2008 HSC Notes from the Marking Centre Agriculture

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2008 HSC NOTES FROM THE MARKING CENTRE AGRICULTURE

Introduction

This document has been produced for the teachers and candidates of the Stage 6 course in Agriculture. It contains comments on candidate responses to the 2008 Higher School Certificate examination, indicating the quality of the responses and highlighting their relative strengths and weaknesses.

This document should be read along with the relevant syllabus, the 2008 Higher School Certificate examination, the marking guidelines and other support documents which have been developed by the Board of Studies to assist in the teaching and learning of Agriculture.

General comments

In 2008, approximately 1300 candidates attempted the Agriculture examination.

Teachers and candidates should be aware that the knowledge, understanding and skills developed through the study of all syllabus sections should accumulate to a more comprehensive understanding than may be described in each section separately. Examiners may ask questions that require candidates to respond by integrating their knowledge, understanding and skills developed through studying the entire course, rather than focusing on discrete syllabus 'dot points' and associated 'key words'.

Paper 1

Section I

Question 1

(a) Weaker responses mistakenly gave a measure of yield for their product.

(b) Better responses identified a way the quality of their product could be improved and outlined how the method improved quality.

(c) Better responses outlined the role of advertising and linked this role with the effect of advertising. A relevant example of an advertising medium or campaign was also provided.

Question 2

(a)(ii) Best responses gave suitable management strategies linking these to a change in phosphorus levels. For example, the application of superphosphate in deficient paddocks would raise the phosphate levels. Weaker range response described a management strategy but provided no link to a change in phosphorus levels.

(b) The better responses identified a change in land uses practice, for example conventional tillage to minimum tillage and provided detail of the impacts of adopting this change. Mid-range responses often gave considerable detail regarding particular land use practices. However no change in practice was mentioned or indicated.

Question 3

(a)(ii) Better responses calculated the standard deviation.

(b) Better responses justified their choice of feed *Y* by indicating that it produced the highest mean and lowest standard deviation. These responses identified that a lower standard deviation showed a less variable and a more reliable weight gain. Weaker responses did not refer to the standard deviation.

(c) Better responses described in detail the information that should be considered before using this feed type. These responses justified the factors, such as cost of feed against the economic benefits gained from the increased weight gain. Weaker responses identified factors without description or justification.

Section II

Question 4

(a) Most candidates identified a reason for a farmer to control diseases. In better responses, candidates linked this to animal welfare or a type of legislation.

(b) Most candidates named an animal disease, stated a cause (either primary or secondary) and gave symptoms of the disease.

(c) Most candidates showed an understanding of the disease triangle and indicated that altering one or more of the components was necessary to prevent or control the disease. Better responses then applied the triangle to a named disease and linked management actions to disease control and prevention. Some candidates showed an understanding but neglected to name a disease.

(d) Better responses discussed physiological processes of both monogastric and ruminant digestion, however many candidates referred to anatomical differences and similarities only. Overall the majority of candidates understood the difference between ruminant and monogastric digestion.

Question 5

(a) Better responses identified a role of water in plants and linked plant growth to the role of water. While this question was generally well answered by most candidates, weaker responses simply listed or stated a role of water eg plant growth; photosynthesis; carries nutrients.

(b) Better responses identified the importance of soil moisture at sowing by including information from the table that referenced 2004 and 2005 in particular where, although, total rainfall was

equivalent, crop yield was highest in 2004. Poorer responses identified the general effects of water on yield with little or no reference to the data presented in the table.

(c) Most candidates identified a management technique used to maximise soil moisture at sowing. Better responses included a description of the technique and included a reason how and/or why the technique is used with a clear evaluation of effectiveness or success of this technique compared to others or in relation to certain criteria. Poorer responses gave general outlines or neglected to evaluate a technique.

(d) Better responses articulated candidates' knowledge and understanding of the interaction between plant genotype and the environment, relating cause and effect and the relationships between such interactions and plant productivity. These responses included appropriate examples and quantified plant productivity effects. The best responses also included genetic manipulation and/or plant breeding examples. Weaker responses identified that a relationship exists between genotype and environment, however, focused too heavily on the environmental effects in the interaction with little or no reference to genotype in any examples that may have been included. Weakest responses reflected poor or limited understanding of how plant genetics interact with the environment and simply identified some environmental factors that affect plant growth.

Section III

Question 6

(a) Better responses clearly described the process by which microbes and invertebrates decompose organic matter. These responses offered examples of organic matter, microbes and invertebrates. They clearly linked the processes carried out by invertebrates and microbes with the release of nutrients from organic matter for use by plants. They also included the physical and/or chemical changes that occur in the soil as a result of decomposition.

The weaker responses identified the role of microbes and invertebrates as releasing nutrients from organic matter but failed to describe the processes carried out in the decomposition.

(b) Better responses identified a crop rotation and outlined its use in improving sustainability. They clearly explained how crop rotation is used to improve sustainability of Australian farming systems. They provided numerous points for and/or against the use of crop rotation and raised issues that may need to be addressed such as the need for specialised equipment, expertise, profitability and availability of markets.

