Government of **Western Australia**
School Curriculum and Standards Authority

ATAR course examination, 2021

Question/Answer booklet

ANIMAL PRODUCTION SYSTEMS

Please place your student identification label in this box

WA student number: In figures

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.

2022/5828
Web version of 2021/60402

Ref: 21-005

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	6	6	90	96	50
Section Three Extended answer	3	2	60	40	30
				Total	100

Instructions to candidates

1. The rules for the conduct of the Western Australian external examinations are detailed in the *Year 12 Information Handbook 2021: Part II Examinations*. Sitting this examination implies that you agree to abide by these rules.

2. 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.

3. 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.

4. 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.

See next page

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.

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1. Food protein is broken down into peptides and

   (a) sugars.
   (b) amino acids.
   (c) fatty acids.
   (d) methane.

2. The natural breeding season of livestock can be made **more** effective by

   (a) synchronising oestrous in the females.
   (b) maintaining females in condition score three at mating.
   (c) leaving males with the females all year round.
   (d) mating the females immediately after weaning.

3. A hypothesis

   (a) is a statement of fact.
   (b) is the aim of the experiment.
   (c) describes the experimental method.
   (d) is a statement that can be tested.

4. A risk management strategy to mitigate declining income could be to

   (a) increase spending.
   (b) take out multi-peril insurance.
   (c) hire unskilled labour.
   (d) change the enterprise mix.

5. Quality assurance programs are in place to

   (a) ensure producers are paid a premium price.
   (b) ensure that a product meets the market standards.
   (c) protect producers against unfair product pricing.
   (d) make producers sell to a single market.

See next page

6. In both ruminant and monogastric animals, the majority of nutrients are absorbed in the

   (a) rumen.
   (b) small intestine.
   (c) large intestine.
   (d) stomach.

7. A randomised trial site minimises the chance of

   (a) bias.
   (b) non-valid results.
   (c) an unsupported hypothesis.
   (d) replicates being incorrectly allocated.

8. A strategy that would be of advantage to a farm's sustainability in the long term could be

   (a) using insecticides to control insect pests.
   (b) cultivating to control weeds.
   (c) conserving natural ecosystems.
   (d) maximising income to fund infrastructure.

9. Progesterone is a hormone that is responsible for

   (a) maintaining pregnancy.
   (b) releasing ova.
   (c) stimulating milk let-down.
   (d) exhibiting libido.

10. A producer has oats (9% crude protein) and lupins (30% crude protein) available to formulate a ration requiring 10% protein. Calculate the ration of oats to lupins, expressed as a ratio.

    (a) 20:1
    (b) 1:20
    (c) 5:1
    (d) 1:5

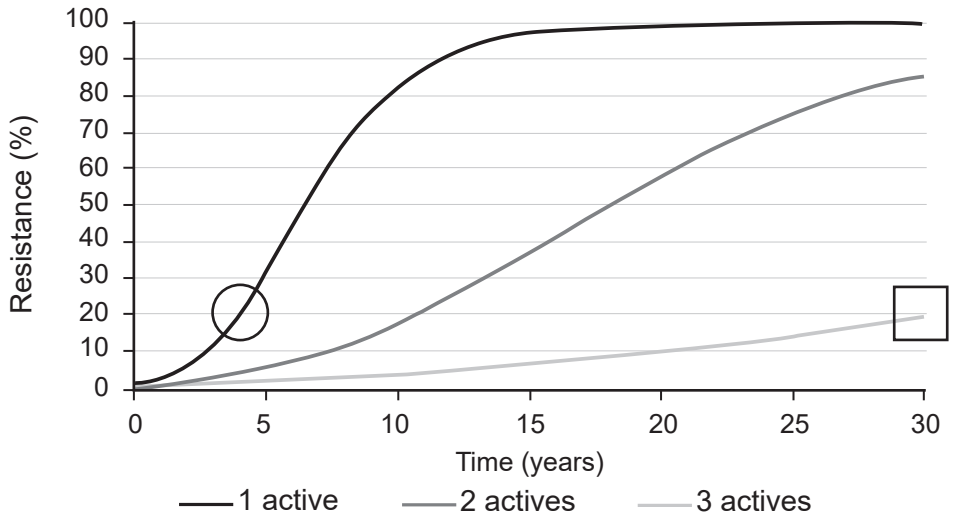
11. The use of different classes of stock in a feed conversion trial of two rations would be considered to be

    (a) randomisation.
    (b) replication.
    (c) experimental error.
    (d) standardisation.

