



## SAMPLE ASSESSMENT TASKS

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**ANIMAL PRODUCTION SYSTEMS**  
**GENERAL YEAR 12**

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## Sample assessment task

### Animal Production Systems – General Year 12

#### Task 11 – Unit 4

**Assessment type:** Investigation

**Conditions**

Time for the task: 50 minutes for planning; 120 minutes for collecting data; 50 minutes for processing and evaluating results

**Task weighting**

5% of the school mark for this pair of units

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**The effect of sheep age on fleece weight**

**(53 marks)**

**Special requirements**

For this task, students will require access to a mixed-age flock of Merino sheep at shearing time.

**Background reading**

<http://vein.vetsci.usyd.edu.au/sheephealth/Chapter4.html>

**Task description**

The main source of income from Merino flocks is from wool production. To maximise income, producers need to structure their flocks to optimise both the quality and quantity of wool produced, and to ensure enough replacements for sustainable production.

Your task is to investigate whether fleece weight is affected by the age of the sheep.

Each fleece from the mixed-age flock will be weighed and recorded at shearing. You will then sort the data according to age (tag colour) and see if there is a difference.

**What you need to do**

- Working individually, complete the questions in the *Planning* section of the activity sheet. Show this to your teacher before moving to the next part.
- Work with your partner to discuss your individual planning and amend your plans, if necessary.
- Work with your partner to collect your data as in the *Conducting* section of the activity sheet.
- Working individually, complete the questions in the *Processing and Analysis, Conclusion and Evaluation* sections of the activity sheet.

## Investigating the effect of sheep age on fleece weight

### Part 1 – Planning

1. Based on your background reading, write a suitable hypothesis for the investigation. This should be a concise, testable statement about the relationship you expect to find between age and fleece weight. (2 marks)

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2. (a) Make a prediction about the results. How do you think sheep age will affect fleece weight? (1 mark)

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- (b) Cite a source of information or research that might support your prediction in (a), and summarise its main ideas. (3 marks)

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3. Identify the following variables for the investigation:

(a) Independent variable – what is being changed? (1 mark)

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(b) Dependent variable – what is being measured? (1 mark)

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4. Sheep frame size or bodyweight could possibly influence fleece weight, creating a degree of experimental error. In this investigation, this error will be minimised by averaging the fleece weights for each age group.

(a) Describe another method that could be used to minimise errors due to differences in sheep frame size or bodyweight. (2 marks)

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(b) Identify **two** factors, other than age and frame size, that could affect fleece weight. (2 marks)

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(c) State how the two factors you identified in (b) will be controlled. (2 marks)

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5. Plan and describe how you will carry out the investigation and collect your data. Your description should have enough detail that it could be repeated from your instructions. You should include:
- a list of procedures, dates and equipment
  - sample size for each age group
  - a general overview of the flock being used for the investigation, e.g. gender, recent husbandry history such as lambing dates (if ewes), shearing date, description of paddocks used and feeding regimes, and any other relevant information
  - occupational safety and health issues, and how these will be addressed
  - animal welfare issues and how these will be addressed. (10 marks)
6. Create a table in which to record your information. The table can be done in a spread sheet (and printed to take to the site where data is to be collected). (2 marks)

### Part 2 – Conducting

7. The total allocation of marks for conducting the experimental work will be based on the following:
- data collected and recorded in table (2 marks)
  - safe work practices (2 marks)
  - appropriate handling of equipment (2 marks)
  - handling of sheep meets animal welfare requirements. (2 marks)

#### Practical work at shearing time

- Set up the fleece weighing scales and make sure they are working effectively.
- As each animal is shorn, take note of its year of birth (tag colour). Retain the belly wool.
- You may like to attach a corresponding coloured peg to the fleece immediately after shearing to reduce errors when the fleece is weighed. This can be removed just prior to weighing.
- Weigh each fleece (including bellies) and enter in the appropriate age column.

**Part 3 – Processing and analysis**

8. Select an appropriate method to present your data. Attach this to your report. (6 marks)

9. Describe any patterns or trends in your data. (2 marks)

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10. Suggest reasons for any patterns or trends in your data. (2 marks)

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**Part 4 – Conclusion**

11. Do the data support the hypothesis? Explain. (3 marks)

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**Part 5 – Evaluation**

12. Discuss the reliability of your data. Describe any changes in the way the investigation was done that could increase the reliability of results. (4 marks)

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13. Describe aspects of the investigation that could be improved to reduce negative impacts on sheep. (2 marks)

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## Marking key for sample assessment task 11 – Unit 4

1. Based on your background reading, write a suitable hypothesis for the investigation. This should be a concise, testable statement about the relationship you expect to find between age and fleece weight.