The weaker responses confused crop rotation with rotational grazing. Others outlined what crop rotation involved but did not explain how it is used to improve sustainability in Australian farming systems. They did not provide points for and/or against the use of crop rotation or identify any issues that may arise from the use of crop rotation.

Question 7

(a) Better responses displayed a clear understanding of the energy changes, correctly identifying energy stage names including where and what losses occurred. Many produced an annotated diagram as part of their answer.

Weaker responses included information about digestive system function with only passing reference to the changes in the energy of the food.

(b) Better responses differentiated between development and growth giving valid analysis of the factors as they affect development or growth.

Weaker responses gave a general outline of one or two factors often with a focus on management.

Question 8

(a) Better responses gave a detailed description of a technique and provided several features and characteristics of this technique. Mid-range responses correctly named a plant breeding technique without fully describing it or many of its features. Weaker responses incorrectly identified budding and grafting as a technique which modifies the genetic basis of a plant.

(b) Better responses described several techniques available to farmers and gave positive and negative features of these pasture management techniques. Mid-range responses identified some techniques but did not relate this to how it affects pasture management. They did not communicate the features of these techniques. Weaker responses failed to distinguish between crop production and pasture management.

Question 9

(a) Better responses described complete marketing chains for agricultural products, including key steps as well as providing a relevant example of government intervention. Many produced an annotated diagram as part of their answer.

Poorer responses provided incomplete marketing chains or weak or non-relevant government interventions. Some responses described advertising strategies for products.

(b) Better responses explained several specific areas of scientific research and related these to the future of Australian agriculture. They evaluated the role of relevant areas of scientific research using examples.

Poorer responses discussed scientific research in general terms, outlining general effects on the future of Australian agriculture. Some responses outlined a few specific benefits of scientific research without providing an evaluation or link to the future of Australian agriculture.

Paper 2

Question 1 – Agribusiness

(a) Better responses provided characteristics and features of a number or ways the information was presented on the impact of a large business or agricultural industries.

(b) Better responses outlined a range of strategies. These responses demonstrated the relationship between the strategy used and the improved marketing opportunities for their chosen product.

(c) Mid-range responses provide characteristics and features of sources of finance. Better responses provided judgements on the sources of finance described.

Question 2 – Animal management

(a) Better responses provided features of the research methodology used in a study and related to the use of a current technique/technology that was advancing the productivity in an animal production system. Mid-range responses either only identified a study or identified part of research methodology

(b) Better responses outlined the relationship between a pest, its genetic makeup and the development of resistance to a chemical used in an animal production system. Mid-range responses outlined how/why resistance might happen.

(c) Better responses described various techniques that were available to farmers to manipulate reproduction in farm animals and placed a judgment on the value of each of these techniques against criteria. Weaker responses did not place a judgment on the techniques and just described the technique.

Question 3 – Horticulture

(a) Better responses provide detailed characteristics and features of this research methodology including the application of a control, randomisation, replication and standardisation.

(b) Weaker responses outlined how factors in the domestic market influenced horticultural production. Better responses described in detail the relationship between the changing domestic markets and the types of products produced within the horticultural industry (eg organic produce).

(c) Better responses described in detail management practices resulting in sustainability as well as providing a value judgment on these practices.

Question 4 – Innovation and diversification

(a) Better responses named an experiment and described at least two features of experimental design for example, the role of a control, standardization, replication, randomisation. Weaker responses identified a study, but neither an experiment nor components of experimental design related to the implementation of an alternate production system or technology.

(b) Better responses outlined several factors, for example, environmental, social and economic, and showed the relationship of each to the development of an alternative agricultural system. Weaker responses listed factors without explaining how they led to the development of alternative agricultural systems or technology.

(c) Better responses described two or more marketing techniques, for example, field days, media and value-adding, and proceeded to place a value judgment on the importance and/or success of each technique. Weaker responses evaluated the innovation rather than the marketing technique or evaluated marketing without specifying techniques.

Question 5 – Plant management

(a) Better responses provided characteristics and features of a range of data and related them to a study of improving plant productivity. Weaker responses identified a study and/or one or two types of data, with only some responses relating them to improved productivity.

(b) Better respondents described in detail how management techniques impacted on nutrient cycles. Weaker responses simply identified a management technique or a nutrient cycle.

(c) The best responses described the effects of plant density on both vegetative and reproductive yield, as well as making a judgement on the importance of plant density compared to other factors/criteria that may have an influence on yield. Weaker responses stated that plant density affected vegetative and/or reproductive yields. These responses described the effect of plant density on vegetative yields and generally ignored reproductive yields. Some of these responses placed a value judgement on the impact on plant production systems.

Question 6 – Sustainable management

(a) Better responses clearly explained how replication, randomisation, standardisation and a control improved the reliability of the results. Weaker responses identified a suitable study but did not describe any aspects of experimental design.

