



# Western Australian Certificate of Education Examination, 2014

## Question/Answer Booklet

# ANIMAL PRODUCTION SYSTEMS

## Stage 3

Please place your student identification label in this box

Student Number: In figures

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In words

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### Time allowed for this paper

Reading time before commencing work: ten minutes

Working time for paper: 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: non-programmable calculators approved for use in the WACE examinations

### 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 notes or other items of a non-personal nature in the examination room. 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 exam
Section One: Multiple-choice	15	15	20	15	15
Section Two: Short answer	6	6	90	95	50
Section Three: Production practices	1	1	30	22	15
Section Four: Extended answer	3	2	40	40	20
<b>Total</b>					100

## Instructions to candidates

- The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2014*. 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. 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, Three and Four: Write your answers in this Question/Answer Booklet.

- You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question.
- Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.
  - Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
  - Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question that you are continuing to answer at the top of the page.

**See next page**

## Section One: Multiple-choice

15% (15 Marks)

This section has **15** 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. 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: 20 minutes.

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1. Compared with natural ecosystems, agricultural ecosystems have
  - (a) a higher level of nutrient recycling.
  - (b) more biodiversity.
  - (c) more complex relationships.
  - (d) less stability.
  
2. Which statement about hormone growth promotants is correct?

They increase

  - (a) the age at which an animal reaches puberty.
  - (b) feed conversion efficiency.
  - (c) disease resistance.
  - (d) fertility.
  
3. A sire has an estimated breeding value (EBV) for 200 day growth of +14 kg. He is mated to a female with an estimated breeding value for 200 day growth of +8 kg. What is the expected genetic gain for 200 day growth of the offspring?
  - (a) 11 kg
  - (b) 14 kg
  - (c) 22 kg
  - (d) 16 kg
  
4. Which of the following substances stimulates the production of antibodies?
  - (a) antigen
  - (b) colostrum
  - (c) antitoxin
  - (d) white blood cells

5. Which of the following is an example of manipulative breeding to increase ovulation rate permanently?
- (a) injecting females with follicle stimulating hormone (FSH)
  - (b) flush feeding with high protein supplements
  - (c) selecting breeders with a history of multiple births
  - (d) crossing with breeds with naturally lower birth rates
6. Insurance is an example of risk
- (a) avoidance.
  - (b) assessment.
  - (c) elimination.
  - (d) mitigation.
7. The **most** important energy source for rumen microbes is
- (a) protein.
  - (b) carbohydrates.
  - (c) fats.
  - (d) minerals.
8. What is the **greatest** threat to the stability of the rumen ecosystem?
- (a) increased rumen acidity
  - (b) high pH
  - (c) feed additives
  - (d) bacteria
9. In the calculation of gross margins, what information is **not** used?
- (a) income
  - (b) variable costs
  - (c) fixed costs
  - (d) expenditure
10. A pedigree is **best** described as
- (a) an animal's breeding record.
  - (b) a chart of an animal's ancestors.
  - (c) a type of inheritance.
  - (d) an inheritance calculation.

11. The increase in popularity of free-range and organic products is an example of
- (a) a low cost of production being passed on to consumers.
  - (b) altering production systems due to pressure from animal activists.
  - (c) altering production systems in response to changing consumer trends.
  - (d) consumers demanding locally-grown products.
12. Feed rations are usually developed on a least-cost basis because
- (a) producers do not have the financial reserves for expensive feed rations.
  - (b) they provide a nutritionally-balanced diet for the animal.
  - (c) they take into account the fact that the animal will get some energy from pasture.
  - (d) it is the most cost-efficient way of supplying the required energy.
13. Profit = income – costs
- In the above equation, income is determined from the
- (a) quality of the product produced and price received.
  - (b) quantity of the product sold and price received.
  - (c) quality of the product produced and interest received.
  - (d) quantity of the product sold and cost of production.
14. Pesticides should be applied
- (a) sparingly to affected animals only, as they are expensive.
  - (b) at the first sign of pest presence to all animals on the property.
  - (c) when it is determined to be cost-effective to do so.
  - (d) when the cost of control exceeds the value of lost production.
15. The energy content of a feed ration is expressed in
- (a) megajoules of metabolisable energy per kilogram.
  - (b) digestible dry matter per kilogram.
  - (c) gross energy per kilogram.
  - (d) kilojoules of digestible energy per kilogram.