See next page

Questions 12, 13 and 14 relate to the graph below.

Development of drench resistance when different drench groups are in a treatment



12. The circle indicates

(a) low resistance to the drench in the first four years.
(b) good control of worms in the first four years.
(c) about half the worms are resistant in four years.
(d) that resistance is increasing quickly after four years.

13. The square indicates the

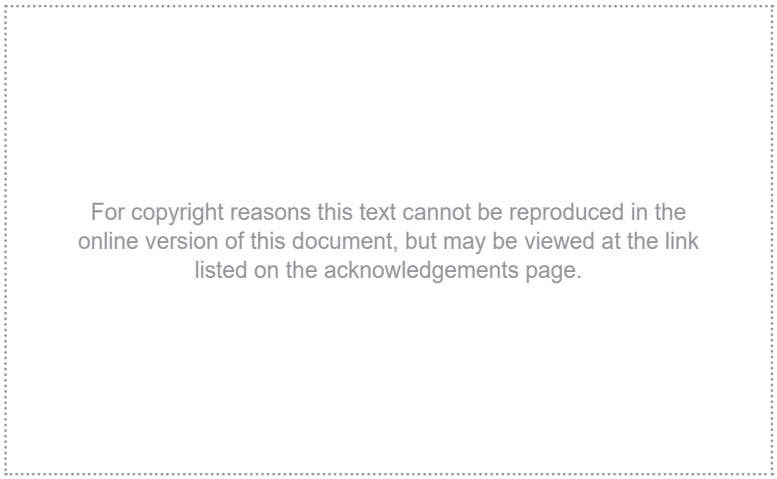
(a) most effective option for minimising resistance.
(b) least effective option for minimising resistance.
(c) general ineffectiveness of using three actives.
(d) trend toward no resistance using three actives.

14. Which statement about drench resistance is the **most** accurate?

(a) not all worms become resistant to drenches
(b) resistance to drenches is likely
(c) the use of four actives would stop resistance
(d) resistance is mostly caused by under-dosing

See next page

15. Consider the diagram shown below:



Which of the following statements **correctly** states the heritability of the affected characteristic?

(a) the affected male and female are not related
(b) any offspring of the affected male will be affected
(c) the characteristic is controlled by the recessive gene
(d) the characteristic is controlled by the dominant gene

16. If a farm's gross margin for its beef enterprise is falling, the producer might choose to increase

(a) beef numbers to maximise production.
(b) income by only selling when prices are high.
(c) input costs to maximise production.
(d) income by diversifying to another enterprise.

17. Lower production due to soil degradation in farming regions has an effect on

(a) intergenerational equity.
(b) safe farm practices.
(c) Australia's global competitiveness.
(d) the adoption of new technology.

18. The Australian Government could introduce a tariff on an import to

(a) protect importers against price fluctuations in the market place.
(b) increase export trade by subsidising Australian producers.
(c) restrict trade by increasing the price of the imported good.
(d) improve the comparative advantage of Australian producers.

See next page

19. The **biggest** risk to safe work practices in an Australian agricultural workplace is

(a) weather conditions.
(b) poor training.
(c) the use of chemicals.
(d) isolation.

20. An employer's main duty of care in the workplace is to ensure that

(a) all employees and visitors are safe.
(b) employees take responsibility for their own safety.
(c) employees only are safe.
(d) everyone, including visitors, are safe.

