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External assessment

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 (36 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 36 marks.
- 

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### QUESTION 1 (4 marks)

The table shows average Angus herd EBVs for live weight (kg) from 2015 to 2017.

Year	Birth	200 days	400 days	600 days
2015	4.4	+15.7	+28	+35
2016	4.8	+17.4	+35	+45
2017	5.5	+23.3	+41	+51

- a) Determine the change in average 600-day weight from 2015 to 2017.

[1 mark]

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- b) If the data trends in the table continue, draw conclusions about the impact on the Angus breed into the future.

[3 marks]

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## QUESTION 2 (3 marks)

- a) Identify an advantage of tissue culture and explain how this can be used in an agricultural setting.

[2 marks]

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- b) Describe the genetic relationship between the original plant and the new plant in the process of tissue culture.

[1 mark]

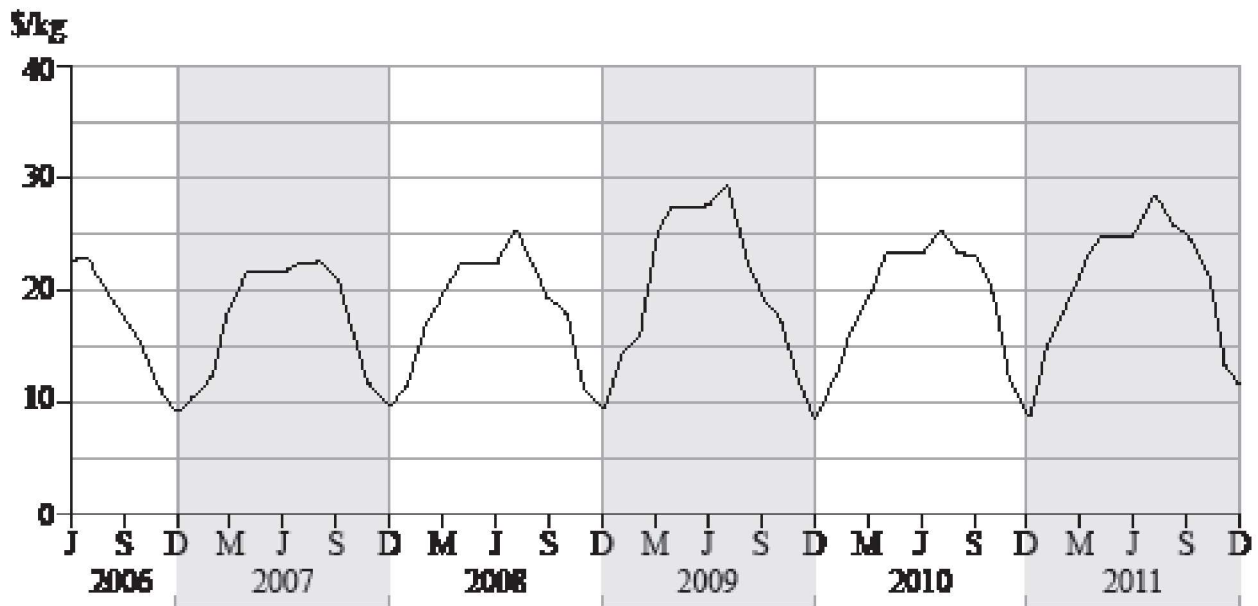
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### QUESTION 3 (3 marks)

The graph shows the domestic price of strawberries in New Zealand from June (J) 2006 to December (D) 2011.



- a) Determine the change in domestic price between December 2008 and March (M) 2009. [1 mark]

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- b) Identify the season likely to see the greatest supply of strawberries. Provide a reason for your decision. [2 marks]

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### QUESTION 5 (4 marks)

Identify two plant pests or diseases that are significant for plant industries. Describe why each pest or disease is a major issue for its respective industry.

Plant pest/disease 1: \_\_\_\_\_

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Plant pest/disease 2: \_\_\_\_\_

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### QUESTION 6 (3 marks)

- a) Explain one reason for a producer to clear land on their property.

[1 mark]

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- b) Describe one short-term effect and one long-term effect land clearing may have on the soil.

[2 marks]

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### QUESTION 7 (4 marks)

An experiment was conducted to determine the effect of spraying different concentrations of a hormone on the maturation of different apple varieties.

This stimulus has not been published for copyright reasons.

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- a) Identify the plant hormone that was applied to the apples. Explain the effect this hormone has on apple maturation time using evidence from the graph.

[2 marks]

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- b) Identify the optimum concentration of hormone that should be applied to Golden apples. Provide reasoning to support your decision.

