



ATAR course examination, 2020

Question/Answer booklet

ANIMAL PRODUCTION SYSTEMS

Please place your student identification label in this box

WA student number: In figures

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In words

Time allowed for this paper

Reading time before commencing work: ten minutes

Working time: three hours

Materials required/recommended for this paper

To be provided by the supervisor

This Question/Answer booklet

Multiple-choice answer sheet

Number of additional
answer booklets used
(if applicable):

To be provided by the candidate

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: up to three calculators, which do not have the capacity to create or store programmes or text, are permitted in this ATAR course examination

Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised material. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of examination
Section One Multiple-choice	20	20	30	20	20
Section Two Short answer	7	7	90	100	50
Section Three Extended answer	3	2	60	40	30
Total					100

Instructions to candidates

- The rules for the conduct of the Western Australian external examinations are detailed in the *Year 12 Information Handbook 2020: Part II Examinations*. Sitting this examination implies that you agree to abide by these rules.

- Answer the questions according to the following instructions.

Section One: Answer all questions on the separate Multiple-choice answer sheet provided. For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. Do not use erasable or gel pens. If you make a mistake, place a cross through that square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Sections Two and Three: Write your answers in this Question/Answer booklet.

- You must be careful to confine your answers to the specific questions asked and to follow any instructions that are specific to a particular question.
- Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Section One: Multiple-choice**20% (20 Marks)**

This section has **20** questions. Answer **all** questions on the separate Multiple-choice answer sheet provided. For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. Do not use erasable or gel pens. If you make a mistake, place a cross through that square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Suggested working time: 30 minutes.

1. An animal production system can have an impact on the natural environment by
 - (a) decreasing nutrient recycling.
 - (b) reducing energy consumption.
 - (c) increasing biodiversity.
 - (d) excluding abiotic components.

2. An effective strategy for conserving farm biodiversity while maintaining economic viability is to
 - (a) only adopt practices that are profitable.
 - (b) implement industry best practice in all aspects of the farm system.
 - (c) identify areas that are environmentally sensitive.
 - (d) monitor continually the environmental impact of existing practices.

3. The majority of nutrient absorption in both ruminants and monogastric animals occurs in the
 - (a) pancreas.
 - (b) stomach.
 - (c) large intestine.
 - (d) small intestine.

4. Which of the following has the **least** impact on the legal transportation of livestock?
 - (a) weather conditions
 - (b) time off feed and water
 - (c) stage of pregnancy
 - (d) physical injury

5. The main reason for producers participating in a quality assurance program is
 - (a) value adding.
 - (b) budgeting purposes.
 - (c) legal requirements.
 - (d) market access.

See next page

6. When preparing farm budgets, the primary source of information should be
- (a) district averages.
 - (b) industry benchmarks.
 - (c) production records.
 - (d) seasonal forecasts.
7. The main source of protein for a ruminant is
- (a) crushed grain.
 - (b) hay or silage.
 - (c) non-protein nitrogen.
 - (d) rumen microbes.
8. A method of managing the breeding season of livestock efficiently is to
- (a) maintain the females in condition 'score two' at mating.
 - (b) synchronise the oestrous cycle of females.
 - (c) leave males with the females for at least four cycles.
 - (d) mate the females three weeks after giving birth.
9. The use of by-products stockfeed in a cattle feeding program **must** be notified on the
- (a) livestock waybill.
 - (b) National Animal Health Statement.
 - (c) National Vendor Declaration.
 - (d) National Livestock Identification System.
10. Risk mitigation can **best** be described as a process to
- (a) avoid the likelihood of a risk occurring.
 - (b) prioritise and spread the risk.
 - (c) eliminate the risk of an event.
 - (d) reduce the impact of the risk when it occurs.
11. Ensuring the wellbeing of future generations by using sustainable farming practices is known as
- (a) the triple bottom line.
 - (b) regenerative agriculture.
 - (c) intergenerational equity.
 - (d) generational sustainability.

Questions 12 to 14 relate to the information below.