Description	Marks
Appropriate statement relating fleece weight and age provided	1–2
<b>Total</b>	<b>/2</b>
<b>Answer could include, but is not limited to:</b>	
For 1 mark, a statement such as:	
<ul style="list-style-type: none"> <li>As sheep age, their fleece weight increases.</li> </ul>	
For 2 marks, a statement such as:	
<ul style="list-style-type: none"> <li>As sheep age, their fleece weight increases until they reach adulthood, when it stabilises for a number of years until declining in 'old age'.</li> </ul>	

2. (a) Make a prediction about the results. How do you think sheep age will affect fleece weight?

Description	Marks
Suitable prediction provided to match the given hypothesis	1
<b>Total</b>	<b>/1</b>

- (b) Cite a source of information or research that might support your prediction in (a), and summarise its main ideas.

Description	Marks
Appropriate source of information cited to allow it to be found	1
Ideas summarised	1–2
<b>Total</b>	<b>/3</b>
<b>Answer could include, but is not limited to:</b>	
Aspects that may be in a summary of ideas include:	
<ul style="list-style-type: none"> <li>weight usually increases up to early adulthood and then decreases</li> <li>whether the sheep was single or twin birth, which will affect fleece weight</li> <li>nutrition will affect fleece weight.</li> </ul>	

3. Identify the following variables for the investigation:

- (a) Independent variable – what is being changed?

Description	Marks
Age of sheep	1
<b>Total</b>	<b>/1</b>

- (b) Dependent variable – what is being measured?

Description	Marks
Fleece weight	1
<b>Total</b>	<b>/1</b>

4. Sheep frame size or bodyweight could possibly influence fleece weight, creating a degree of experimental error. In this investigation, this error will be minimised by averaging the fleece weights for each age group.
- (a) Describe another method that could be used to minimise errors due to differences in sheep frame size or bodyweight.

Description	Marks
Suitable method described	1–2
<b>Total</b>	<b>/2</b>
<b>Answer could include, but is not limited to:</b>	
<ul style="list-style-type: none"> <li>include only sheep of similar frame size or bodyweight in the study</li> <li>express fleece weight as fleece weight per kg of bodyweight.</li> </ul>	

- (b) Identify **two** factors, other than age and frame size, that could affect fleece weight.

Description	Marks
Two factors identified	1–2
<b>Total</b>	<b>/2</b>
<b>Answer could include, but is not limited to:</b>	
Possible factors may include: <ul style="list-style-type: none"> <li>whether the sheep was single or multiple birth</li> <li>feed conditions</li> <li>environmental conditions</li> <li>conditioning</li> <li>age of first shearing</li> <li>gender of sheep.</li> </ul>	

- (c) State how the two factors you identified in (b) will be controlled.

Description	Marks
Control methods for each factor stated	1–2
<b>Total</b>	<b>/2</b>
<b>Answer could include, but is not limited to:</b>	
Possible controls may include: <ul style="list-style-type: none"> <li>whether the sheep was single or multiple birth – include only single-birth sheep</li> <li>feed conditions – run as a flock in the same paddock</li> <li>environmental conditions – run as a flock in the same paddock</li> <li>conditioning – run as a flock in the same paddock, and treat any parasites etc. in the same way for all sheep</li> <li>age of first shearing – use only sheep whose first shearing was the same age</li> <li>gender of sheep – use only wethers or only ewes.</li> </ul>	

5. Plan and describe how you will carry out the investigation and collect your data. Your description should have enough detail that it could be repeated from your instructions. You should include:
- a list of procedures, dates and equipment
  - sample size for each age group
  - a general overview of the flock being used for the investigation, e.g. gender, recent husbandry history such as lambing dates (if ewes), shearing date, description of paddocks used and feeding regimes, and any other relevant information
  - occupational safety and health issues, and how these will be addressed
  - animal welfare issues and how these will be addressed.

Description	Marks
Equipment list provided e.g. shearing tools, fleece weighing scales	1
Description of steps involved provided	1
Dates for collection of data provided	1
Sample size of each age group provided	1
Description of flock provided that includes gender and recent husbandry history	1–2
Occupational safety and health issues identified and ways to address them provided	1–2
Animal welfare issues identified and ways to address them provided	1–2
<b>Total</b>	<b>/10</b>

6. Create a table in which to record your information. The table can be done in a spread sheet (and printed to take to the site where data is to be collected).

Description	Marks
Appropriately titled columns included (age of sheep, fleece weight)	1
Units included in column title	1
<b>Total</b>	<b>/2</b>

7. The total allocation of marks for conducting the experimental work will be based on the following:
- data collected and recorded in table
  - safe work practices
  - appropriate handling of equipment
  - handling of sheep meets animal welfare requirements.