(b) Better responses identified one or two roles that governments play in land and resource management and provided specific examples of these roles. They detailed how these government actions contributed to sustainable management of land and water resources. Weaker responses made generalised statements about the role of government in land and resource management.

(c) Better responses clearly described characteristics and features of at least two relevant strategies and made meaningful judgements about their effectiveness in managing water quality and supply. The criteria they used often related to cost, efficiency, environmental impact and the time required to reap the benefits of the strategies they had identified. Weaker responses simply identified some strategies without making any attempt to describe or evaluate them.

Optional research project

Better projects were characterised by:

- the selection of a relevant agricultural problem or issue
- the statement of a clear research question
- the use of appropriate research methodologies including experimental design, data collection and data analysis
- appropriate conclusions drawn from the data collected and meaningful recommendations emanating from the research question and findings

- flexibility in drawing conclusions and responding to unexpected findings, trends and outcomes of the research
- good structure, ie the project was within the 3000–5000 word limit and presented cohesively
- the inclusion of a properly referenced, concise and relevant literature review that focused directly on previous research associated with the research question, and reviewed literature was referred to throughout the project and not presented in isolation
- consideration of ethical and welfare issues related to the research conducted
- the inclusion of a precise synopsis of the research and an accurate bibliography
- appropriate acknowledgement of all sources, collaboration and assistance.

Better projects were also accompanied by process journals that clearly detailed the progress in developing and conducting the research as well as the assistance sought during the process. This is an important aspect of the report writing process as it assists validating the candidate's choice of topic of research.

Weaker projects contained a poor literature review. In these projects all the information about the topic was presented in a general and not directly related to the research question. Many weaker projects did not refer to previous research. The quantity of material presented in the literature review is not as important as its relevance. The literature review should discuss previous research in relation to the issue or problem that is the subject of the research.

Better projects not only presented relevant literature reviews, but also related their own findings back to those of other researchers. These projects were well organised and demonstrated a clear understanding of the role of the literature review in a research project.

Many of the weaker quantitative projects displayed poor experimental design; for example, too many variables, inadequate replication, lack of randomisation, poor attention to standardisation of conditions, inappropriate controls were often evident. Weaker projects that were qualitative in nature often used an inadequate sample size, leading to less meaningful results and then making it difficult to draw conclusions and write discussions. Poor experimental design then hindered the analysis of the results and the development of meaningful conclusions. The analysis in some weaker responses was not appropriate for the data collected.

Weaker projects presented poor referencing with no clear link from the text to the details in the reference section. Often website references were not dated. It should be noted that where a website provides a window to a publication, the publication should be cited, not the website. The best quality literature reviews were ones that referenced current material from a wide range of sources of different types.

Agriculture Paper 1

2008 HSC Examination Mapping Grid

Question	Marks	Content	Syllabus outcomes
Section I			
1 (a)	1	Farm Product study	H3.2
1 (b)	2	Farm Product study	H3.1
1 (c)	4	Farm Product study	H3.2
2 (a) (i)	2	Sustainable Agricultural Production	H2.1
2 (a) (ii)	3	Sustainable Agricultural Production	H2.1
2 (b)	4	Sustainable Agricultural Production	H1.1
3 (a) (i)	1	Practical Work/Experimental Design	H2.2
3 (a) (ii)	1	Practical Work/Experimental Design	H2.2
3 (b)	3	Practical Work/Experimental Design	H2.2
3 (c)	4	Practical Work/Experimental Design	H2.2
Section II			
4 (a)	2	Animal Production Systems	H1.1
4 (b)	3	Microbes and Invertebrates	H2.2
4 (c)	4	Microbes and Invertebrates	H2.2
4 (d)	6	Animal Production Systems	H2.2
5 (a)	2	Plant Production System	H2.1
5 (b)	3	Plant Production Systems	H2.1
5 (c)	4	Plant Production Systems	H1.1
5 (d)	6	Plant Production System	H2.1
Section III			
6 (a)	5	Microbes and Invertebrates	H1.1
6 (b)	10	Sustainable Agricultural Production	H1.1
7 (a)	5	Animal Production Systems	H2.2

Question	Marks	Content	Syllabus outcomes
7 (b)	10	Animal Production Systems	H2.2
8 (a)	5	Plant Production Systems	H2.1
8 (b)	10	Plant Production Systems	H1.1, H2.1
9 (b)	5	Farm Product Study	H3.2, H3.4
9 (b)	10	Farm Product Study	H3.3

