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School code

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Book

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of

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books used

External assessment 2021

Question and response book

Agricultural Science

Paper 2

Time allowed

- Perusal time — 10 minutes
- Working time — 90 minutes

General instructions

- Answer all questions in this question and response book.
- Write using black or blue pen.
- QCAA-approved calculator permitted.
- Planning paper will not be marked.

Section 1 (40 marks)

- 9 short response questions

Section 2 (15 marks)

- 1 extended response question



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Section 1

Instructions

- If you need more space for a response, use the additional pages at the back of this book.
 - On the additional pages, write the question number you are responding to.
 - Cancel any incorrect response by ruling a single diagonal line through your work.
 - Write the page number of your alternative/additional response, i.e. See page ...
 - If you do not do this, your original response will be marked.
 - This section has nine questions and is worth 40 marks.
-

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QUESTION 1 (5 marks)

In 2015 and 2016, a number of events affected Australian horticulture industries.

- An agreement between South Korea and Australia — the Korea–Australia Free Trade Agreement (KAFTA) — came into effect on 1 January 2015.
- The Korea–New Zealand Free Trade Agreement came into effect on 20 December 2015.
- Yields of Tasmanian cherries harvested in 2016 were lower than expected.

The table shows an excerpt of fresh fruit and vegetable exports from Australia to South Korea from 1 January 2014 to 31 December 2016.

Crop	Exports (tonnes)		
	2014	2015	2016
Asparagus	39	87	105
Cherries	248	365	77
Oranges	245	1 015	1 461
Potatoes	11 372	24 269	20 634

- a) Draw a conclusion about the benefits of the KAFTA for Australian horticulture industries. Justify your response.

[2 marks]

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b) Explain how these events account for the changes in cherry exports from 2014 to 2016. [3 marks]

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QUESTION 2 (4 marks)

Family farms are one type of agricultural enterprise. Identify another type of agricultural enterprise and use an example to explain two of the enterprise's features.

QUESTION 3 (3 marks)

Explain the role of a beneficial organism in a plant production system. Use two examples in your response.

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QUESTION 4 (4 marks)

The table shows the effect of increasing foliar application of magnesium on the average number and weight of chilli fruits at harvest. Uncertainties indicate 95% confidence intervals.

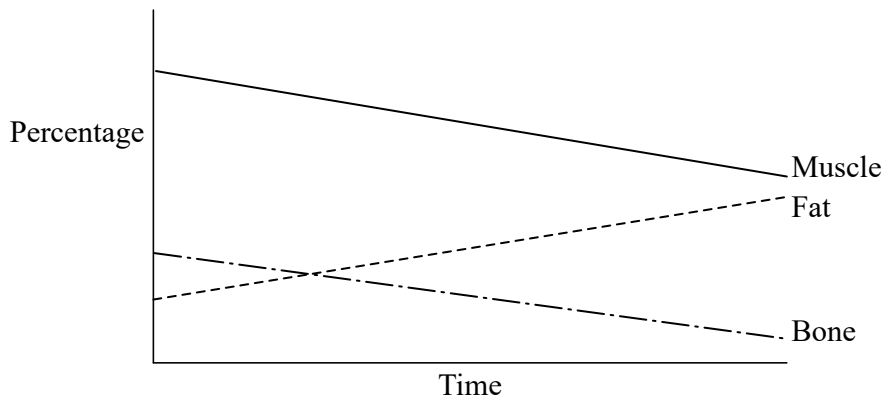
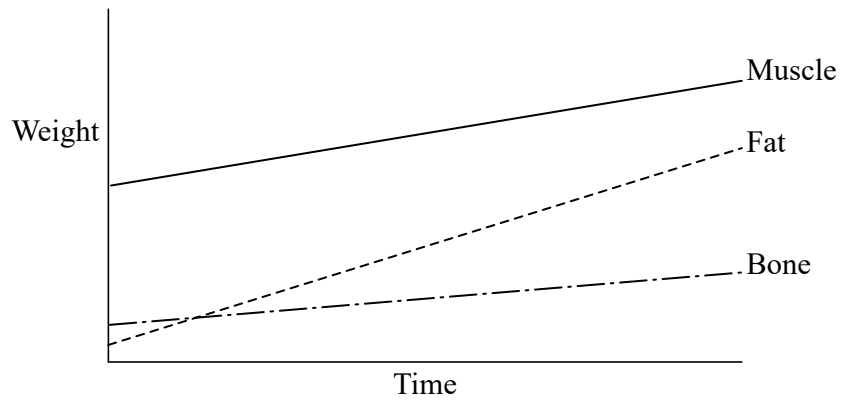
Treatment	Number of fruits	Fresh weight of fruits (g)
Control	7.0 ± 0.1	139.0 ± 1.0
50 ppm	17.0 ± 0.6	226.0 ± 1.2
100 ppm	18.3 ± 1.2	260.0 ± 1.2
150 ppm	21.0 ± 1.2	274.0 ± 1.2