**End of Section One**

**See next page**

**Section Two: Short answer****50% (95 Marks)**

This section has **six (6)** questions. Answer **all** questions. Write your answers in the spaces provided.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
- Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question that you are continuing to answer at the top of the page.

Suggested working time: 90 minutes.

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**Question 16****(12 marks)**

In the late 1980s, an outbreak of 'mad cow disease' in the United Kingdom resulted in human deaths, and four million cattle were destroyed to limit its spread. The disease was found to be transmitted through the feeding of meat and bone meal to ruminants.

- (a) As a feed additive, what main purpose would meat and bone meal have served in an animal diet? (1 mark)

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- (b) What livestock feeding strategy was introduced to minimise the likelihood of 'mad cow disease' occurring in Australia? (2 marks)

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(c) Describe how Australia’s global competitiveness would be affected if a disease outbreak occurred

(i) in Australia. (3 marks)

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(ii) in another major exporting country. (3 marks)

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(d) (i) Identify **one** feature of the National Livestock Identification System (NLIS) that could be useful in the event of a disease outbreak. (1 mark)

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(ii) Describe how the NLIS helps to protect Australian livestock production and trade on international markets. (2 marks)

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## Question 17

(12 marks)

Financial analysis allows an enterprise's performance to be assessed and comparisons made with the performance of other similar enterprises or with district averages.

- (a) What are **two** production factors a producer could adjust if they were underperforming against other producers? (2 marks)

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The table below displays the profit for the highest performing 25% of producers compared with the average of all producers surveyed for an animal industry over three successive years.

**Comparison of profit between the highest performing 25% of producers and the average of the survey group**

Year	Highest performing 25% of producers profit per hectare (\$/ha)	Average of surveyed group profit per hectare (\$/ha)
2010–2011	185	35
2011–2012	170	85
2012–2013	154	22

- (b) What is your interpretation of the data in the table above? (2 marks)

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(c) Describe how a lower cost of production could help minimise the impact of **one** of the following. Indicate with a tick the scenario on which you are basing your answer.

(3 marks)

- a poor season
- market price fluctuations
- rising input costs

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(d) Using a practical example, describe how some producers are able to use existing resources more efficiently to increase profit per hectare.

(3 marks)

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(e) State **two** ways in which a producer could use profit from good seasons to offset losses in poor seasons.

(2 marks)

One: \_\_\_\_\_

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Two: \_\_\_\_\_

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Question 18

(19 marks)

Pesticide resistance is one of the main threats to sustainable livestock production.

- (a) (i) Outline how pesticide resistance develops. (2 marks)

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- (ii) Identify **one** factor to consider when using chemicals to help avoid pesticide resistance. (1 mark)

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- (b) Identify **one** way in which pesticides can be grouped according to their mode of action. (1 mark)

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- (c) Drenches are pesticides used to control worms in livestock. Describe an economic, social and environmental issue related to ongoing drench use. (6 marks)

Economic: \_\_\_\_\_

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Social: \_\_\_\_\_

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Environmental: \_\_\_\_\_

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- (d) For a selected animal pest, discuss how pesticide resistance can be minimised by using integrated pest management (IPM) principles to support sustainable pest control. (5 marks)

Selected pest: \_\_\_\_\_

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- (e) A producer has a short-term goal of maintaining profitability, and a long-term goal of improving natural resistance to pests and disease in their animals. Describe **two** ways in which these goals could be addressed through a breeding and selection program. (4 marks)

One: \_\_\_\_\_

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Two: \_\_\_\_\_

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## Question 19

(14 marks)

Humans have affected the Earth's atmosphere because the growing global population has created a need for more energy and food.