Description	Marks
Data collected and recorded in table	1–2
Safe work practices	1–2
Appropriate handling of equipment	1–2
Handling of sheep meets animal welfare requirements	1–2
<b>Total</b>	<b>/8</b>

8. Select an appropriate method to present your data. Attach this to your report.

Description	Marks
Data presented as a graph (ideally, bar graph)	1
Data accurately plotted	1
Age on x-axis	1
Average fleece weight on y-axis	1
Axes labelled	1
Units included on axes labels	1
<b>Total</b>	<b>/6</b>

9. Describe any patterns or trends in your data.

Description	Marks
Suitable description of pattern	1–2
<b>Total</b>	<b>/2</b>
<b>Answer could include, but is not limited to:</b>	
Data likely to show increase in fleece weight up to about three years of age, then some small drop off after that	

10. Suggest reasons for any patterns or trends in your data.

Description	Marks
Suitable reasons for pattern provided	1–2
<b>Total</b>	<b>/2</b>
<b>Answer could include, but is not limited to:</b>	
Possible reasons include:	
<ul style="list-style-type: none"> <li>• young sheep do not have the frame size or bodyweight to support a higher fleece weight</li> <li>• as a lamb ages it gains weight, so can support more wool</li> <li>• once full maturity reached, factors affecting sheep weight will only be related to nutrition and general condition</li> <li>• reduced fleece weight for 'old age' sheep will be a function of loss of condition with age.</li> </ul>	

11. Do the data support the hypothesis? Explain.

Description	Marks
Statement about support or not of hypothesis provided	1
Explanation for support or not of hypothesis uses evidence from the experimental work	1–2
<b>Total</b>	<b>/3</b>

12. Discuss the reliability of your data. Describe any changes in the way the investigation was done that could increase the reliability of results.

Description	Marks
Discusses any aspects of the experiment that could impact its reliability	1–2
Describes ways of improving reliability	1–2
<b>Total</b>	<b>/4</b>
<b>Answer could include, but is not limited to:</b>	
Aspects that may impact reliability include: <ul style="list-style-type: none"> <li>• the sample size</li> <li>• variations in the extent of grease in the wool</li> <li>• variations in the moisture content of the wool.</li> </ul> Improving reliability could be achieved by: <ul style="list-style-type: none"> <li>• increasing sample size</li> <li>• comparing weights based on clean wool</li> <li>• comparing weights based on dry wool.</li> </ul>	

13. Describe aspects of the investigation that could be improved to reduce negative impacts on sheep.

Description	Marks
Describes ways of reducing negative impacts on sheep	1–2
<b>Total</b>	<b>/2</b>
<b>Answer could include, but is not limited to:</b>	
Aspects that may reduce negative impacts on animals include: <ul style="list-style-type: none"> <li>• minimise handling by people</li> <li>• use experienced shearers</li> <li>• minimise time sheep are in the shearing shed and return to paddock promptly</li> <li>• avoid shearing when weather conditions are likely to stress the shorn sheep (i.e. when cold and/or wet weather conditions are present or forecast for the next day or so).</li> </ul>	

## Sample assessment task

## Animal Production Systems – General Year 12

## Task 13 – Unit 3 and Unit 4

**Assessment type:** Test**Conditions**

Time for the task: 40 minutes

**Task weighting**

6% of the school mark for this pair of units

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## Test

**Animal structure and function and Animal nutrition****(30 marks)****Recommended time: 40 minutes****Structure of this test**

<b>Section</b>	<b>Number of questions</b>	<b>Suggested working time (minutes)</b>	<b>Marks available</b>
Section One: Multiple-choice	10	15	10
Section Two: Short answer	6	25	20
		<b>Total</b>	<b>30</b>

**Section One: Multiple-choice****(10 marks)**

1. What is the typical pH range for the monogastric stomach?
  - (a) 1–2
  - (b) 2–3
  - (c) 3–4
  - (d) 4–5
  
2. Which one of the following gives the main processes involved in monogastric digestion?
  - (a) mechanical and microbial breakdown
  - (b) chemical and microbial breakdown
  - (c) mechanical and chemical breakdown
  - (d) chemical and enzyme breakdown
  
3. Which one of the following is another name for the avian (bird) proventriculus?
  - (a) stomach
  - (b) crop
  - (c) gizzard
  - (d) small intestine
  
4. For both monogastric and ruminant digestion, in which part of the digestive system does most absorption of nutrients occur?
  - (a) large intestine
  - (b) stomach
  - (c) cecum
  - (d) small intestine
  
5. Roughages are
  - (a) low in energy and low in fibre.
  - (b) high in energy and high in fibre.
  - (c) low in energy and high in fibre.
  - (d) high in energy and low in fibre.

