• justifies a second strategy for response **[1 mark]**
	• justifies a strategy for recovery **[1 mark]**
	• justifies a second strategy for recovery **[1 mark]**

Question 11

Sample response	The response:
Prevention Management strategy 1: Monitor long range weather forecasts from the Bureau of Meteorology (BOM) to predict periods of wet weather that might increase the incidence of net blotch. This information could help make a decision about the optimal planting time. Management strategy 2: Diversify the farming enterprise (with other crops that are not susceptible to this disease) so that it spreads the economic risk in case of a disease outbreak. Rotating crops could help decrease the incidence of net blotch by removing the host (i.e. barley). **Preparedness** Management strategy 1: Monitor the crops regularly and, if the disease is suspected, have the plants sampled and sent away for testing to identify the specific pathogen. Early detection and identification are key to preventing economic losses. Management strategy 2: Ensure fungicides are on hand and ready in case the disease is discovered so that action can be taken quickly.	**Identification of strategies for net blotch in barley** • identifies a strategy for prevention **[1 mark]** • identifies a second strategy for prevention **[1 mark]** • identifies a strategy for preparedness **[1 mark]** • identifies a second strategy for preparedness **[1 mark]** • identifies a strategy for response **[1 mark]** • identifies a second strategy for response **[1 mark]** • identifies a strategy for recovery **[1 mark]** • identifies a second strategy for recovery **[1 mark]**

Sample response	The response:
Response Management strategy 1: Burn or graze stubble of crops that have been diseased to reduce the chance of spores being released from stubble into nearby crops. Management strategy 2: Apply fungicides at critical stages of growth so that it has the greatest impact on the disease. **Recovery** Management strategy 1: Grow crops that are not susceptible to the disease in the next season so that the life cycle of the disease is broken. Management strategy 2: Leave the paddock fallow for a season before planting barley again to disrupt the life cycle of the disease.	**Justification of strategies for net blotch in barley**
	• justifies a strategy for prevention **[1 mark]**
	• justifies a second strategy for prevention **[1 mark]**
	• justifies a strategy for preparedness **[1 mark]**
	• justifies a second strategy for preparedness **[1 mark]**
	• justifies a strategy for response **[1 mark]**
	• justifies a second strategy for response **[1 mark]**
	• justifies a strategy for recovery **[1 mark]**
	• justifies a second strategy for recovery **[1 mark]**