Agricultural Science 2019 v1.3

IA1: Sample assessment instrument

Data test (10%)

This sample has been compiled by the QCAA to assist and support teachers in planning and developing assessment instruments for individual school settings.

Student name

Student number

Teacher

Exam date

Marking summary

Criterion	Marks allocated	Provisional marks
Data test	10	
Overall	**10**	

Conditions

Technique	Data test
Unit	Unit 3: Agricultural production
Topic/s	Topic 1: Animal production B Topic 2: Plant production B
Time	60 minutes + 10 minutes perusal
Seen/Unseen	Unseen questions and datasets
Other	QCAA-approved graphics calculator permitted

Instructions

Use the datasets to respond to the associated items in the spaces provided. Each item is associated with the dataset that immediately precedes it.

Data test summary

Dataset	Item	Objective			
		Apply understanding	Analyse evidence	Interpret evidence	
1	1	1			
	2	2			
	3		2		
	4		2		
2	5	1			
	6	1			
	7	1			
	8		2		
	9			2	
3	10			6	
Total		**6**	**6**	**8**	**20**
Percentage		**30%**	**30%**	**40%**	**100%**

Dataset 1

An experiment was conducted to test the effect of gibberellic acid on the growth (i.e. plant height) of dwarf peas. The gibberellic acid was applied to dwarf peas at Day 0 (i.e. the start of the trial). A control group of dwarf peas grown without gibberellic acid was established as a comparison.

Figure 1 shows the plant heights, which were measured at various stages over a period of 20 days. Table 1 shows plant heights for the two groups at Day 20, along with the standard error for each group.

Figure 1: Mean plant height — effect of gibberellic acid on growth of dwarf peas

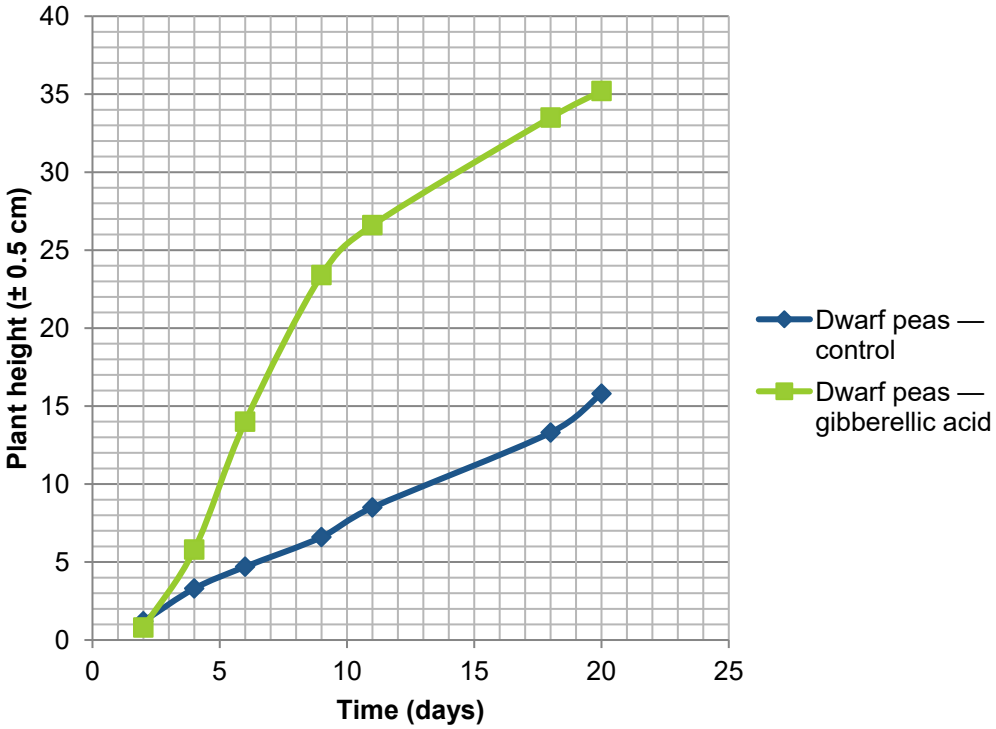

Table 1: Plant heights at Day 20 — effect of gibberellic acid on growth of dwarf peas

Pot	Dwarf peas — control (± 0.5 cm)	Dwarf peas — gibberellic acid (± 0.5 cm)
A	16.1	38.5
B	19.0	30.1
C	18.1	30.0
D	13.4	38.2
E	12.3	39.2
Average	**15.8**	**32.5**
Standard error	**1.3**	**2.1**

Question 1 (1 mark)

Identify the mean height for dwarf peas treated with gibberellic acid after six days.

mean height = …… cm (0 d.p.)