6. A deficiency of calcium in the blood causes which nutritional disease?
- (a) milk fever
  - (b) acidosis
  - (c) white-muscle disease
  - (d) grain poisoning
7. Supplementary feeding of breeding ewes before and during joining can improve fertility by
- (a) improving foetus growth.
  - (b) increasing birth weights.
  - (c) decreasing the number of miscarriages in ewes.
  - (d) increasing ovulation rates.
8. Which one of the following gives information needed to assist in meeting a feed on offer (FOO) target for a paddock?
- (a) the health of the animals
  - (b) the rates of both pasture growth and pasture removal by grazing animals
  - (c) the soil acidity
  - (d) the time of year
9. Feed conversion ratios are usually expressed as
- (a) the time it takes an animal to gain 1 kg of weight per kilogram of dry feed intake.
  - (b) the mass of all feed to achieve 1 kg of weight gain by an animal.
  - (c) the mass of dry feed to achieve 1 kg of weight gain by an animal.
  - (d) the mass gained by an animal per kilogram of dry feed intake.
10. A realistic feed conversion ratio for a monogastric animal in an intensive production system would be
- (a) 3:1.
  - (b) 7:1.
  - (c) 11:1.
  - (d) 15:1.

**End of Section One**



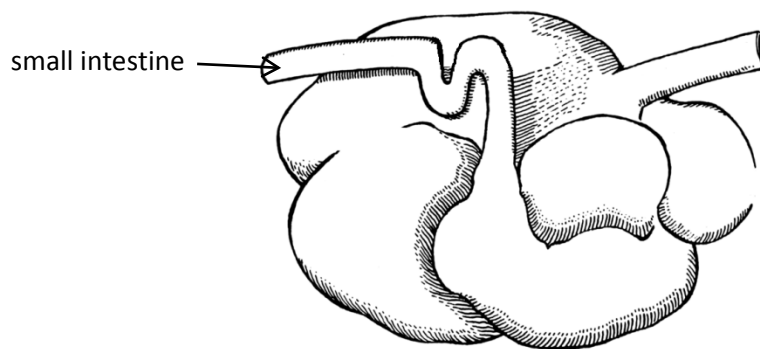
**Section Two: Short answer****(20 marks)**

Write your answers in the space provided on the paper.

1. The diagram below shows a representation of the ruminant digestive system. Label the following parts of the ruminant system on the diagram:

- rumen
- abomasum
- omasum
- reticulum
- oesophagus.

(5 marks)



2. Using the chambers from question 1, give the order in which food passes through the chambers of a ruminant's digestive tract.

(4 marks)

1. oesophagus

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. small intestine

3. Describe the processes that occur in the abomasum. Your answer needs to include the names of any substances used in, and any products from, the processes that occur in the abomasum. (3 marks)

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4. Explain the process that occurs in the rumen of a ruminant's digestive tract. Your answer needs to include the names of any substances used in, and any products from, the processes. (3 marks)

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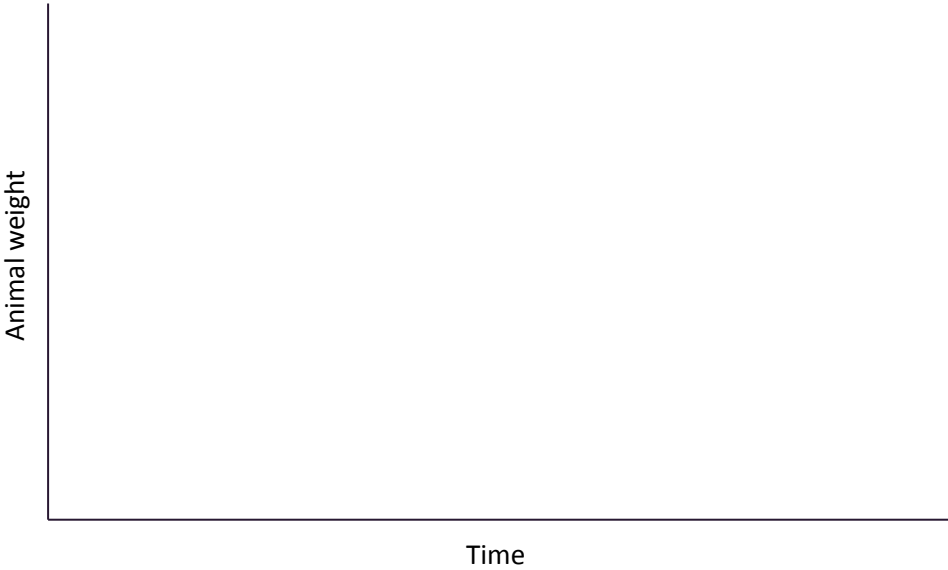
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5. Give the name of the by-product from the digestion occurring in the rumen. State why this by-product is a problem. (2 marks)