Agriculture Paper 2

2008 HSC Examination Mapping Grid

Question	Marks	Content	Syllabus outcomes
Question 1 — Agribusiness			
1 (a)	3	Research Methodology	H4.1
1 (b)	4	Innovation and Current Issues	H5.1
1 (c)	8	Processes in Agricultural Systems	H3.4
Question 2 — Animal Management			
2 (a)	3	Research Methodology	H4.1
2 (b)	4	Innovation and Current Issues	H5.1
2 (c)	8	Processes in Agricultural Systems	H3.4
Question 3 — Horticulture			
3 (a)	3	Research Methodology	H4.1
3 (b)	4	Innovation and Current Issues	H5.1
3 (c)	5	Processes in Agricultural Systems	H3.4
Question 4 — Innovation and Diversification			
4 (a)	3	Research Methodology	H4.1
4 (b)	4	Innovation and Current Issues	H5.1
4 (c)	8	Processes in Agricultural Systems	H3.4
Question 5 — Plant Management			
5 (a)	3	Research Methodology	H4.1
5 (b)	4	Innovation and Current Issues	H5.1
5 (c)	8	Processes in Agricultural Systems	H3.4
Question 6 — Sustainable Land and Resource Management			
6 (a)	3	Research Methodology	H4.1
6 (b)	4	Innovation and Current Issues	H5.1
6 (c)	8	Processes in Agricultural Systems	H3.4

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2008 HSC Agriculture Paper 1
Marking Guidelines

The following marking guidelines were developed by the examination committee for the 2008 HSC examination in Agriculture Paper 1, and were used at the marking centre in marking student responses. For each question the marking guidelines are contained in a table showing the criteria associated with each mark or mark range. For some questions, 'Sample Answers' or 'Answers may include' sections are included. These are developed by the examination committee for two purposes. The committee does this:

(1) as part of the development of the examination paper to ensure the questions will effectively assess students' knowledge and skills, and

(2) in order to provide some advice to the Supervisor of Marking about the nature and scope of the responses expected of students.

The examination committee develops the marking guidelines concurrently with the examination paper. The 'Sample Answers' or similar advice are not intended to be exemplary or even complete answers or responses. As they are part of the examination committee's 'working document', they may contain typographical errors, omissions, or only some of the possible correct answers.

The information in the marking guidelines is further supplemented as required by the Supervisor of Marking and the senior markers at the marking centre.

A range of different organisations produce booklets of sample answers for HSC examinations, and other notes for students and teachers. The Board of Studies does not attest to the correctness or suitability of the answers, sample responses or explanations provided. Nevertheless, many students and teachers have found such publications to be useful in their preparation for the HSC examinations.

A copy of the Mapping Grid, which maps each question in the examination to course outcomes and content as detailed in the syllabus, is also included.

Section I

Question 1 (a)

Outcomes assessed: H3.2

MARKING GUIDELINES

Criteria	Marks
• Names ONE measure of quality for the named product	1

Answers could include:

- protein percentage in wheat
- micron for wool
- butterfat content for milk

Question 1 (b)

Outcomes assessed:H3.1

MARKING GUIDELINES

Criteria	Marks
• Sketches in general terms a way the quality of this product can be improved	2
• Identifies a way the quality of the product can be improved	1

Sample answer:

An increased use of nitrogen fertiliser can lead to a higher protein percentage in the harvested wheat. This can improve quality of the wheat from Australian Standard Wheat (ASW) to Australian Hard.

Question 1 (c)

Outcomes assessed: H3.2

MARKING GUIDELINES

Criteria	Marks
• Outlines the role of advertising and promotion and relates this to an effect on the marketing of this product, with the use of an example	4
• Outlines the role of advertising and promotion in the marketing of this product, with the use of an example	3
• Outlines an example of advertising and promotion that may be used OR • Outlines the role of advertising and promotion	2
• Identifies an example of advertising that can be used OR • Identifies an example of promotion that can be used	1

Question 1 (c) (continued)

Sample answer:

A company that makes premium pasta products uses advertising and promotion to increase sales or develop new markets. They use advertising on television and print media as well as promotion in store (supermarkets and shopping centres). They serve fresh pasta products to consumers in order to gain a higher market share of the boutique pasta market.

Question 2 (a) (i)

Outcomes assessed: H2.1

MARKING GUIDELINES

Criteria	Marks
• Gives TWO reasons for the variation in phosphorous level on this farm	2
• Gives ONE reason for the variation in phosphorous level on this farm	1

Answers could include:

- Nutrient loading from animal manures (night paddocks)
- Soil type variation (pH, clay content)
- Parent material variation
- Paddock history of fertiliser use
- Paddock history of grazing / hay cutting ad removal

Question 2 (a) (ii)

Outcomes assessed: H2.1

MARKING GUIDELINES

Criteria	Marks
• Outlines a way a farmer can manage phosphorous on this farm relating the management practices to phosphorous levels	3
• Outlines a way farmer can manage levels of phosphorous across the farm OR • Identifies ways farmers can manage levels of phosphorous across the farm OR • Identifies a paddock requires phosphorous management and identifies a management strategy	2
• Identifies a way farmers can manage levels of phosphorous across the farm OR • Identifies paddocks that require phosphorous levels to be managed	1

Sample answer:

On this dairy farm paddocks 19, 20 are very low in phosphorous (very infertile). The farmer can manage these levels by applying phosphorous fertiliser (superphosphate) when sowing pastures or when top dressing pastures. The farmer can also spread animal manures collected at the dairy or from night paddocks to even up soil phosphorous.