Feed cost table

	On farm cost (\$/t)	Energy (MJ/kg DM)*
Wheat	400	15
Barley	300	13
Oats	250	10
Lupins	500	18

*MJ/kg DM = megajoules/kg dry matter

12. Which grain provides a cost effective feed (\$ per MJ/kg DM) in meeting livestock energy requirements?
- (a) wheat
 - (b) barley
 - (c) oats
 - (d) lupins
13. Which grain is **most** likely to cause acidosis?
- (a) wheat
 - (b) barley
 - (c) oats
 - (d) lupins
14. Using the Pearson Square method, calculate the percentages of barley and lupins to achieve a ration with 15 MJ of energy.
- (a) 40% lupins, 60% barley
 - (b) 50% lupins, 50% barley
 - (c) 60% lupins, 40% barley
 - (d) 75% lupins, 25% barley
15. The hormone that can be used to restart a female's heat cycle is
- (a) prostaglandin.
 - (b) oestrogen.
 - (c) relaxin.
 - (d) oxytocin.
16. Which enzyme is released in the stomach to break down protein?
- (a) amylase
 - (b) saliva
 - (c) lipase
 - (d) pepsin

See next page

Questions 17 to 19 relate to the information below.

Beef cattle feedlot gross margin

Income	Carcase grid May 2020 220-280 kg DWt: \$4/kg	Carcase grid August 2020 220-280 kg DWt: \$5/kg
50 steers @ 260 kg DWt		
Costs		
Feed	40 000	50 000
Labour	3000	3000
Veterinary services	1000	1000
Total		

DWt = Dressed Weight

17. The feedlot gross margin in May 2020 is
- \$4000.
 - \$6000.
 - \$8000.
 - \$10 000.
18. Selling cattle in August rather than May would result in
- a reduction in profit.
 - an increase in profit.
 - a doubling in profit.
 - no change in profit.
19. The **most** effective strategy for minimising costs in the feedlot is to
- pay a lower wage.
 - use the least-cost ration.
 - increase the number of cattle.
 - sell steers at a lower weight.
20. At which point in a pest outbreak should control measures be initiated?
- at the equilibrium population of pests
 - after passing through the economic injury level
 - before the economic threshold is reached
 - after passing through the economic threshold

End of Section One

See next page

Section Two: Short answer**50% (100 Marks)**

This section has **seven** questions. Answer **all** questions. Write your answers in the spaces provided.

Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Suggested working time: 90 minutes.

Question 21**(13 marks)**

Genetic gain is the cornerstone of livestock breeding.

- (a) Identify **one** male and **one** female hormone that is released during the natural breeding behaviour and outline their main roles. (6 marks)

Name of hormone	Observed behaviours	Main role
Male		
Female		

- (b) Describe how **one** of the hormones identified in part (a) can be manipulated to improve breeding outcomes. (3 marks)

Question 21 (continued)

- (c) Select a commercially-used livestock breeding technology and describe how it improves the rate of genetic gain. (4 marks)

Question 22**(13 marks)**

Estimated breeding value (EBV) is an important selection tool for buyers.

- (a) Outline how EBV is utilised in an animal breeding program. (2 marks)

The table below shows the EBV of two rams.

Estimated breeding values (EBV)

Ram tag	WWT (kg)	WFAT (mm)	WEMD (mm)
A1	8.6	-1.5	0.7
A2	9.4	2.1	2.9

WWT = Weaning live weight

WFAT = Weaning fat depth

WEMD = Weaning eye muscle depth

- (b) (i) From the table above, clarify the breeding objectives of the buyer who selected ram tag A2 to produce prime lamb. (2 marks)

Question 22 (continued)

Referring to the EBV table on page 9.