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6. Draw the typical shape of an animal's growth curve and explain its relationship to nutritional management. (3 marks)



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**ACKNOWLEDGEMENTS**

**Section Two**

**Question 1** Image adapted from: Pearson Scott Foresman. (n.d.). File:Abomasum (PSF).png. Retrieved April, 2015, from [http://commons.wikimedia.org/wiki/File:Abomasum\\_\(PSF\).png](http://commons.wikimedia.org/wiki/File:Abomasum_(PSF).png)

## Marking key for sample assessment task 13 – Unit 3 and Unit 4

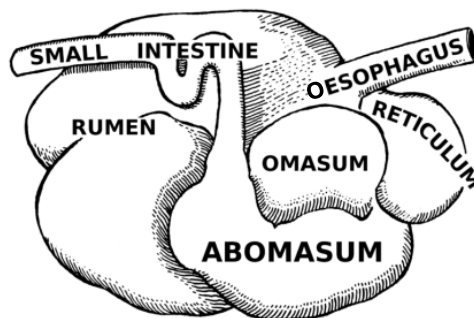
### Section One: Multiple-choice

Question number	Answer
1	B
2	C
3	A
4	D
5	C
6	A
7	D
8	B
9	C
10	A

Description	Marks
1 mark for each question	1–10
<b>Total</b>	<b>/10</b>

### Section Two: Short answer

- The diagram below shows a representation of the ruminant digestive system. Label the following parts of the ruminant system on the diagram:
  - rumen
  - abomasum
  - omasum
  - reticulum
  - oesophagus.



Description	Marks
1 mark for each correctly labelled part	1–5
<b>Total</b>	<b>/5</b>

2. Using the chambers from question 1, give the order in which food passes through the chambers of a ruminant's digestive tract.

Description	Marks
Rumen positioned at number 2	1
Reticulum positioned at number 3	1
Omasum positioned at number 4	1
Abomasum positioned at number 5	1
<b>Total</b>	<b>/4</b>

3. Describe the processes that occur in the abomasum. Your answer needs to include the names of any substances used in, and any products from, the processes that occur in the abomasum.

Description	Marks
Abomasum wall releases enzymes and hydrochloric acid	1
Proteins in the food are broken down to smaller sub-units	1
Sub-units are amino acids (and dipeptides)	1
<b>Total</b>	<b>/3</b>

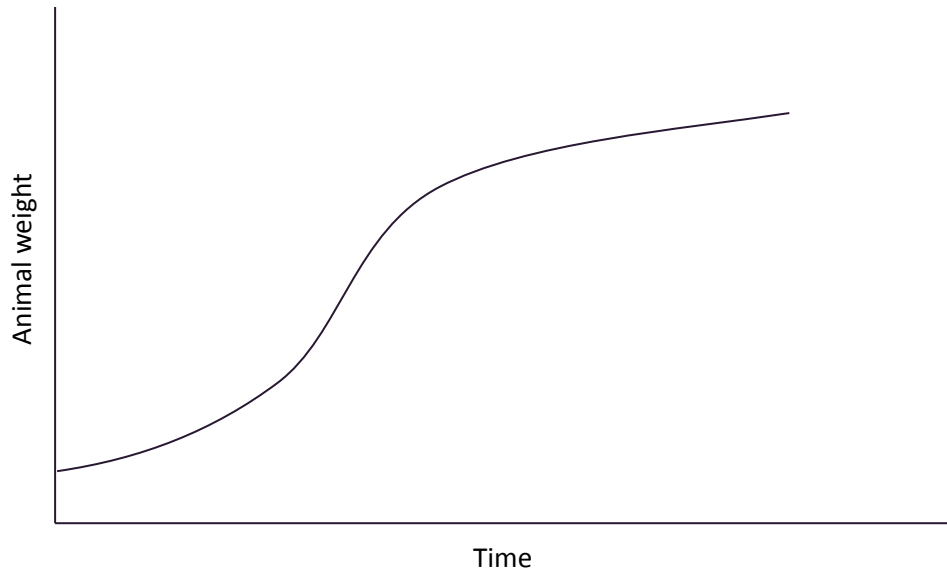
4. Explain the process that occurs in the rumen of a ruminant's digestive tract. Your answer needs to include the names of any substances used in, and any products from, the processes.