Question 2 (b)

Outcomes assessed: H1.1

MARKING GUIDELINES

Criteria	Marks
• Outlines a change(s) in land use practices that have occurred over time in Australian agriculture and describes the impact(s) of these changes	4
• Outlines a change that has occurred to land use practice • Outlines another land use practice OR • Outlines a change(s) that have occurred in land use practice and identifies the impact(s) of this change	3
• Outlines an impact related to a land use practice OR • Outlines a land use practice OR • Identifies impacts related to a change in a land use practice OR • Outlines a change that has occurred to a land use practice	2
• Identifies an impact of a land use practice OR • Identifies a land use practice	1

Sample answer:

Traditional cultivation methods where paddocks were cultivated a number of times was thought to provide a good seedbed for germinating seeds. The continual cultivation led to reduced soil structure and increased the potential to erosion, and used greater levels of fuel and time

The method of minimum tillage was developed, where the number of cultivations were reduced. This provided for better stubble retention and hence less soil structure decline. Minimum tillage methods however, are more reliant on the use of chemicals to control weeds which may impact on the environment. May also require specialised machinery.

Question 3 (a) (i)

Outcomes assessed: H2.2

MARKING GUIDELINES

Criteria	Marks
• Calculates the mean final weight for pen 1 correctly	1

Sample answer:

Pen 1 mean = 104.0

Question 3 (a) (ii)

Outcomes assessed: H2.2

MARKING GUIDELINES

Criteria	Marks
• Calculates the standard deviation for pen 2 correctly	1

Answers could include:

Pen 2 SD = 2.8 for sample (formula)
SD = 2.6 for population (formula)

SD Sample formula = $\sqrt{\frac{\sum(x-\bar{x})^2}{n-1}}$

SD Population formula = $\sqrt{\frac{\sum(x-\bar{x})^2}{n}}$

Question 3 (b)

Outcomes assessed: H2.2

MARKING GUIDELINES

Criteria	Marks
• Identifies the best feed from the trial and justifies their choice to the highest mean and lowest standard deviation calculated	3
• Identifies the best feed from the trial related to their calculation of mean or standard deviation	2
• Identifies the best feed from the trial based on figures calculated	1

Sample answer:

Feed Y was the feed type with the highest calculated mean final weight (107) and lowest standard deviation (2.8kg). Feed Y mean final weight was only 0.5kg greater than Feed Z, however, Feed Y's SD was a lot lower showing the results were less variable and could be considered more reliable.

Question 3 (c)

Outcomes assessed: H2.2

MARKING GUIDELINES

Criteria	Marks
• Outlines information that should be considered before using this feed type • Providing reasons	3–4
• Identifies more than ONE piece of information that could be considered OR • Outlines a piece of information that could be considered before using this feed type	2
• Identifies a piece of information that should be considered	1

Sample answer:

The farmer may need to consider the costs associated with each feed because the cost of feed Y may be greater than the economic benefits gained from the increase weight gain. The farmer may also need to consider the effect of this feed in meeting the market specifications (fat/muscle score etc) compared to other feeds and/or the age/stage of growth of the pigs.

Section II

Question 4 (a)

Outcomes assessed: H1.1

MARKING GUIDELINES

Criteria	Marks
• Sketches in general terms a legal obligation of farmers in controlling animal diseases	2
• Identifies a reason for farmers to control animal disease	1

Sample answer:

Where farm animals may be found to be exhibiting symptoms that may be related to a notifiable contagious disease, the property owner/farmer is required to inform the Department of Primary Industries or local veterinary officers.

Answers could include:

- compliance with pesticides Act
- compliance with Animal Welfare Guidelines
- compliance with Cruelty to Animals legislation
- compliance with OH&S legislation for employees involved in treatments of animals

Question 4 (b)

Outcomes assessed: H2.2

MARKING GUIDELINES

Criteria	Marks
• Provides cause and symptoms of a named animal disease	3
• Provides the cause and a symptom of a named animal disease OR • Provides symptoms of a named animal disease	2
• Provides a cause on symptom of a named animal disease OR • Provide a cause AND a symptom of an animal disease OR • Provide TWO symptoms of an animal disease	1

Sample answer:

Name of Animal Disease	**Ovine Johnes disease**
Cause	by a bacteria which infects the gut of sheep
Symptoms	– Affects the ability to absorb nutrients from the small intestine – Wasting/reduced weight gain – Reduced fertility – Wool quality and quantity reduced

Question 4 (c)

Outcomes assessed: H2.2

MARKING GUIDELINES

Criteria	Marks
• Outlines the relationship between all the components of the diagram and links them to the prevention or control of the named disease	4
• Outlines all the components from the diagram and links them to prevention or control of a named disease	3
• Outlines TWO components from the diagram that can be used to prevent or control disease OR • Identifies a component/s of the diagram and links it to the prevention of control of the named disease	2
• Identifies a prevention or control method for an animal disease	1

Question 4 (c) (continued)

Sample answer:

The farmer can address the host component, making the host not susceptible to the disease by vaccinating. Ovine Johnes can be controlled by the use of a vaccination program using the Gudaiv vaccine. The vaccine allows the sheep to produce antibodies as a defence mechanism that prevents the spread of the disease within and between sheep flocks. The pathogen can be excluded from contact with a susceptible host by quarantine and the use of national vendors declaration and animal health statements. This ensures animals with the pathogen are limited in their movement. The environment may be managed by fencing-off damp and/or shady areas of pasture/paddocks to minimise exposure to areas where pathogen levels may remain higher for longer.