Use the data to discuss how foliar application of magnesium affects the yield of chilli plants.

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QUESTION 5 (4 marks)

The graphs show generalised growth trends for animals' weight and percentage composition.



Use the graphs to draw a conclusion about why animals are suitable for different markets at different ages. Justify your conclusion with three pieces of evidence.

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QUESTION 6 (7 marks)

The table contains information about the market share (% volume) and value for different egg production systems in the 2018 financial year.

System	Market volume (%)	Market value (%)	Eggs produced ($\times 1000$)	Change in market volume from 2017 (%)
Cage eggs	43.99	30.68	101 038	-6.90
Free-range eggs	45.38	56.36	104 211	13.80
Barn-laid eggs	9.12	9.45	20 944	3.70
Specialty eggs	1.51	3.51	3 466	15.20

- a) Determine which egg production system would have the highest value per egg in the marketplace. Justify your answer using two pieces of evidence. [3 marks]

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b) Infer reasons for two trends in the change of egg production systems.

[4 marks]

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QUESTION 7 (5 marks)

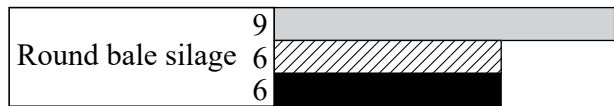
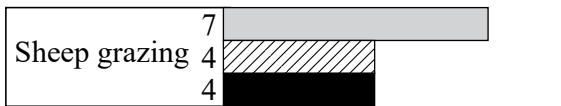
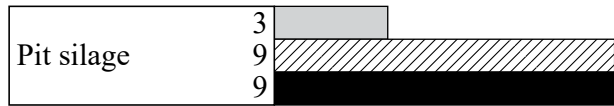
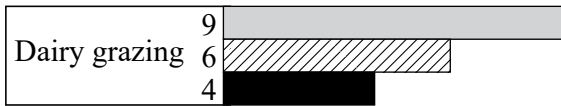
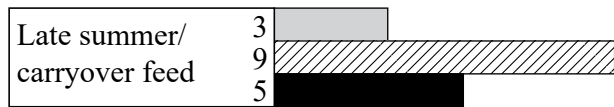
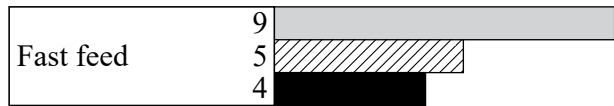
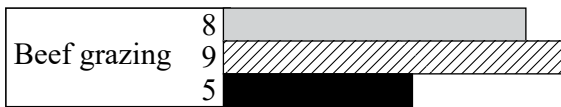
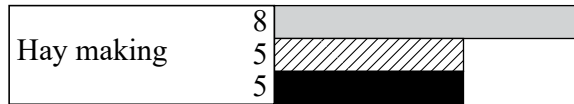
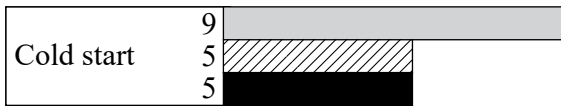
A beef producer in southern Queensland wants to take advantage of an unseasonal late-winter rainfall of 110 mm and plant a summer forage crop. The beef producer is unsure if the crop will be grazed off or mechanically removed as hay or bale-wrapped silage. This decision will depend on future growing conditions.