Description	Marks
Recognition that bacteria are involved in the digestion occurring in the rumen	1
Recognition that cellulose is broken down	1
Recognition that sugars are produced	1
<b>Total</b>	<b>/3</b>

5. Give the name of the by-product from the digestion occurring in the rumen. State why this by-product is a problem.

Description	Marks
Recognition that methane is the by-product	1
Recognition that it is a greenhouse gas (flammability danger in enclosed spaces may also be an acceptable answer)	1
<b>Total</b>	<b>/2</b>

6. Draw the typical shape of an animal's growth curve and explain its relationship to nutritional management.



Description	Marks
S-shaped curve	1
Recognition that nutritional requirements highest from birth to puberty	1
Recognition that nutritional requirements level off at maturity	1
<b>Total</b>	<b>/3</b>

## ACKNOWLEDGEMENTS

### Section Two

- Question 1** Image from: Pearson Scott Foresman. (n.d.). File:Abomasum (PSF).png. Retrieved April, 2015, from [http://commons.wikimedia.org/wiki/File:Abomasum\\_\(PSF\).png](http://commons.wikimedia.org/wiki/File:Abomasum_(PSF).png)

## Sample assessment task

### Animal Production Systems – General Year 12

#### Task 14 – Unit 3 and Unit 4

**Assessment type:** Production project

**Conditions**

Period allowed for completion of the task: two weeks; a combination of in-class and out of class time

**Task weighting**

8% of the school mark for this pair of units

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#### **Livestock Breeding and Improvement Plan**

**(58 marks)**

Breeding for particular traits in livestock is an important contributor to the profitability of a farm enterprise.

To develop a breeding plan, the primary focus of the farm enterprise needs to be identified. If the primary income-generating activity is wool production, then the breeding program will likely need to focus on traits related to wool production. On the other hand, if the main income-generating activity is meat production, other traits will be more important.

When developing a breeding plan, you need to know the current status of the flock in respect to the targeted traits. A plan to improve the chosen trait can then be developed.

In this task, you will develop a plan to breed for specific characteristics in sheep that will improve the profitability of your farm.

### Livestock Breeding and Improvement Plan

State whether your enterprise is focused on improving wool production or meat production.

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1. Australian Sheep Breeding Values (ASBVs) estimate an individual sheep's breeding value for a particular trait.
  - Identify the ASBV types typically used to express traits in a ram.
  - For each ASBV type, briefly describe the trait.
  - Cite the source of your information.

(16 marks)

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2. Describe the trait your breeding program is designed to improve in the farm sheep. Explain why you have chosen this trait. (4 marks)

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3. Identify the ASBV type that expresses the trait you have chosen in question 2. Describe the way the trait information is presented to a farmer to enable him/her to assess a ram for the ASBV type. (6 marks)

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4. Describe how improvement of this trait will contribute to the profitability of the farm enterprise. (2 marks)

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5. Use farm livestock records to identify sheep in the farm’s flock that best show the trait you are trying to improve and sheep that should be culled.
- Attach a list to your report that identifies these sheep.
  - For sheep identified for culling, explain why you think they should be culled.
  - For sheep identified for breeding, explain why they are suitable for the breeding program.
- (4 marks)

6. (a) Give the typical ratio of rams to ewes when natural mating is used for sheep breeding for
- (i) mature rams
- \_\_\_\_\_
- (ii) immature rams.
- \_\_\_\_\_
- (2 marks)

- (b) Identify the number of rams needed for this ratio to be used on the farm school. Indicate whether the school rams are mature or immature.
- (1 mark)

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\_\_\_\_\_

7. Use livestock breeding resources to identify rams that could be purchased for the breeding program. Choose the number of rams you identified in question 6.
- For each ram, explain why you have chosen this animal and from where it will be purchased. Cite the source of your information.
- (5 marks)

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8. Provide a budget to show the costs associated with establishing the breeding program. The budget can be provided in a spread sheet attached to your report.

Also provide, in a separate sheet, an indication of the income improvements expected from the improvement in the chosen trait.

(7 marks)

9. State when mating should take place in the cycle of farm operations. Describe the factors that influence the decision about joining time. (4 marks)

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10. An important part of a successful breeding program is the management of the rams. Describe **two** aspects of ram management important to successful breeding. (4 marks)

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11. A breeding plan is normally for the long term, going over more than a single season. State **three** strategies to include in the breeding plan to ensure sires do not mate with progeny in later seasons. (3 marks)

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## Marking key for sample assessment task 14 – Unit 3 and Unit 4

1. Australian Sheep Breeding Values (ASBVs) estimate an individual sheep's breeding value for a particular trait.
  - Identify the ASBV types typically used to express traits in a ram.
  - For each ASBV type, briefly describe the trait.
  - Cite the source of your information.