End of Section One

See next page

Section Two: Short answer **50% (96 Marks)**

This section has **six** 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 **(15 marks)**

Pest management needs to balance the damage caused by the pest with the best time to control that pest.

The graph below represents a treatment process for the control of lice in beef cattle.

(a) (i) What do lines A and B on the above graph represent?

(2 marks)

A = _____

B = _____

(ii) Outline the main reason for a gap between A and B on the above graph. (2 marks)

_____

_____

_____

_____

See next page

(iii) Describe, with reference to the graph, how pesticide resistance could occur. (3 marks)

(b) Propose **two** short-term and **two** long-term strategies that would assist in the management of pesticide resistance. (8 marks)

Short-term strategies

One:

Two:

Long-term strategies

One:

Two:

See next page

Question 22 **(14 marks)**

Manipulation of the breeding cycle of sheep can lead to more lambs being weaned and greater profits.

(a) (i) Outline how the feeding technique of flushing is used to manipulate the breeding cycle. (2 marks)

(ii) State which reproductive hormone is **most** affected by the flushing technique. (1 mark)

(iii) Describe how an artificial breeding technique would take full advantage of the flushing technique. (3 marks)

The table below shows the data from an experiment to determine which feed type is more profitable to flush ewes.

Lamb production and return from flushing ewes with lucerne hay or lupin grain

Feed type	Income ($/ha)	Cost of feeding twin-bearing ewes during pregnancy ($/ha)	Cost of feeding twin-bearing ewes during lactation ($/ha)	Income less feeding costs ($/ha)
Lucerne hay	19	2	4	A
Lupin grain	30	7	14	B

(b) (i) Calculate A and B in the table. (2 marks)

A = _____

B = _____

(ii) Propose a relevant hypothesis for this experiment. (2 marks)

_____

_____

_____

_____

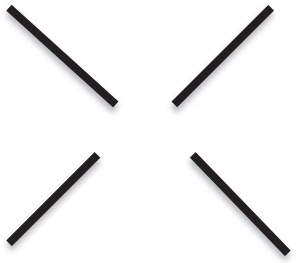
(iii) State a possible management decision based on the results of the experiment. (1 mark)

_____

_____

Question 22 (continued)

(iv) The crude protein of lucerne hay is 30% and oaten hay is 15%. Using the Pearson square method, calculate the ratio of lucerne hay to oaten hay required to provide 20% crude protein. Show **all** workings. (3 marks)



Ratio: _____

Question 23 **(17 marks)**

Fats are present in many feedstuffs and are one of the most important components of diets.

(a) (i) Apart from fats, state the other **two** major components of a diet. (2 marks)

One: _____

Two: _____

(ii) State the main role of fat in an animal's diet. (1 mark)

_____

(iii) State the substance that is released from the liver to break down fat in the digestive system. (1 mark)

_____

(iv) Identify the site of fat absorption in the digestive system. (1 mark)

