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Sample assessment 2020

Question and response book

Agricultural Science

Paper 1

Time allowed

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

General instructions

- Answer all questions in this question and response book.
- QCAA-approved calculator permitted.
- Planning paper will not be marked.

Section 1 (20 marks)

- 20 multiple choice questions

Section 2 (40 marks)

- 11 short response questions



Section 1

Instructions

- Choose the best answer for Questions 1–20.
- This section has 20 questions and is worth 20 marks.
- Use a 2B pencil to fill in the A, B, C or D answer bubble completely.
- If you change your mind or make a mistake, use an eraser to remove your response and fill in the new answer bubble completely.

	A	B	C	D
Example:	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	A	B	C	D
1.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Section 2

Instructions

- Write using black or blue pen.
 - Respond in paragraphs consisting of full sentences unless instructed otherwise.
 - 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 11 questions and is worth 40 marks.
-

QUESTION 21 (4 marks)

The market share of free-range and barn-laid egg production systems has increased from 2009 to 2018.

- a) Explain a reason for the increase in the market share of free-range and barn-laid eggs.

[2 marks]

- b) Explain a risk management strategy that a producer of caged eggs could adopt to avoid declining market share.

[2 marks]

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QUESTION 22 (4 marks)

A producer undertook a comparison of gross margins to help them decide between planting dryland sorghum or dryland sunflowers.

a) Complete the table below.

[2 marks]

	Dryland sorghum	Dryland sunflowers
Income		
Yield t/ha	2.00	1.00
Income \$/t	215.00	510.00
Total income \$/ha	430.00	510.00
Variable costs \$/ha		
Sowing	35.15	48.71
Fertiliser and application	0.00	54.00
Herbicide and application	117.63	90.82
Insecticide and application	0.00	23.96
Harvesting	66.24	66.24
Levies and insurance	18.20	18.82
Total variable cost \$/ha	237.22	302.56
Gross margin \$/ha		

Note: If you make a mistake in the table, cancel it by ruling a single diagonal line through your work and use the additional table on page 13 of this question and response book.

b) Which crop should the producer plant? Give a reason for your decision.

[2 marks]

QUESTION 23 (4 marks)

Explain two strategies that a producer could implement to increase the level of agricultural production on soil with an elevated level of salinity.

1. _____

2. _____

QUESTION 24 (3 marks)

Identify three components of nutrition that are important to agricultural animals.

1. _____
2. _____
3. _____

QUESTION 25 (3 marks)

Define the following plant terms.

a) herbicide *[1 mark]*

b) nematicide *[1 mark]*

c) grafting *[1 mark]*

QUESTION 26 (2 marks)

Explain why tissue culture is used in breeding new plant varieties.

QUESTION 27 (2 marks)

An animal study fed four groups of birds of the same age the same ration for a period of seven days. The table below shows the birds' average mass gain and the amount of food consumed for each group.

	Group A	Group B	Group C	Group D
Mass gained / animal (g)	253	302	295	340
Mass of food eaten (g) / animal	1825	1840	1953	2095

Interpret the results to decide which group of birds is genetically superior in terms of production. Explain your decision.

QUESTION 28 (2 marks)

Identify where carbohydrates are absorbed into the blood in

a) ruminant animals *[1 mark]*

b) monogastric animals. *[1 mark]*

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QUESTION 29 (3 marks)

A beef producer in tropical Queensland wishes to implement an integrated management program to control buffalo flies in their herd.

Dung beetles reduce buffalo fly populations by removing or spreading dung so flies cannot breed in it. Dung beetles are most active in hot, humid weather (i.e. wet season, October–March), which coincides with the period when flies are most active. To help increase the dung beetle population, farmers must consider using chemicals that are known to have little or no effect on the beetles and avoid using chemicals at peak dung beetle breeding times.

Three chemical products available for buffalo fly control are Product A, Product B and Product C.

	Product A	Product B	Product C
Potential activity period of the chemical after a single treatment	21 days	14–18 days	up to 21 days
Likelihood of resistance in flies to the chemical	medium	low	medium
Likely activity period of the chemical where there is resistance in flies	around 10 days	around 7 days	7–10 days
Likelihood of chemical activity in dung	yes	none	none

Use data from the table to decide which product a producer should use at the beginning of the wet season. Give reasons for your decision.

QUESTION 30 (7 marks)

The figure below shows the projected human population growth in billions from 2012 to 2050.