Question 4 (d)

Outcomes assessed: H2.2

MARKING GUIDELINES

Criteria	Marks
• Outlines THREE or more similarities or differences in the physiology of monogastrics and ruminant animal digestion	5–6
• Outlines TWO similarities or differences in the physiology of monogastric and ruminant digestion OR • Outlines a similarity or difference in the physiology of monogastric and ruminant digestion AND identifies an additional physiological/anatomical similarity or difference	3–4
• Outlines a similarity or difference in the physiology or anatomy of monogastric and ruminant digestion OR • Identifies similarities of differences in the anatomy or physiology of monogastric and ruminant digestion	1–2

Sample answer:

MONOGASTRIC	RUMINANT
No synthesis of Vitamin B	Are able to synthesise vitamin B due to microbes in the rumen
Carbohydrates broken down to simple sugars and absorbed in small intestine	Carbohydrate digestion produces volatile fatty acids which are absorbed into the bloodstream through the rumen wall and used as energy source.
No breakdown of microbial protein	Microbial breakdown of protein in the rumen to essential amino acids
Not able to utilise sources of non–protein nitrogen	Able to convert/utilise sources of non–protein nitrogen (eg urea) into microbial protein

Question 5 (a)

Outcomes assessed: H2.1

MARKING GUIDELINES

Criteria	Marks
• Sketches in general terms a role of water in plant growth	2
• Identifies a role of water in plant growth	1

Sample answer:

Water is important in keeping the guard cells (surrounding the stomata of plants) turgid, allowing for the exchange of gases.

Answers could include:

– uptake of nutrients
– translocation of nutrients
– photosynthesis

Question 5 (b) (i)

Outcomes assessed: H2.1

MARKING GUIDELINES

Criteria	Marks
• States a reason for the difference in crop yield levels referring to the amount of soil moisture present at sowing for an equivalent total amount of water or possible rainfall effects	3
• Outlines a relationship between the amount of water with reference to information in the table	2
• Identifies a relationship between the amount of water and crop yield	1

Sample answer:

The highest crop yield is achieved where the amount of soil moisture present at sowing is highest, (2004, 150mm) even though total available moisture (soil plus rainfall) is equivalent (2005: 400mm; 2004: 400mm).

This suggests that stored soil moisture contributes more to crop yield than in–crop rainfall because it is not subject to runoff or evaporative losses. The stored soil moisture is also present at the germination and establishment phases of the crop (compared to rainfall that may come at other less crucial times in the crop's growth and/or development).

Question 5 (c)

Outcomes assessed: H1.1

MARKING GUIDELINES

Criteria	Marks
• Outlines a management technique a farmer can use to maximise the amount of soil moisture at sowing • Outlines a reason for or an effect of using this technique to maximise the amount of soil moisture at sowing • Makes a value judgement on the use of this technique	3–4
• Outlines a management technique a farmer can use to maximise soil moisture at sowing OR • Outlines a reason for an effect of a management technique used to maximise the amount of soil moisture at sowing	2
• Identifies a management technique a farmer can use to maximise soil moisture at sowing	1

Sample answer:

Retaining surface residues in the fallow period can maximise soil moisture storage at sowing. This is achieved through maintaining greater than 30% ground cover and no surface cultivation. This increases water infiltration and reduces soil water loss through run–off and evaporation. This technique may however increase levels of nitrogen immobilisation due to higher carbon levels or may increase levels of some residue based pathogens, but overall this technique is advantageous in reducing year to year variable in crop yield in certain soil types.

Question 5 (d)

Outcomes assessed: H2.1

MARKING GUIDELINES

Criteria	Marks
• Outlines, using examples the effect of the interaction between plant genotype and the environment on plant productivity	5–6
• Outlines the interaction between plant genotype and the environment on plant productivity OR • Using an example, outlines the interaction between plant genotype and the environment and the effect on plant productivity	3–4
• Identifies an interaction(s) between plant genotype and the environment and plant productivity	1–2

Question 5 (d) (continued)

Sample answer:

Genotype sets the upper limit to production. Having a genotype that is suited to a particular environment eg frost conditions can aid in maximising potential productivity. Low chill peaches were bred for the subtropical areas of the state. These varieties require less chilling hours and a shorter dormancy period. These varieties yield greater in these areas than traditional varieties.