_____

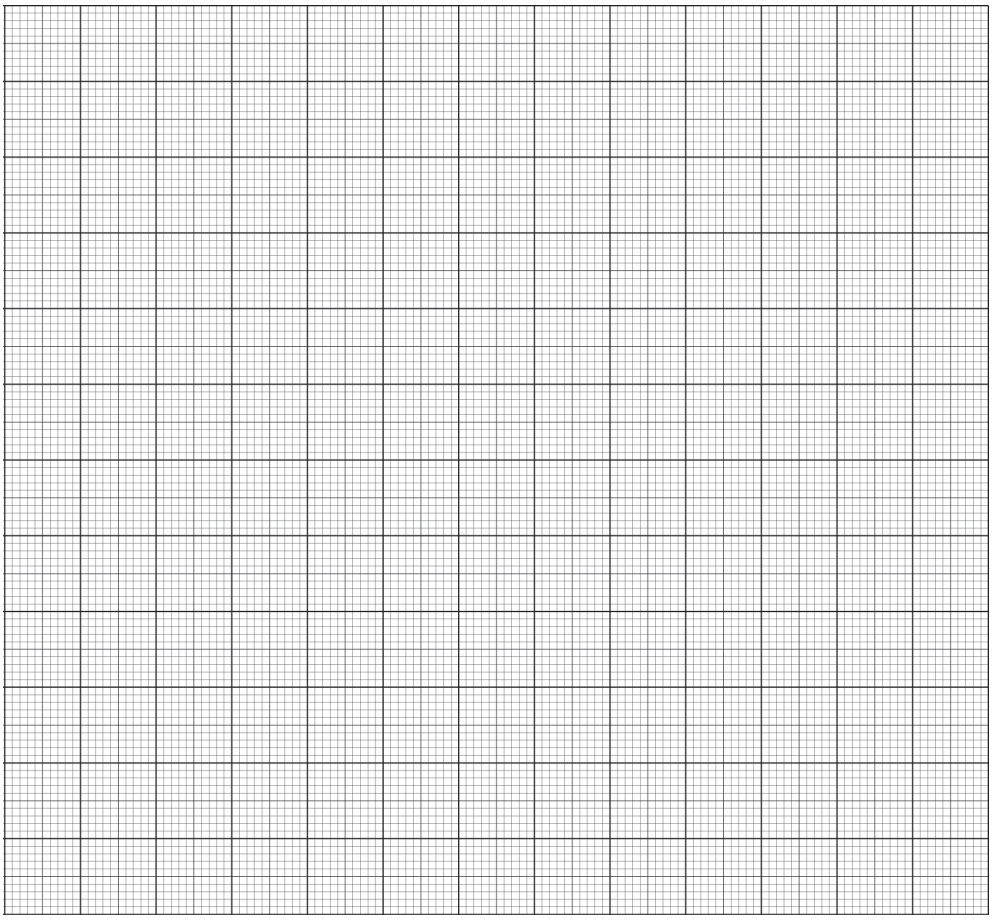
See next page

Question 23 (continued)

The data table below is from an experiment undertaken to assess the effect of adding three different sources of dietary fat to the ration of meat birds. The meat birds were weighed once a week and their weight gain recorded.

	Weight gain (g)			
Fat source	**Week 1**	**Week 2**	**Week 3**	**Week 4**
Canola meal	100	150	200	250
Meat meal	100	160	250	350
Soya bean meal	100	180	300	400

(b) Using the table above, graph the results of the experiment on the grid below. (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.

See next page

(c) Outline **two** variables that would need to be considered in the experimental design to minimise experimental error. (4 marks)

One: _____

_____

_____

_____

Two: _____

_____

_____

_____

(d) From the table on page 14, identify the source of fat that should **not** be fed to cattle and outline the main reason for its restricted status. (3 marks)

Source: _____

Reason: _____

_____

_____

_____

Question 24 **(16 marks)**

Genetic modification of organisms and other emerging biotechnologies could have important roles in producing more and higher quality food.

(a) (i) Explain, using an example, the process by which genetically-modified organisms can be produced. (4 marks)

(ii) Consider a potential benefit of using genetically-modified livestock in animal production systems. (3 marks)

(b) Define the term ‘cloning’ and outline a potential application of this technology to animal production systems. (3 marks)

See next page

(c) (i) Outline **two** ways in which the introduction of genetically-modified or cloned livestock into commercial food production might have a **negative** effect on the sustainability of the production system. (4 marks)

One: _____

_____

_____

_____

Two: _____

_____

_____

_____

(ii) For **one** of the effects stated in part (c)(i), recommend what action could be taken to minimise this effect. (2 marks)

_____

_____

_____

_____

See next page

Question 25 **(17 marks)**

Natural, agricultural and urban ecosystems differ in a number of ways.