- (ii) For ram tag A2, calculate the progeny's expected genetic gain for each trait. (3 marks)

- (iii) Explain the producer's choice in ram selection if the market was offering a better price for leaner lamb. (3 marks)

- (c) Consider **one** adaptation to reproduction management and explain how it would improve the efficiency of an élite sire's superior genetics in a breeding program. (3 marks)

Question 23

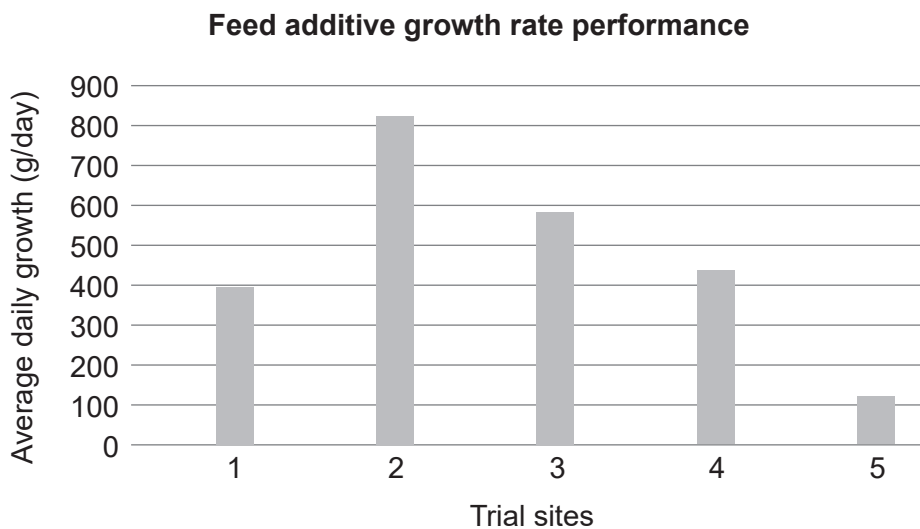
(9 marks)

Improving growth rates are a means of achieving more viable production systems.

- (a) (i) Outline the main difference between a feed additive and a growth promotant in a nutrition program. (2 marks)

- (ii) Why are animal by-products banned as feed additives in Australia? (2 marks)

Feed additive is used in the pig industry to improve pig growth performance. Growth rate across the industry averages 300 grams per day (g/day). The graph below represents the average g/day of pigs at five trial piggeries.



- (b) (i) Comment on the reliability of the trial on the basis of the above results. (2 marks)

Question 23 (continued)

(ii) Explain a reason for the differences in average growth rates at each site. (3 marks)

Question 24**(13 marks)**

There have been various methods developed to control worms in livestock.

- (a) Outline **one** reason for using slow-release capsules in preference to an oral drench to control worms. (2 marks)