"Roundup Ready Cotton" – plants genotype is modified to be resistant to Glyphosphate hence cotton crops can be sprayed to control weeds as the crop is not affected. This will increase cotton productivity as competition due to weeds is reduced.

Section III

Question 6 (a)

Outcomes assessed: H1.1

MARKING GUIDELINES

Criteria	Marks
• Provides characteristics and features of the roles of both microbes and invertebrates in decomposition of organic matter in terms of the physical/chemical changes that occur	5
• Provides characteristics and features of the role of both microbes and invertebrates in the decomposition of organic matter	3–4
• Identifies a role(s) of a microbe or invertebrate in decomposition of organic matter OR • Identifies a microbe or invertebrate	1–2

Sample answer:

Dung beetles are involved with the breakdown and subsequent burial of manure deposited by animals on pastures. These smaller and broken down pieces are incorporated into the biomass of the soil therefore leading to improved soil structure and fertility. Microbes play a role in the breakdown of organic matter ingested by ruminant animals. Fungi and Protozoa in the rumen turn complex carbohydrates into smaller molecules in the digestive process.

Question 6 (b)

Outcomes assessed: H1.1

MARKING GUIDELINES

Criteria	Marks
• Identifies issues and provides a number of points for and/or against the use of crop rotation, including the improvements that may eventuate in the sustainability of Australian farming systems	9–10
• Provides some points for and/or against the use of crop rotation, including the improvements that may eventuate in the sustainability of Australian farming systems	7–8
• Explains how crop rotation is used to improve sustainability of Australian farming systems	5–6
• Outlines the use of crop rotation in improving sustainability of Australian farming systems	3–4
• Outlines a crop rotation used in agriculture OR • Identifies an aspect of sustainability of Australian farming systems OR • Identifies an aspect of crop rotation	1–2

Answers could include:

- Breaks disease cycle
- Increases organic matter
- Increases soil fertility
- Improve soil structure
- Could potentially increase acidity
- Productive land may be tied up and not be producing a cash crop
- Increased labour/time
- Different machinery required

Question 7 (a)

Outcomes assessed: H2.2

MARKING GUIDELINES

Criteria	Marks
• Provides the key features of the energy changes that occur from feeding to maintenance and production including the types of losses that occur and correctly identifies all energy stage names	5
• Provides some features of energy changes that occur and losses that occur when feeding farm animals	3–4
• Outlines that energy losses occur in a feed when fed to an animal OR • Identifies an energy stage name/s OR • Identifies an energy loss/es	1–2

Sample answer:

Gross energy in feed
↓ Minus energy in faeces
Digestible Energy
↓ Minus energy in urine and methane
Metabolisable energy
↓ Minus energy in heat production
Net energy
(available for maintenance and production)

Question 7 (b)

Outcomes assessed: H2.2

MARKING GUIDELINES

Criteria	Marks
• Explains factors that affect growth and development in animals and relates the implications of these factors on growth and development	9–10
• Explains factors that affect growth and development and relates the implications of these on growth or development	7–8
• Describes THREE factors that affect growth and development in animals	5–6
• Outlines factors that affect growth and development in animals OR • Identifies factors that affect growth and development and draws a relationship/interaction between these	3–4
• Identifies a factor/s that affect the growth and development in animals OR • Identifies that animal development is related to proportions of bone, muscle and fat and that growth is an increase in size/weight	1–2

Answers could include:

- Time
- Environment
- Genetics
- Management
- Nutrition
- Pests and Diseases
- Sex of animal
- Age of animal

Question 8 (a)

Outcomes assessed: H2.1

MARKING GUIDELINES

Criteria	Marks
• Provides characteristics and features of a plant breeding technique that modifies the genetic basis of a plant	5
• Provides some features of a plant breeding technique	3–4
• Outlines a plant breeding technique OR • Identifies a plant breeding technique	1–2

Sample answer:

Plant breeders firstly select lines of plants (eg in a wheat breeding program) that have desirable characteristics / genetic traits that they wish to incorporate into a new variety to improve production. Breeders collect pollen from one variety and dust this into the stigma of the other parent plant. To prevent any contamination the dusted head is then bagged. This generates F1 plants which can be grown out and tested prior to single plant selections being made to produce the F2. This is repeated until the F3 generation and the lines are then fixed in the F4 generation.