Description	Marks
Identification of the typical traits in the ASBVs (1 mark each)	1–5
Brief description of the aspects encompassed by broad trait classifications (up to 2 marks each)	1–10
Source of information provided with sufficient detail to enable someone else to locate it	1
<b>Total</b>	<b>/16</b>
<b>Answer could include, but is not limited to:</b>	
ASBVs typically encompass the following traits: <ul style="list-style-type: none"> <li>• live weight traits – birth, weaning, post-weaning, yearling, hogget, adult</li> <li>• carcass traits – fat depth, eye muscle depth</li> <li>• wool traits – fleece weight, fibre diameter, staple strength, staple length, curvature</li> <li>• reproduction traits – number of lambs born, number of lambs weaned, scrotal circumference</li> <li>• worm resistance – worm egg count (%).</li> </ul>	

2. Describe the trait your breeding program is designed to improve in the farm sheep. Explain why you have chosen this trait.

Description	Marks
Description of trait targeted for improvement	1–2
Explanation of why this trait was chosen as opposed to another	1–2
<b>Total</b>	<b>/4</b>
<b>Answer could include, but is not limited to:</b>	
Chosen traits may include: <ul style="list-style-type: none"> <li>• live weight traits – birth, weaning, post-weaning, yearling, hogget, adult</li> <li>• carcass traits – fat depth, eye muscle depth</li> <li>• wool traits – fleece weight, fibre diameter, staple strength, staple length, curvature</li> <li>• reproduction traits – number of lambs born, number of lambs weaned, scrotal circumference</li> <li>• worm resistance – worm egg count (%).</li> </ul> Possible reasons for selecting one trait over another include: <ul style="list-style-type: none"> <li>• trait is minimally present in flock</li> <li>• identified trait will improve profitability of enterprise, e.g. for lamb producers, higher weaning and post-weaning weights are desirable; for wool producers, particular fibre diameters and staple length are likely target traits</li> <li>• identified trait will improve health of sheep, reducing management costs</li> <li>• trait is more highly heritable than others and less influenced by environmental factors.</li> </ul>	

3. Identify the ASBV type that expresses the trait you have chosen in question 2. Describe the way the trait information is presented to a farmer to enable him/her to assess a ram for the ASBV type.

Description	Marks
Identification of ASBV type (e.g. wool trait, carcass trait)	1
Description of the way ASBV type is expressed	
<ul style="list-style-type: none"> <li>• age stage indicated by a letter, e.g. W = weaning, P = post-weaning</li> <li>• trait name indicated by a letter code, e.g. WT = weight</li> <li>• ASBV is expressed as a positive or negative number showing its deviation from an average, e.g. a value of 10.2 for a weight ASBV would mean that, on average, progeny from this ram would be 5.1 kg heavier at the stated age (the ram contributes only half the weight; the ewe contributes the other half)</li> <li>• ASBV accuracy expressed as per cent – the accuracy value is based on the amount of data available about the ram.</li> </ul>	<p>1</p> <p>1</p> <p>1–2</p> <p>1</p>
<b>Total</b>	<b>/6</b>

4. Describe how improvement of this trait will contribute to the profitability of the farm enterprise.

Description	Marks
Description of how trait could improve profitability	1–2
<b>Total</b>	<b>/2</b>
<b>Answer could include, but is not limited to:</b>	
<ul style="list-style-type: none"> <li>• live weight traits – for wool production, in general, increased weights lead to sheep that can support higher fleece weight; for meat production, higher weaning and post-weaning weights mean lambs are ready for market earlier</li> <li>• carcass traits – fat depth score indicates leanness of animal and so can be used to target a market; a positive eye muscle depth score means a genetically thicker-muscled animal, and one that will have slightly more of its lean tissue in the higher-priced cuts, and so can enable producers to target a particular market</li> <li>• wool traits – particular wool traits can be used to target particular wool markets</li> <li>• reproduction traits – increases in numbers of lambs born and of lambs weaned mean more sheep for production</li> <li>• worm resistance – reduced worm egg count means animals are in better condition and fewer chemicals are needed to control worms, so reduced management costs.</li> </ul>	

5. Use farm livestock records to identify sheep in the farm's flock that best show the trait you are trying to improve and sheep that should be culled.
- Attach a list to your report that identifies these sheep.
  - For sheep identified for culling, explain why you think they should be culled.
  - For sheep identified for breeding, explain why they are suitable for the breeding program.

Description	Marks
List of animals to keep for breeding provided	1
List of animals to cull provided	1
Reason for inclusion of animals in breeding program provided	1
Reason for animals to be culled provided	1
<b>Total</b>	<b>/4</b>
<b>Answer could include, but is not limited to:</b>	
Reasons for inclusion in breeding program may include: <ul style="list-style-type: none"> <li>• animals kept all have the identified trait above a minimum cut-off value</li> <li>• a lower-order reason may be the ewe's mothering skills.</li> </ul> Reason for animals to be culled may include: <ul style="list-style-type: none"> <li>• animals have the identified trait below a minimum cut-off value</li> <li>• poor mothering skills.</li> </ul>	

6. (a) Give the typical ratio of rams to ewes when natural mating is used for sheep breeding for
- mature rams
  - immature rams.