Question 2 (2 marks)

Determine the average growth rate (i.e. cm/day) from Day 2 to Day 10 for:

a. control group

average growth rate = …… cm/day (1 d.p.)

b. gibberellic acid group

average growth rate = …… cm/day (1 d.p.)

Note: Average growth rate = $\frac{(Final\ plant\ height - initial\ plant\ height)}{Time}$

Question 3 (2 marks)

Contrast the growth rates and final heights for dwarf peas in the control group with dwarf peas treated with gibberellic acid from Day 2 to Day 10 of the trial.

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Question 4 (2 marks)

Contrast the uncertainty of the data collected at Day 20, referring to evidence in Table 1.

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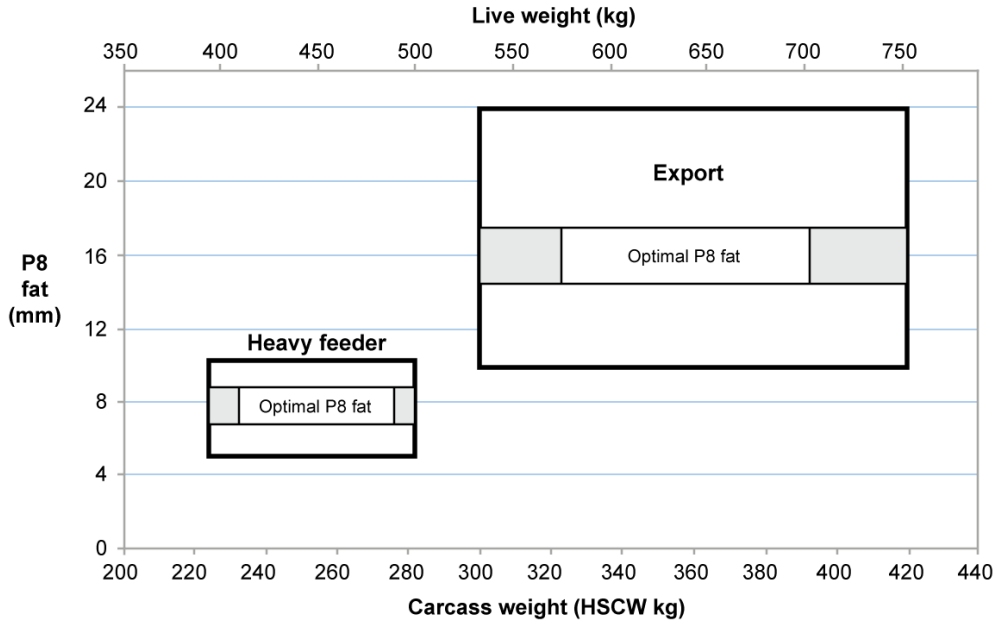
Dataset 2

A school that exhibited steers in the open steer competition at the Brisbane Exhibition received the information in Table 2 for each of the animals. The school steers were on a full 'feedlot' ration for 100 days before the competition.

Table 2: Recorded data for steers after Brisbane Exhibition open steer competition

Name of steer	Breed	Live weight (kg)	P8 fat (mm)	Live weight gain (kg) over 100 days in feedlot
Blondie	Charolais x Angus	600	11	145
Tank	Limousin x Angus	450	6	170
Henry	Limousin x Angus	650	12	160
Percy	Charolais x Angus	425	5	160

Figure 2: Market-recommended specifications for cattle entering the heavy feeder or export market



Source: Meat & Livestock Australia 2013, 'Meeting market specifications: Procedure 1 — Know your market specifications', http://mbfp.mla.com.au/Meeting-market-specifications/1-Know-your-market-specifications, citing NSW Department of Primary Industries, Forbes.

Question 5 (1 mark)

Determine the most suitable market for the steer named Tank.