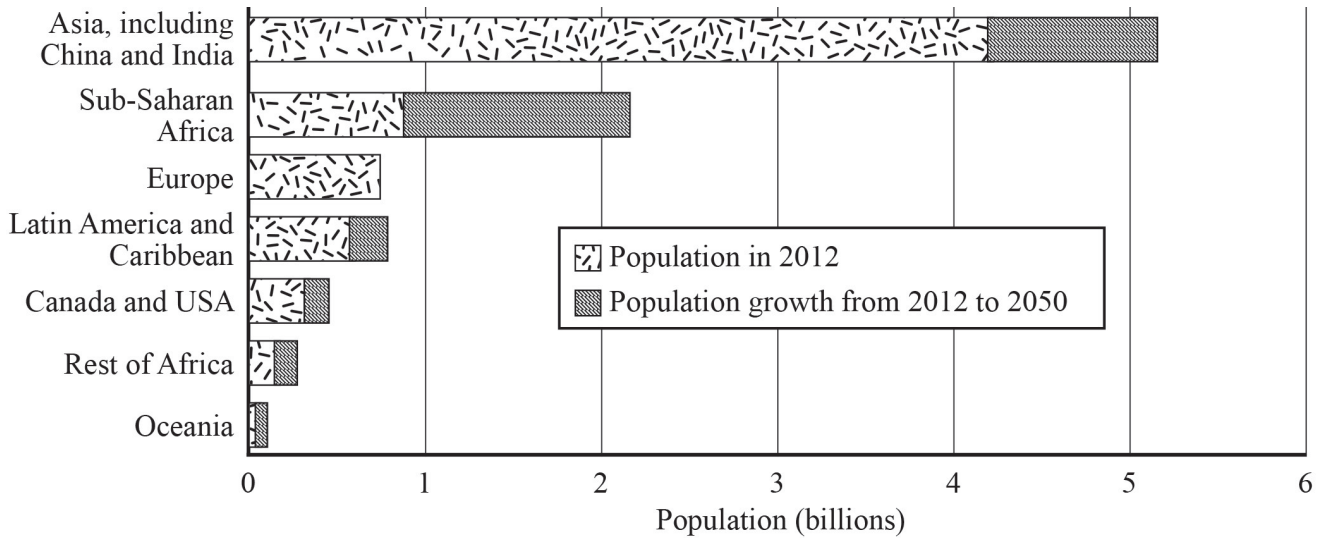


Table 1 below shows the expected changes in global consumption of meat products from 2006 to 2050.

Table 1

Region	Livestock (kcal/person/day)			Beef and mutton (kcal/person/day)		
	2006	2050	%Change	2006	2050	%Change
Asia, including China and India	745	1177	58%	49	108	120%
Sub-Saharan Africa	144	185	29%	41	51	26%
Europe	864	925	7%	80	75	-6%
Canada and USA	907	887	-2%	117	95	-19%

Table 2 below shows the volume of water in litres required for each crop and animal product to produce a kilogram of product, kilocalorie of energy, and gram of protein.

Table 2

Crop or animal product	L/kg	L/kcal	L/g of protein
Vegetables	322	1.34	26
Fruits	962	2.09	180
Cereals	1644	0.51	21
Pulses (legumes)	4055	1.19	19
Chicken meat	4325	3.00	34
Sheep/goat meat	8763	4.25	63
Bovine (cattle) meat	15 415	10.19	112

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Use the data to answer the following questions.

a) Assess the opportunity for sustainable social practices in beef production systems in Australia using the following criteria.

- population distribution
- food quality
- food security

[3 marks]

b) Draw a conclusion about the opportunity for sustainable social practices in beef production, providing reasons to support your conclusion.

[4 marks]

QUESTION 31 (6 marks)

Table 1 below shows the carcass results for three animals shown at the Royal National Association Led Steer competition. Table 2 below shows the pricing schedule at the abattoir that the animals were sent to after the competition (grid price \$5.90/ kg).

Table 1

Characteristics	Animal A	Animal B	Animal C
Hot score carcass weight (HSCW) (kg)	250	220	220
Dentition	4	0	2
P8 fat (mm)	4	8	14
Butt shape	D	B	B
Sex	M	M	F
Eye muscle area (cm ²)	98	94	87

Table 2

Sex		P8 fat mm		Butt shape		Dentition		HSCW kg	
M	0	0–2	–40c	A	+20c	0	0c	130.1–150	–60c
F	–5c	3	–20c	B	+10c	2	–5c	150.1–160	–45c
		4	–10c	C	0	4	–30c	160.1–180	–30c
		5–9	0	D	–20c	6	–50c	180.1–200	–15c
		10–12	0	E	–50c	8	–65c	200.1–280	0
		13–17	–5c					280.1–300	–5c
		18–22	–15c					300.1–320	–15c
		23–32	–40c					320.1–400	–40c
		33+	–60c					>400.1	–60c

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a) Determine which animal returned the highest income. Show your working.

[3 marks]

Animal returning the highest income = Animal _____

b) For each animal, discuss the possible characteristics, if any, that prevented them from achieving the agreed grid price.

[3 marks]

END OF PAPER

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ADDITIONAL RESPONSE SPACE FOR QUESTION 22

If you want this table to be marked, rule a diagonal line through the table on page 3.

	Dryland sorghum	Dryland sunflowers
Income		
Yield t/ha	2.00	1.00
Income \$/t	215.00	510.00
Total income \$/ha	430.00	510.00
Variable costs \$/ha		
Sowing	35.15	48.71
Fertiliser and application	0.00	54.00
Herbicide and application	117.63	90.82
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Harvesting	66.24	66.24
Levies and insurance	18.20	18.82
Total variable cost \$/ha	237.22	302.56
Gross margin \$/ha		

References

Question 22

Derived from NSW Government Department of Primary Industries 2013, *Dryland north-west NSW summer crop budgets*, www.dpi.nsw.gov.au/__data/assets/pdf_file/0013/410440/North-West-all-12-13.pdf.

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Question 30

Derived from Ranganathan, J 2013, 'The global food challenge explained in 18 graphics', *World Resources Institute*, 3 December, www.wri.org/blog/2013/12/global-food-challenge-explained-18-graphics.

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Derived from Water Footprint Network 2010, 'Water footprint of crop and animal products: A comparison', <http://waterfootprint.org/en/water-footprint/product-water-footprint/water-footprint-crop-and-animal-products>.

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