(a) Identify a natural ecosystem and compare its key characteristics with those of an agricultural ecosystem. (5 marks)

(b) (i) Explain the difference in the degree of biodiversity between natural and agricultural ecosystems. (4 marks)

See next page

(ii) Compare the degree of biodiversity between an urban and a natural ecosystem. (4 marks)

(c) Explain, using examples, how the improvement of biodiversity in an agricultural system can enhance its productivity. (4 marks)

See next page

Question 26 **(17 marks)**

The profitability of a feedlot is sensitive to beef cattle specifications.

Beef cattle specifications - price grid - $/kg carcass weight

Carcass weight (kg)	Fat depth (mm)			
	0–3	**4–15**	**16–25**	**>25**
100–160	3.00	4.00	3.00	2.00
161–220	3.00	5.00	4.00	3.00
221–280	3.00	6.00	4.00	3.00
281–340	3.00	5.00	4.00	3.00
>341	2.00	4.00	3.00	2.00

(a) Using the information provided in the table above:

(i) state the optimum specifications for selling beef. (1 mark)

(ii) evaluate the effect of product variation on financial return. (3 marks)

(b) Describe a nutritional management strategy to help achieve market specifications for an animal production system with which you are familiar. (3 marks)

See next page

(c) (i) State a variation in product quality in a feedlot caused by mishandling. (1 mark)

(ii) Outline how the variation in part (c)(i) could be minimised. (2 marks)

(iii) State a variation in product quality in a feedlot caused by road transport. (1 mark)

(iv) Propose how the variation in part (c)(iii) could be minimised. (2 marks)

(d) Explain how quality assurance can ensure that on-farm practices can deliver the quality required by the market. (4 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 27) and **one** of the other questions (Question 28 or Question 29). For Question 27, write your answer in the spaces provided. For Question 28 or Question 29, write your answers on the lined pages following Question 29.

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 27 **(20 marks)**

Select an animal enterprise with which you are familiar and state its marketable product.

Animal enterprise: _____ (0 marks allocated)

Marketable product: _____ (0 marks allocated)

(a) (i) Propose a breeding goal of the nominated animal enterprise that will enhance the marketable product. (1 mark)

Breeding goal: _____

(ii) How can the breeding goal be measured? (2 marks)

_____

_____

_____

_____

(iii) Explain how a producer could make progress toward the proposed breeding goal identified in part (a)(i). (3 marks)

_____

_____

_____

_____

_____

_____

_____

See next page

(b) Discuss **two** new technologies that could optimise progress toward the proposed breeding goal identified in part (a)(i). (8 marks)

One: _____

Two: _____

Question 27 (continued)

(c) Identify and outline the effect of an aspect of climate change on the proposed breeding goal in part (a)(i), and describe a strategy to mitigate its impact. (6 marks)

See next page

Question 28 **(20 marks)**

Australia exports approximately 70% of its agricultural production.

(a) Clarify how comparative advantage works in the context of an animal production system with which you are familiar. Describe the importance of the global economy for **two** Australian animal products, including their major market and main competitor. (11 marks)

(b) Outline **four** on-farm strategies to maintain Australia's global competitiveness in animal production and evaluate the effectiveness of **one** of these strategies in promoting sustainable farming practices. (9 marks)

or

Question 29 **(20 marks)**

Sustainable agriculture provides food, fibre and animal products needed by society, but not at the expense of the environment.

(a) Identify **one** natural resource that is critical for sustainable animal production and discuss the issues farmers have in balancing the short-term needs of productivity with the long-term need to improve that resource. (11 marks)

(b) Analyse the concept of intergenerational equity as it relates to an animal production system and describe **two** economic strategies animal producers could adopt to improve sustainability. (9 marks)