Question 6 (1 mark)

Identify the maximum live weight requirement for steers to meet the heavy feeder market.

maximum live weight = …… kg

Question 7 (1 mark)

If the carcass weight for Percy was 243 kg, **determine** (to the nearest kg) the expected carcass weight (HSCW) for Blondie.

expected carcass weight = …… kg

Question 8 (2 marks)

Identify the mathematical relationship between HSCW and live weight. Show your working.

Question 9 (2 marks)

Draw a conclusion about the effectiveness of the school's feeding program for steers to meet market requirements. Give a reason for your conclusion.

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Dataset 3

Table 3 below shows the effect of the application of phosphorus fertiliser on a crop of French beans (*Phaseolus vulgaris*).

Table 3: Mean data from a fertiliser trial measuring the effect of different phosphorus application rates on the average growth (i.e. leaf area) and yield (i.e. pods/plant) of French beans

Phosphorus rate (kg/ha)	Mean leaf area (cm^2) ± confidence interval	Mean number of pods/plant ± confidence interval
0	56.3 ± 6.6	27.0 ± 3.0
10	79.8 ± 1.5	32.3 ± 1.1
20	120.2 ± 2.7	50.0 ± 2.2
30	98.5 ± 4.9	37.2 ± 3.1
40	52.5 ± 3.3	32.7 ± 2.2

Question 10 (6 marks)

Draw a conclusion about the optimum phosphorus rate based on statistical analysis of the data for mean leaf area and number of pods per plant.

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Instrument-specific marking guide (ISMG)

Criterion: Data test

Assessment objectives

2. apply understanding of animal production, plant production or agricultural enterprises to given algebraic, visual or graphical representations of scientific relationships and data to determine unknown scientific quantities or features
3. analyse evidence about animal production, plant production or agricultural enterprises to identify trends, patterns, relationships, limitations or uncertainty in datasets
4. interpret evidence about animal production, plant production or agricultural enterprises to draw conclusions based on analysis of datasets

The student work has the following characteristics:	Cur-off	Marks
• consistent demonstration, across a range of scenarios about animal production, plant production or agricultural enterprises, of – selection and correct application of scientific concepts, theories, models and systems to predict outcomes, behaviours and implications – correct calculation of quantities through the use of algebraic, visual and graphical representations of scientific relationships and data – correct and appropriate use of analytical techniques to correctly identify trends, patterns, relationships, limitations and uncertainty – correct interpretation of evidence to draw valid conclusions.	> 90%	10
	> 80%	9
• consistent demonstration, in scenarios about animal production, plant production or agricultural enterprises, of – selection and correct application of scientific concepts, theories, models and systems to predict outcomes, behaviours and implications – correct calculation of quantities through the use of algebraic, visual and graphical representations of scientific relationships and data – correct use of analytical techniques to correctly identify trends, patterns, relationships, limitations and uncertainty – correct interpretation of evidence to draw valid conclusions.	> 70%	8
	> 60%	7
• adequate demonstration, in scenarios about animal production, plant production or agricultural enterprises, of – selection and correct application of scientific concepts, theories, models and systems to predict outcomes, behaviours and implications – correct calculation of quantities through the use of algebraic, visual and graphical representations of scientific relationships and data – correct use of analytical techniques to correctly identify trends, patterns, relationships, limitations or uncertainty – correct interpretation of evidence to draw valid conclusions.	> 50%	6
	> 40%	5

The student work has the following characteristics:	Cur-off	Marks
• demonstration, in scenarios about animal production, plant production or agricultural enterprises, of elements of – selection and correct application of scientific concepts, theories, models and systems to predict outcomes, behaviours and implications – correct calculation of quantities through the use of algebraic, visual or graphical representations of scientific relationships or data – correct use of analytical techniques to correctly identify trends, patterns, relationships, limitations or uncertainty – correct interpretation of evidence to draw valid conclusions.	> 30%	4
	> 20%	3
• demonstration, in scenarios about animal production, plant production or agricultural enterprises, of elements of – application of scientific concepts, theories, models or systems to predict outcomes, behaviours or implications – calculation of quantities through the use of algebraic or graphical representations of scientific relationships and data – use of analytical techniques to identify trends, patterns, relationships, limitations or uncertainty – interpretation of evidence to draw conclusions.	> 10%	2
	> 1%	1
• does not satisfy any of the descriptors above.	≤ 1%	0