Description	Marks
Mature rams: <ul style="list-style-type: none"> <li>• minimum recommended ratio of mature rams to ewes when natural mating is used is typically 1%.</li> </ul>	1
Immature rams: <ul style="list-style-type: none"> <li>• minimum recommended ratio of immature rams to ewes when natural mating is used is typically 1%.</li> </ul>	1
<b>Total</b>	<b>/2</b>

- (b) Identify the number of rams needed for this ratio to be used on the farm school. Indicate whether the school rams are mature or immature.

Description	Marks
Number of rams needed for the farm provided	1
<b>Total</b>	<b>/1</b>

7. Use livestock breeding resources to identify rams that could be purchased for the breeding program. Choose the number of rams you identified in question 6.

For each ram, explain why you have chosen this animal and from where it will be purchased.

Cite the source of your information.

Description	Marks
Required number of rams identified	1
Explanations as to why rams chosen	1–2
Company where rams can be purchased given	1
Source of information provided	1
<b>Total</b>	<b>/5</b>
<b>Answer could include, but is not limited to:</b>	
Explanations as to why rams chosen may include:	
<ul style="list-style-type: none"> <li>• ASBV in the chosen trait meets the set criteria</li> <li>• cost of purchase of rams meets budget requirements</li> </ul>	

8. Provide a budget to show the costs associated with establishing the breeding program. The budget can be provided in a spread sheet attached to your report.

Also provide, in a separate sheet, an indication of the income improvements expected from the improvement in the chosen trait.

Description	Marks
Cost of purchasing rams	1
Estimate of cost of transporting rams	1–2
Estimates of costs associated with feed/paddock management for rams	1–2
Indication of increased income as a result of improvement in trait (usually expressed on a price per animal basis, or wool unit basis)	1–2
<b>Total</b>	<b>/7</b>

9. State when mating should take place in the cycle of farm operations. Describe the factors that influence the decision about joining time.

Description	Marks
Date provided for mating of ewes and rams	1
Description of factors influencing mating time	1–3
<b>Total</b>	<b>/4</b>
<b>Answer could include, but is not limited to:</b>	
<p>Joining time may vary based on the reasons given by the student. Factors influencing choice of joining time may include:</p> <ul style="list-style-type: none"> <li>• timing joining so that birth occurs when pasture supply is matched to peak energy demand of ewes – a ewe’s energy needs to double in late pregnancy and triple in lactation. This reduces costs that might be associated with providing supplementary feeding, if birth occurs when pasture supply is low</li> <li>• mid-late pregnancy nutrition impacts on survival and future performance of the offspring, so pasture supply, and whether supplemental feeding might be needed, will also affect the decision about joining time</li> <li>• early lactation nutrition affects milk production and, therefore, lamb growth rates and time to reach market weight</li> <li>• the ewes’ natural breeding season also influences decisions about joining time – sheep fertility increases as daylight decreases</li> <li>• sheep fertility is also influenced by sheep condition – pre-joining nutrition affects ovulation rate</li> <li>• date of lamb turn-off for slaughter and weight targets.</li> </ul>	

10. An important part of a successful breeding program is the management of the rams. Describe **two** aspects of ram management important to successful breeding.

Description	Marks
Two aspects of ram management described (up to 2 marks each)	1–4
<b>Total</b>	<b>/4</b>
<b>Answer could include, but is not limited to:</b>	
<ul style="list-style-type: none"> <li>• management of ram nutrition for fertility – improving nutritional intake of protein and energy during the two-month period before joining can increase sperm production; vitamin A is important to sperm production</li> <li>• paddock management – having sufficient trees for shade to reduce high temperatures which reduce sperm production; rams require paddocks about twice the size of the ewes; an ample supply of good-quality cool water as close to shade as possible</li> <li>• avoid running ewes in paddocks that adjoin the ram paddock – close contact may reduce the influence of the ram effect (ovulation at introduction of ram after separation) at joining</li> <li>• monitoring age of rams – a ram’s desire to mate and its fertility decrease after six years of age</li> <li>• monitoring rams for disease – ovine brucellosis can cause swelling in the ram's sperm duct, which subsequently blocks the transfer of sperm.</li> </ul>	



11. A breeding plan is normally for the long term, going over more than a single season. State **three** strategies to include in the breeding plan to ensure sires do not mate with progeny in later seasons.

Description	Marks
Rams and ewes need to be tagged for identification	1
Records of which flock is mated with which rams need to be maintained	1
At joining, ewes need to be grouped consistently each year	1
<b>Total</b>	<b>/3</b>