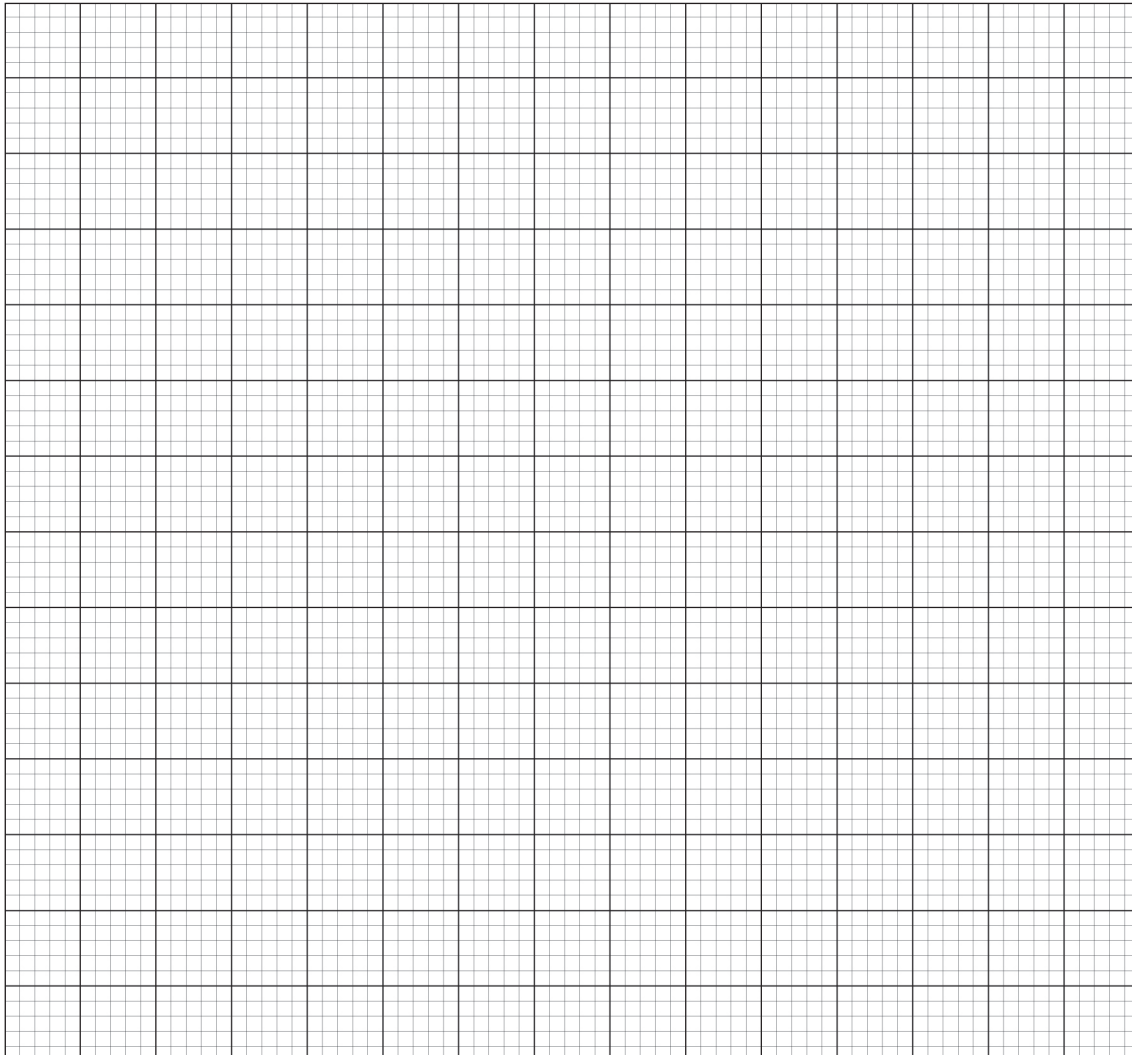
Question 24 (continued)

The following table compares the average weight gain of merino wethers over 90 days when using an oral drench treatment and slow-release capsules.

Site	Weight gain Oral drench	Weight gain Slow-release capsule
Albany	30 kg	40 kg
Katanning	48 kg	49 kg
Northam	18 kg	20 kg

(b) Construct a bar graph using the above data.

(5 marks)



A spare grid is provided at the end of this Question/Answer booklet. If you need to use it, cross out this attempt and indicate that you have redrawn it on the spare grid.

- (c) Propose a conclusion that could be drawn from the trial results. (2 marks)

- (d) (i) State a possible bias in the data in part (b). (1 mark)

- (ii) Describe a relevant change in the experimental design that could minimise the bias stated in part (d)(i). (3 marks)

Question 25

(19 marks)

Climate changes have an impact on animal production systems.

Select a livestock production system to answer this question.

Selected livestock production system: _____ (0 marks allocated)

- (a) Outline **two** effects that climate change has on the productivity of the selected livestock production system. (4 marks)

One: _____

Two: _____

The following graph represents the three-year moving average of very hot days in Australia.



- (b) (i) Does the graph support the theory of climate change? Outline a reason for your response. (3 marks)

- (ii) Describe the long-term effect of an increase in very hot days on the sustainability of the livestock production system. (3 marks)

- (c) (i) Describe **one** short-term strategy for optimising production during the increasing number of very hot days. (3 marks)

Question 25 (continued)

- (ii) Describe **two** long-term improvements to the livestock production system to maintain sustainability as the number of very hot days increases. (6 marks)

One: _____

Two: _____

Question 26

(17 marks)

An understanding of digestion underpins feeding programs.