[2 marks]

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### QUESTION 8 (6 marks)

Two groups of sheep were grown under different management strategies. One group was weaned at 4 months and sent to the abattoir. The second group was weaned at 3 months and then fed on grain for 40 days before being sent to the abattoir.

The tables show the results for each of the management strategies and the minimum requirements for different lamb markets.

Group	Management strategy	Average birthweight (kg)	Daily weight gain (kg/day)	Final fat depth (mm)	Dressing percentage (%)
1	Weaned after 120 days	4.25	0.25	9	43
2	Weaned after 90 days Fed grain for 40 days	4.5	Before weaning: 0.25 On grain: 0.40	11	44

Market	Carcass weight (kg)	Fat depth (mm)	Grain feeding permitted
Supermarket lamb	18–22	6–15	No
Food service lamb	20–25	6–15	Yes
Light export	10–16	6–10	No
Domestic manufacturing	17–21	0–15	Yes

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- [4 marks]

- [2 marks]

9 of 17

### QUESTION 9 (5 marks)

The table gives the results from a trial conducted on sugarcane over five years. A fallow crop of soybeans was planted, grown and ploughed back into the soil prior to planting the sugarcane.

A control practice was to leave the soil fallowed between sugarcane harvest and the next season's planting. At each location the mean crop yield was measured over five years.

Location	Legume fallow		Bare fallow	
	Nitrogen fertiliser applied (kg/ha)	Mean yield (t/ha)	Nitrogen fertiliser applied (kg/ha)	Mean yield (t/ha)
Site 1	$54 \pm 20$	$92 \pm 1$	$85 \pm 22$	$92 \pm 1$
Site 2	$89 \pm 24$	$147 \pm 3$	$152 \pm 9$	$149 \pm 4$
Site 3	$92 \pm 28$	$169 \pm 4$	$155 \pm 13$	$172 \pm 5$
Site 4	$65 \pm 25$	$121 \pm 3$	$108 \pm 11$	$122 \pm 4$
Site 5	$60 \pm 23$	$112 \pm 2$	$109 \pm 8$	$112 \pm 2$
Site 6	$32 \pm 11$	$107 \pm 3$	$45 \pm 5$	$115 \pm 5$

- a) Draw a conclusion about the most suitable crop rotation system to use. Use the table to justify your conclusion.

[2 marks]

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b) Identify two advantages of the crop rotation system identified in 9a).

[2 marks]

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c) Provide one disadvantage of the crop rotation system identified in 9a).

[1 mark]

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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)**

Refer to Stimulus 1–3 in the stimulus book.

Use three criteria to assess opportunities for sustainable social practices for an industry of your choice. For each criterion, analyse and justify three strengths and/or weaknesses.

Draw a conclusion about the sustainability of the production system.

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## References

### Question 1

Angus Australia 2016, *Capitalising on the Genetic Variation between Angus Animals*, [www.angusaustralia.com.au/content/uploads/2016/11/Ash\\_POC\\_Genetic\\_Variation\\_A4\\_8page.pdf](http://www.angusaustralia.com.au/content/uploads/2016/11/Ash_POC_Genetic_Variation_A4_8page.pdf).

### Question 3

Adapted from Stats NZ 2014, 'Fresh fruit and vegetable prices — our global connection', Price Index News, January, [http://archive.stats.govt.nz/tools\\_and\\_services/newsletters/price-index-news/jan-14-fruit-and-vege.aspx](http://archive.stats.govt.nz/tools_and_services/newsletters/price-index-news/jan-14-fruit-and-vege.aspx). Used under Creative Commons Attribution 4.0 licence (CC BY 4.0).

### Question 4

Nuseed 2019, 'Nuseed Quartz: The new standard for mid-season maturity', [www3.nuseed.com/au/product/nuseed-quartz](http://www3.nuseed.com/au/product/nuseed-quartz).

### Question 7

Adapted from 5-IBA-Brianna's High School n.d., 'Graphing practice', <https://bibanez.weebly.com/graphing-practice.html>.

### Question 8

Australian Wool Innovation and Meat and Livestock Australia 2008, 'Module 3: Market focused lamb and sheepmeat production', *Making More From Sheep*, [www.makingmorefromsheep.com.au/market-focussed-lamb-and-sheepmeat-production/tool\\_3.2.htm](http://www.makingmorefromsheep.com.au/market-focussed-lamb-and-sheepmeat-production/tool_3.2.htm).

### Question 9

Parka, SE, Websterb, TJ, Horanc, HL, Jamesd, AT & Thorbunc, PJ 2010, 'A legume rotation crop lessens the need for nitrogen fertiliser throughout the sugarcane cropping cycle', *Field Crops Research*, vol. 119, no. 2–3, pp. 331–41.



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