End of questions

Question number: _____

Question number: _____

Question number: _____

Question number: _____

Question number: _____

Supplementary page

Question number: _____

Supplementary page

Question number: _____

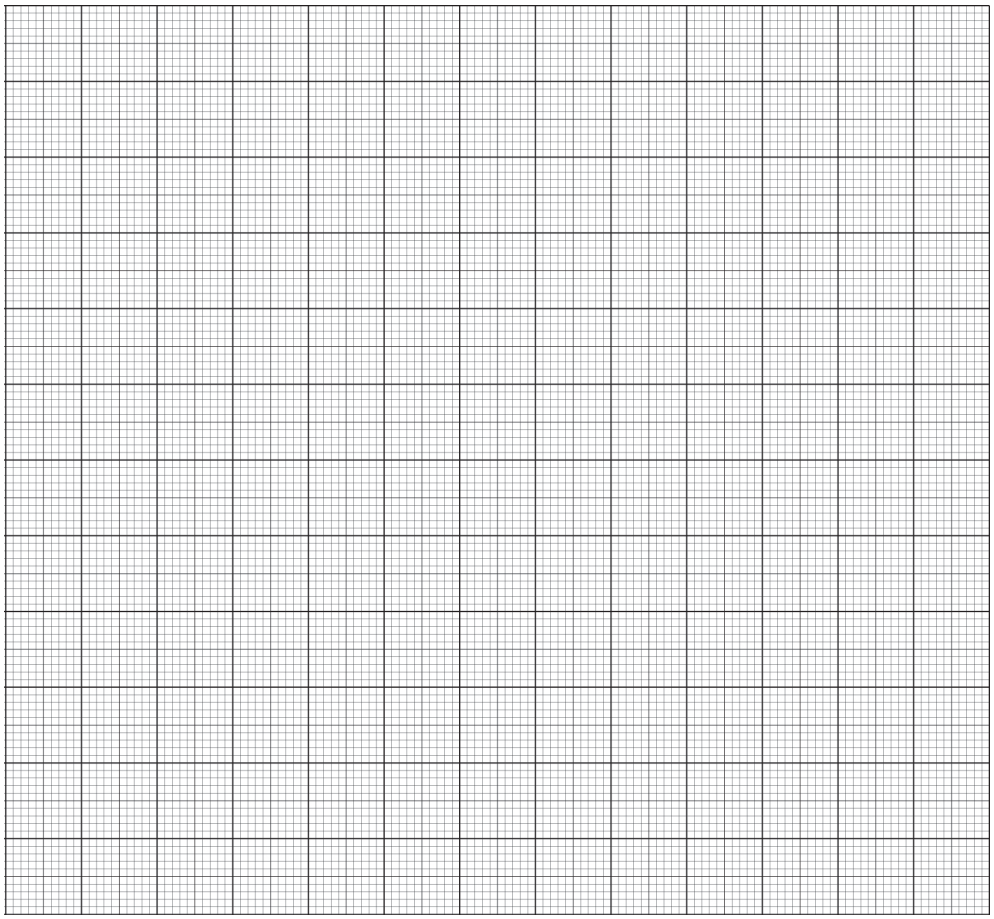
Supplementary page

Question number: _____

Supplementary page

Question number: _____

Spare grid



ACKNOWLEDGEMENTS

Questions 12–14 Figure 2: 'Annual rotation' – Development of drench resistance when different drench groups are in a treatment. [Graph]. (n.d.). *Drench rotation versus combinations to combat drench resistance*. Retrieved June, 2021, from http://www.wormboss.com.au/sheep-goats/tests-tools/management-tools/drenches/drench-rotation-versus-combinations-to-combat-drench-resistance.php

Question 15 *What pattern of inheritance does this trait follow?* [Diagram]. (2015). *Genetics pedigree problems*. Retrieved June, 2021, from https://www.slideshare.net/callr/genetics-pedigree-problems

Question 21(a) Adapted from: Pedigo, L. P. (n.d.). Figure 4: Diagram showing relationship of the economic threshold to the economic injury level and time of taking action. Economic thresholds and economic injury levels. Retrieved June, 2021, from https://ipmworld.umn.edu/pedigo

Published by the School Curriculum and Standards Authority of Western Australia
303 Sevenoaks Street
CANNINGTON WA 6107