- (a) Identify a type of livestock digestive system, state a relevant livestock example and explain how carbohydrates are digested. (5 marks)

Type of livestock digestive system: _____

Livestock example: _____

How carbohydrates are digested: _____

- (b) Outline how energy is used and lost by livestock during metabolic processes. (2 marks)

- (c) Identify a type of livestock digestive system that differs from part (a), state a relevant livestock example and explain how protein is digested in this digestive system. (5 marks)

Type of livestock digestive system: _____

Livestock example: _____

How proteins are digested: _____

Question 26 (continued)

- (d) Outline the effect of a sudden change in feed type on the metabolism of a ruminant. (2 marks)

- (e) Explain the importance of feed rations to achieve market specifications of livestock in a pasture-based grazing system. (3 marks)

Question 27

(16 marks)

Feed budgeting is a critical tool to any livestock system and requires careful analysis.

Due to the late break in the season, a producer needs to provide calving cows with a supplementary feed to maximise calf survival. The choice is to buy pellets or use their own grain/hay mix.

Feed type	Protein %	\$/tonne
Barley	14	300
Oats	12	300
Hay	8	120
Pellets	10	350

- (a) (i) The grain/hay mix needs to provide 10% protein. Using the Pearson Square method, design a suitable ration and show the ingredients as a percentage. (6 marks)

- (ii) Outline a reason for the grain/hay mix selected in part (a)(i). (2 marks)

Question 27 (continued)

- (b) (i) Compare the cost of the selected grain/hay ration from part (a)(i) with that of the pellets by completing the value of A or B, and C, D and E in the following partial budget. (4 marks)

Item	Cost \$/tonne	Grain/hay ration cost \$/tonne	Pellet ration cost \$/tonne
Barley	300	A =	
Oats	300	B =	
Hay	120	C =	
Pellets	350		350
Mixing machinery	40	40	0
Labour mixing	40	40	0
Labour feeding out	40	40	40
Storage	20	20	0
Delivery	10	0	10
Total \$/tonne		D =	E =

- (ii) State the **least-cost** ration. (1 mark)

- (iii) Explain **one** aspect of this partial budget that will require recalculation on a regular basis. (3 marks)

End of Section Two

See next page

Section Three: Extended answer**30% (40 Marks)**

This section contains **three** questions. You must answer **two** questions: the compulsory question (Question 28) and **one** of the other questions (Question 29 or Question 30). For Question 28, write your answer in the spaces provided. For Question 29 or Question 30, write your answers on the lined pages following Question 30.

Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Suggested working time: 60 minutes.

Question 28**(20 marks)**

Using an animal production enterprise you have studied, answer all parts of the questions.

Animal production enterprise: _____ (0 marks allocated)

- (a) Outline a relevant example of pesticide resistance in livestock and explain how this resistance could have developed. (6 marks)

Question 28 (continued)

- (b) Using practical examples, recommend how pesticide resistance can be managed in the animal production enterprise. (6 marks)

- (c) Define quality assurance (QA), state a livestock QA program and evaluate its role in maintaining Australia's 'clean, green' image with regard to the use of pesticides. (8 marks)

Question 29**(20 marks)**

To remain economically viable, it is essential that animal production aligns closely to consumer demand.

- (a) Explain, using examples, how animal production systems are changing as a result of consumer pressures. Evaluate the effectiveness of adopting new technologies to assist with making the stated changes. (11 marks)
- (b) Describe the relevance that market information has on the sustainability of an animal production system. Consider **two** strategies that could be incorporated into the production planning process to mitigate the risk of a downturn in market returns. (9 marks)

or

Question 30**(20 marks)**

Market standards play a vital role in making sure Australian agricultural products are globally competitive.

Identify the animal enterprise and marketable product in the spaces below.