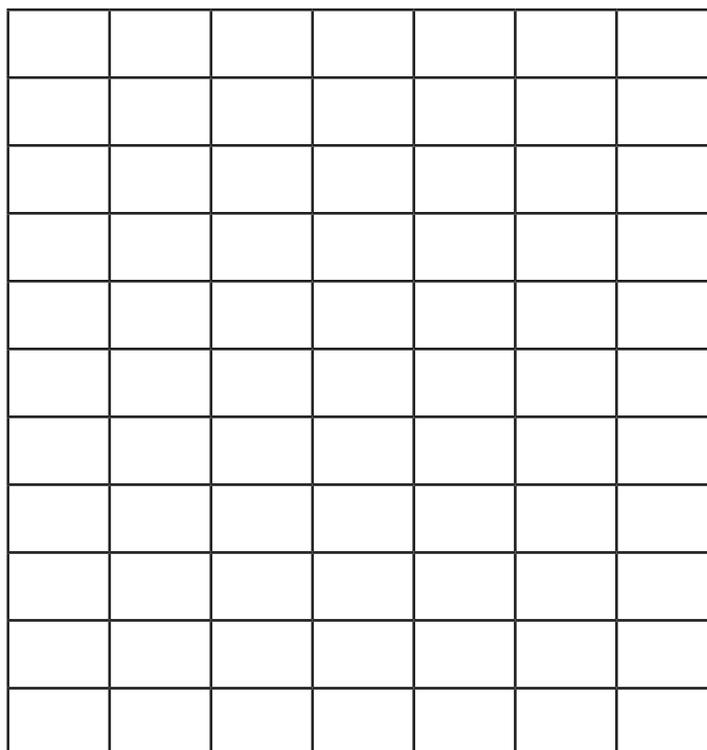
The table below represents the atmospheric carbon dioxide concentration at a particular test site over the last fifty years.

**Concentration of carbon dioxide (CO<sub>2</sub>) at test site 'A' 1960–2010**

Year	Atmospheric CO <sub>2</sub> concentration (parts per million)
1960	310
1970	323
1980	335
1990	352
2000	370
2010	385

- (a) On the grid below, draw a graph of the atmospheric concentration of carbon dioxide over the specified time period. (5 marks)

(If you need to make a second attempt at this graph item, the grid is repeated at the end of this Question/Answer Booklet. Cancel the graph on this page.)



See next page

- (b) Describe how changes in CO<sub>2</sub> concentration in the atmosphere could be affecting the Earth's climate. (3 marks)

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- (c) Give **one** example of how climate change might affect an animal enterprise. (2 marks)

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- (d) Describe **two** strategies a producer could use in the management of their enterprise to deal with the example identified in part (c). (4 marks)

One: \_\_\_\_\_

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Two: \_\_\_\_\_

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## Question 20

(17 marks)

The table below shows financial data from a trial that aimed to assess the economic benefit of using growth promotants in a feedlot enterprise. The only two variables that were changed in the experimental method were the:

- presence or absence of a growth promotant (implant)
- brand of growth promotant. Two different brands were compared: 'Powerplus' and 'Musclemax'.

Ten animals were allocated to each trial group.

Animals entered the feedlot at 330 kg and were sold when they reached 450 kg (liveweight).

Income	Number of animals	Kg/head	\$/kg (liveweight)	\$/head	No implant	Powerplus implant	Musclemax implant
	10	450	2	900	9000		
	10	450	2	900		9000	
	10	450	2	900			9000
<b>Total income</b>					<b>9000</b>	<b>9000</b>	<b>9000</b>

Costs (per 10 animals)	No implant	Powerplus implant	Musclemax implant
Labour	5000	4500	4000
Drench	10	10	10
Ear tags	40	40	40
Vaccines	20	20	20
Cartage	400	400	400
Selling charges	350	350	350
Cost of implants	0	40	60
Feed ration			
No implant 95 days at \$1.20/head x 10 head	1140		
Powerplus 70 days at \$1.20/head x 10 head		840	
Musclemax 60 days at \$1.20/head x 10 head			720
<b>Total costs</b>	6960	6200	5600
<b>Gross margin</b>	2040	<b>A</b>	<b>B</b>
<b>Gross margin/head</b>	204.00	<b>C</b>	<b>D</b>

(a) Calculate the missing information for the table above.

- (i) **A** = gross margin for the 'Powerplus' treatment. (1 mark)

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- (ii) **B** = gross margin for the 'Musclemax' treatment. (1 mark)

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See next page

(iii) **C** = gross margin/head for the 'Powerplus' trial group. (1 mark)

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(iv) **D** = gross margin/head for the 'Musclemax' trial group. (1 mark)

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(b) Calculate the mean daily growth rates of animals in each of the three trial groups. (3 marks)

No implant: \_\_\_\_\_

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Powerplus: \_\_\_\_\_

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Musclemax: \_\_\_\_\_

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(c) Using the table and your calculations in part (b), explain the difference in gross margins obtained in the **three** trial groups. (4 marks)

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Question 20 (continued)