The table shows the mean rainfall usually experienced in the region. The information in the graphs describes the characteristics of three different varieties of forage sorghum suitable for the region.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean rainfall (mm)	129.8	144.0	104.7	43.0	45.3	37.4	31.8	26.8	24.2	49.5	66.3	104.3

Key Rating: 1 = poor 9 = excellent

Sorghum A (solid grey)
 Sorghum B (diagonal lines)
 Sorghum C (solid black)



Determine the best variety of forage sorghum for this producer to plant. Justify your decision with four pieces of evidence from the data.

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QUESTION 8 (3 marks)

Explain the term *cultural practice*. Give two examples of cultural practices used in a plant production system.

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QUESTION 9 (5 marks)

Several key management issues can affect sustainable agricultural production.

- a) Identify a management issue shown in the image.

[1 mark]



- b) Explain two processes that may have contributed to the issue identified in Question 9a). [2 marks]

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c) Propose two solutions for the issue identified in Question 9a).

[2 marks]

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Section 2

Instructions

- This section has one question and is worth 15 marks.
 - Respond in 300–350 words.
-

QUESTION 10 (15 marks)

Case study

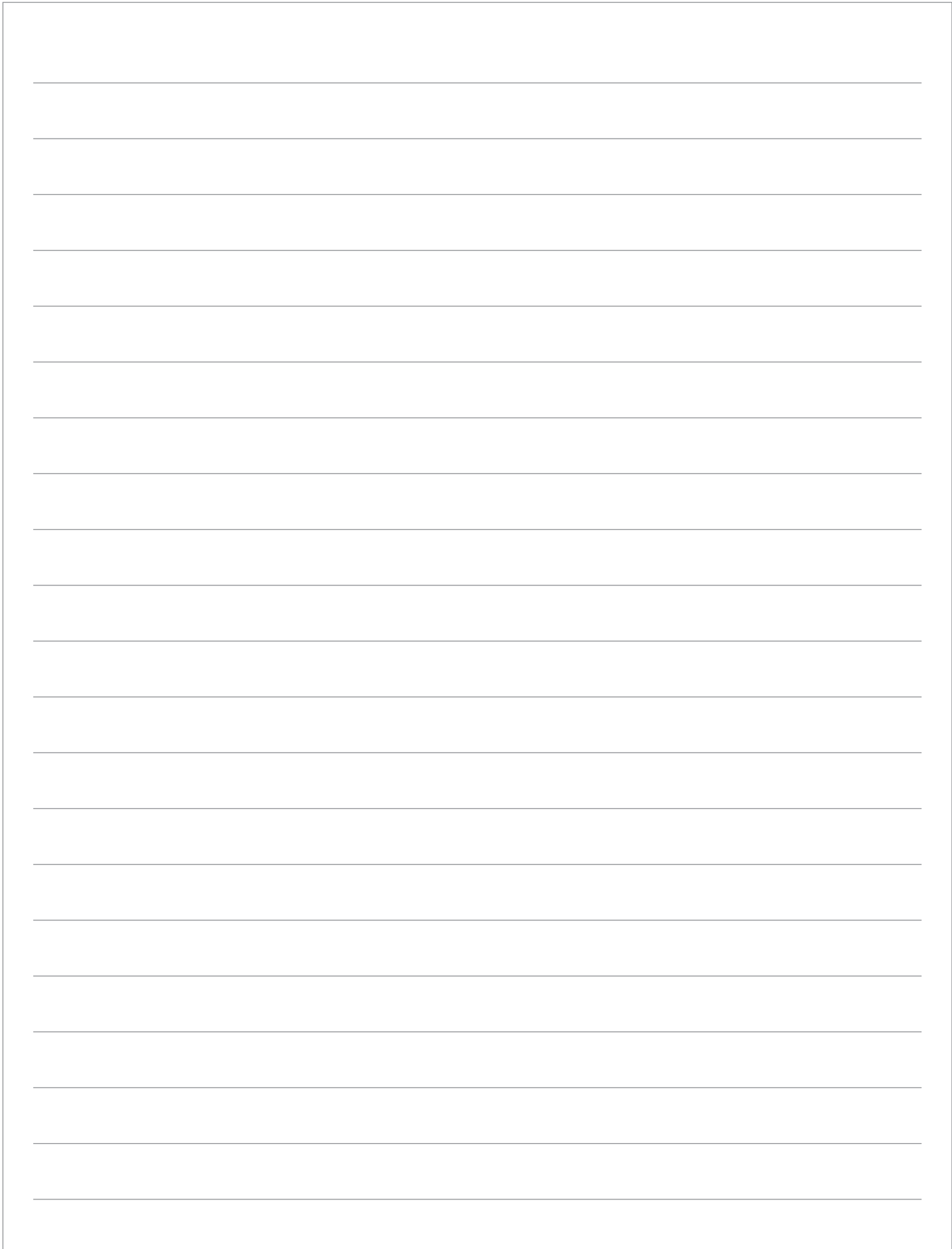
A pastoral company is a 9000-ha sheep and cattle production system situated in southern Queensland in the wheat–sheep belt. It runs 26 000 merino sheep and 800 breeding cows. The land is predominantly native pastures and shrubs on sandy to loamy topsoils, with low fertility and poor water holding capacity. The annual average rainfall is 600 mm. A creek runs through the property and there are several permanent waterholes. There are some patches of soil erosion along the creek where livestock access the creek for drinking water.