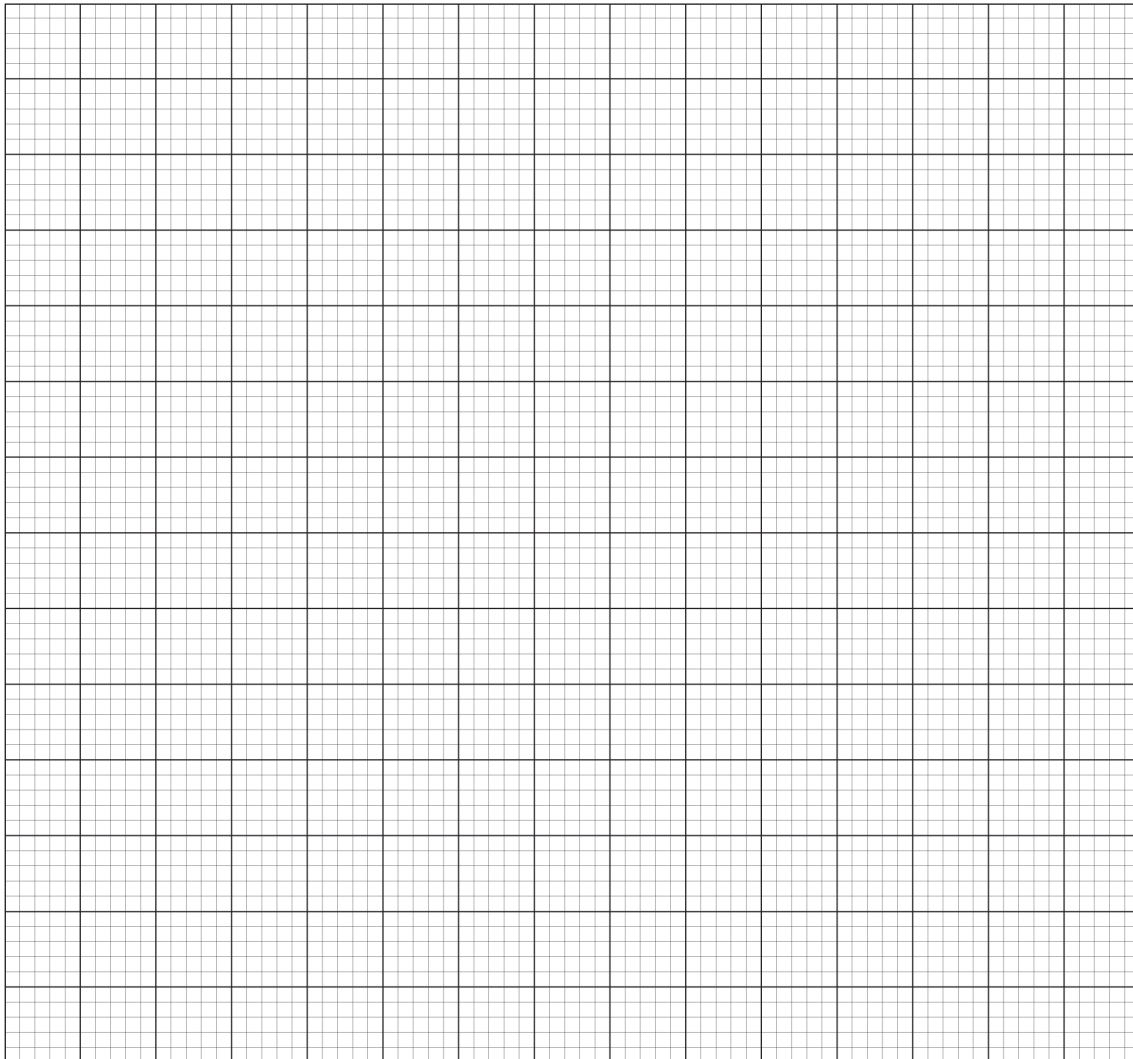
Animal enterprise: _____ (0 marks allocated)

Marketable product: _____ (0 marks allocated)

- (a) Outline **two** market standards that need to be met by the product stated above before it leaves the farm and explain how these standards are maintained during the production phase. (12 marks)
- (b) How are tariffs and quotas used to protect Australia's domestic market share? Examine another management strategy at the farm, state and national level that is critical to securing Australia's global competitiveness. (8 marks)

End of questions

Spare grid



ACKNOWLEDGEMENTS

Question 25

Dobbie, P. (2011). *Very hot days - Australia (1957–2010)* [Graph]. Retrieved June, 2020, from <http://phildobbie.com/2011/08/30/a-climate-of-confusion/>

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