- (d) Describe **one** negative aspect of using growth promotants in an animal production enterprise. (2 marks)

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- (e) Using specific examples, explain **two** aspects of the experimental method and state how these helped to minimise error in the results. (4 marks)

One: \_\_\_\_\_

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Two: \_\_\_\_\_

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**See next page**

Question 21

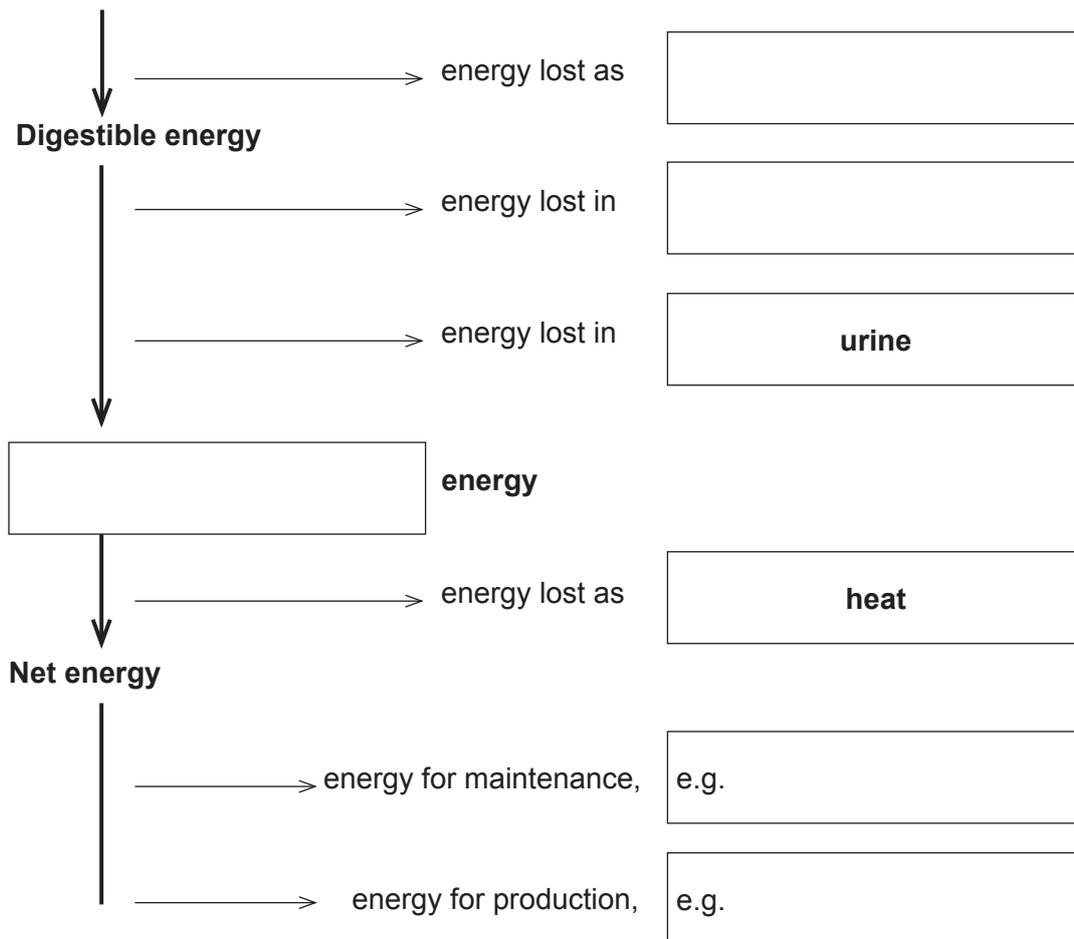
(21 marks)

The net energy available for maintenance and production is the amount of energy left after losses have occurred following feed intake by animals.

- (a) Fill in the empty boxes in the flow diagram below, identifying how energy is lost at different points of digestion. (5 marks)

**ENERGY FLOW**

**Gross energy (feed intake)**



(b) State **two** advantages and **two** disadvantages of the ruminant digestive system. (4 marks)

Advantage one: \_\_\_\_\_

\_\_\_\_\_

Advantage two: \_\_\_\_\_

\_\_\_\_\_

Disadvantage one: \_\_\_\_\_

\_\_\_\_\_

Disadvantage two: \_\_\_\_\_

\_\_\_\_\_

(c) For each of the following, identify a method a ruminant animal uses to:

(i) break down feed (1 mark)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(ii) control pH in the rumen (1 mark)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(iii) remove fermentation gases. (1 mark)

\_\_\_\_\_  
\_\_\_\_\_  
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Question 21 (continued)

- (d) Animals on diets containing a high proportion of cereal grains can experience adverse rumen function. Outline the changes to the rumen environment that occur as a result. (4 marks)

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- (e) Methane production by livestock is an environmental issue.