The company is working to become carbon-neutral in support of the red meat industry goal of carbon neutrality by 2030. Carbon emission reduction strategies being used on the property include:

- genetics — using composite sires and breeding for early finishing in lambs
- lot feeding — reaching market compliance faster by moving to a feedlot situation for finishing
- productivity — using a combination of genetics and livestock management to increase wool production from 440 tonnes in 2018 to 800 tonnes in 2024
- vegetation and land management — using 20% of the land area for conservation and biodiversity. Most of this vegetation is contained to wildlife corridors 30 to 50 m wide. Larger paddocks have been cut up into smaller paddocks surrounded by shelterbelts. Creeks have all been fenced off and all paddocks now have permanent water sources, supplied by a combination of bore and dam water.

The company has an issue with flystrike in its sheep. Approximately 3% of the flock is affected annually, which is higher than the industry average of 1.5 to 2%. Stock is only purchased from known producers, and health declarations are essential for any incoming stock. The company keeps new animals in its quarantine paddock for a minimum of 10 days before they are introduced to new pastures, flocks and herds.

Currently, there is little control of run-off from the feedlot. Although the feedlot is scraped and the top layer of waste is removed, this does not often happen within the industry standard of every 13 weeks. Run-off is stockpiled on the farm and sometimes becomes odorous. The manager has reported that manure waste often ends up in the creek after storms.



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ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

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References

Question 1

Data sourced from AHEIA *Fresh Fruit and Vegetable Export/Import Statistics* (2017/18),
https://www.ftalliance.com.au/data/news_attachments/1808%20aheia%20statistics%5B363944%5D.pdf

Question 4

Data from Table 4, Harris, K.D., Vanajah, T. and Puvanitha, S., 2018. 'Effect of foliar application of Boron and Magnesium on growth and yield of green chilli (*Capsicum annum* L.)'. *AGRIEAST: Journal of Agricultural Sciences*, 12(1), p.31. DOI: <http://doi.org/10.4038/agricast.v12i1.49>

Question 5

Texas A&M University 2021, *Market when ready: Growth curves* in 'Meat science: Growth and development of meat animals', <https://meat.tamu.edu/anasc-307-honors/growth>.

Question 6

Data source Australian Eggs 2018, Annual Report 2018–19, p. 3
<https://www.australianeggs.org.au/who-we-are/annual-reports>,
<https://www.australianeggs.org.au/education/terms-and-conditions>

Question 7

Data from AusWest Seeds and Stephen Pasture Seeds, 'Forage crops: Sorghum',
www.ausweststphenseeds.com.au and <https://www.pioneerseeds.com.au/our-products/summer-forage>

Question 9

Image incorporates:

Fence posts: <https://pixabay.com/photos/coupling-field-fence-fence-posts-3201429/>

Vegetation, Matt Lavin 2013, <https://www.flickr.com/photos/35478170@N08/8896227652> CC BY-SA

Windmill, <https://pixabay.com/photos/windmill-western-texas-panhandle-2092692/>

Wind erosion (Mallee Chickapook), <https://omeka.cloud.unimelb.edu.au/cchc/items/show/5570> Public Domain

Question 10

Adapted from Meat & Livestock Australia 2019, 'Carbon-neutral pathways', *Feedback Magazine*, July/August, p. 20, <https://v3au.zone-secure.net/drive/6703/1046011/#page=20>
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