- (i) Give **one** example of current research into ways of reducing methane production from livestock. (1 mark)

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- (ii) How does the research identified in part (e)(i) help to promote a 'green' image of Australian agriculture? (2 marks)

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- (iii) Assume the research in part (e)(i) is successful. Describe briefly how economics need to be considered by producers before they adopt methane-reducing strategies in their own animal enterprises. (2 marks)

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End of Section Two

See next page

Section Three: Production practices

15% (22 Marks)

This section contains **one (1)** question. You must answer this question. Write your answer in the space provided.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
- Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question that you are continuing to answer at the top of the page.

Suggested working time: 30 minutes.

Question 22

(22 marks)

The profitability of an animal production enterprise is, to a large extent, determined by how it is managed through its production cycle and forward planning.

Name an animal production enterprise you have studied and identify one of its marketed products.

Animal production enterprise: \_\_\_\_\_ (no marks)

Marketed product: \_\_\_\_\_ (no marks)

- (a) Identify **two** key stages in the production cycle for the enterprise, and describe how performance at these **two** stages could influence the overall profitability of the enterprise. (6 marks)

One: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Two: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
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Question 22 (continued)

- (b) (i) Name **one** technology used in your selected enterprise, and describe how it increases efficiency. (3 marks)

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- (ii) Identify **one** barrier to the adoption of the technology in part (b)(i). (1 mark)

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- (c) For your selected enterprise, give **one** example of a physical **or** financial risk, and complete the following table to outline the risk and management strategies. (5 marks)

Risk:	<hr/>		
Probability of risk (circle one):	Low	Moderate	High
One consequence of the risk:	<hr/> <hr/>		
One avoidance strategy:	<hr/> <hr/> <hr/>		
One mitigation strategy:	<hr/> <hr/> <hr/>		

(d) (i) Name a quality assurance (QA) program relevant to your selected enterprise. (1 mark)

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(ii) For the QA program identified in part (d)(i), identify the stage of the supply chain at which the program is implemented. (1 mark)

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(iii) Describe **one** criterion for the QA program identified in part (d)(i). (2 marks)

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(iv) Describe the importance of the criterion identified in part (d)(iii) in maintaining product quality and consumer satisfaction. (3 marks)

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**End of Section Three**

**See next page**

## Section Four: Extended answer

20% (40 Marks)

This section contains **three (3)** questions. You must answer **two (2)** questions. Write your answers on the lined pages provided following Question 25.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
- Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question that you are continuing to answer at the top of the page.

Suggested working time: 40 minutes.

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## Question 23

(20 marks)

Genetic technology is one area that has the potential to address some animal production issues. Until recently, the limits to genetic engineering were mainly technical – what it was **possible** to do. Now there is a shift in thinking to what it is ethically **acceptable** to do.

- (a) Describe what is meant by **one** of the following terms (indicate which) and discuss **two** associated ethical issues.
- genetically modified organisms
- or**
- cloning (12 marks)
- (b) Balance the concerns described in part (a) by discussing **two** possible benefits of genetic modification **or** cloning of animals, to animal production or human health. (8 marks)

## Question 24

(20 marks)

In most developed countries, consumers of animal products are becoming increasingly selective about their food purchases.

- (a) Discuss, using examples, how consumers have become more aware of the products they purchase. Use the subheadings below:
- awareness of nutrition and health
  - environmental awareness
  - ethical awareness. (15 marks)
- (b) Describe how producers can respond to consumer trends to ensure they are meeting market requirements and to support sustainability of their enterprises. (5 marks)

**Question 25****(20 marks)**

Breeding technologies can be used to increase productivity and profitability.

(a) Discuss **one** advantage and **one** disadvantage of each of the following breeding technologies:

- oestrus synchronisation
- artificial insemination
- pregnancy testing/scanning.

**(12 marks)**

(b) Describe **four** steps that occur between superovulation and birth in an embryo transfer program.

**(8 marks)**

**End of questions**





























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