Question 8 (b)

Outcomes assessed: H1.1, H2.1

MARKING GUIDELINES

Criteria	Marks
• Identifies features of a range of techniques used to manage pasture production systems providing points for and/or against each technique	9–10
• Identifies features of a range of techniques used to manage pasture production systems providing points for and/or against at least ONE of these techniques	7–8
• Provides characteristics and features of techniques and relates these to the management of pasture production systems	5–6
• Outlines techniques used to manage pasture production systems	3–4
• Identifies a technique(s) used to manage pasture production systems OR • Identifies an aspect(s) of pasture production system	1–2

Answers could include:

- Irrigation
- Adjusting stocking rates
- Pasture establishment
- Herbicides
- Fertilise
- Pasture Renovation
- Pasture selection
- Pasture Improvement
- Fodder conservation
- Grazing management techniques

Question 9 (a)

Outcomes assessed: H3.2, H3.4

MARKING GUIDELINES

Criteria	Marks
• Provides the key steps in a marketing chain for a named product and clearly outlines an example of government intervention in this marketing chain	5
• Provides the key steps of a marketing chain for a named product OR • Provides some steps of a marketing chain for a named product and identifies a government intervention	3–4
• Identifies a step/s in a marketing chain OR • Identifies an example of government intervention in marketing	1–2

Sample answer:

Steers are sold through an agent at the saleyards by an auctioning system. Cattle are transported to the yards by trucks. Governments intervene as producers must complete an NVD/Waybill form before stock are transported. This is to ensure stock are identified by NLIS devices and are within WHP. Buyers then transport cattle to the abattoir where they are slaughtered. Carcases are then broken up into various cuts and transported by chiller trucks to the supermarket butcher. Consumers are then able to purchase beef from the retailer.

Question 9 (b)

Outcomes assessed: H3.3

MARKING GUIDELINES

Criteria	Marks
• Provides a number of points that outline the need for continued scientific research • Provides a value judgement on how this contributes to the future of Australian Agriculture	9–10
• Provides some points outlining the use of continued scientific research • Indicates how this contributes to the future of Australian Agriculture	7-8
• Provides characteristics and features of scientific research used in Australian Agriculture and attempts to link this to the future of Australian Agriculture	5–6
• Outlines the use of scientific research OR • Outlines the future of Australian Agriculture	3–4
• Identifies a piece of scientific research study that has been undertaken in Agriculture	1–2

Answers could include:

- Industry sustainability
- Meeting global requirements
- Product security
- Providing service
- Improving productivity
- Competitive advantage
- Meet domestic needs
- New technologies that are sustainable

BOARD OF STUDIES
NEW SOUTH WALES

2008 HSC Agriculture Paper 2
Marking Guidelines

The following marking guidelines were developed by the examination committee for the 2008 HSC examination in Agriculture Paper 2, and were used at the marking centre in marking student responses. For each question the marking guidelines are contained in a table showing the criteria associated with each mark or mark range. For some questions, 'Sample Answers' or 'Answers may include' sections are included. These are developed by the examination committee for two purposes. The committee does this:

(1) as part of the development of the examination paper to ensure the questions will effectively assess students' knowledge and skills, and

(2) in order to provide some advice to the Supervisor of Marking about the nature and scope of the responses expected of students.

The examination committee develops the marking guidelines concurrently with the examination paper. The 'Sample Answers' or similar advice are not intended to be exemplary or even complete answers or responses. As they are part of the examination committee's 'working document', they may contain typographical errors, omissions, or only some of the possible correct answers.

The information in the marking guidelines is further supplemented as required by the Supervisor of Marking and the senior markers at the marking centre.

A range of different organisations produce booklets of sample answers for HSC examinations, and other notes for students and teachers. The Board of Studies does not attest to the correctness or suitability of the answers, sample responses or explanations provided. Nevertheless, many students and teachers have found such publications to be useful in their preparation for the HSC examinations.

A copy of the Mapping Grid, which maps each question in the examination to course outcomes and content as detailed in the syllabus, is also included.

Question 1 (a)

Outcomes assessed: H4.1

MARKING GUIDELINES

Criteria	Marks
• Provides characteristics and features of the TWO ways information was presented for a study on the impact of a large rural business organisation on agricultural industries	3
• Outlines ONE way information was presented for a study on the impact of a large rural business organisation on agricultural industries	2
• Identifies a study that was undertaken to determine the impact of a large rural business organisation on agricultural industries OR • Identifies ONE way information was presented on the impact of a large rural business organisation on agricultural industries	1

Sample answer:

A study was conducted on the impact of a large poultry business operating in a rural town. Farms were bought to house the operation. Environmental impact studies, council surveys on the impacts of roads, employment opportunities, and the effects on local rural businesses (produce stores, chemical companies etc) were collated. The information collected was presented in various forms. The community and local businesses were invited to a forum where the results were illustrated in graphical form, (pie graphs etc) and the impacts summarised in a power point presentation on the impact of the poultry business. Plans of the buildings and surrounding roads were drawn up and placed on notice boards for public viewing in the council foyer. Detailed results (tables and graphs) were available on the web.

Question 1 (b)

Outcomes assessed: H5.1

MARKING GUIDELINES

Criteria	Marks
• Outlines strategies and shows the relationship between the strategies used and the improved marketing opportunities for an agricultural product	4
• Outlines a strategy and shows the relationship between this strategy and the improved marketing opportunity for an agricultural product • Identifies a second strategy OR • Outlines strategies that have improved the marketing opportunities for an agricultural product	3
• Identifies strategies that have improved the marketing opportunities for an agricultural product OR • Outlines a strategy and show the relationship between this strategy and the improved marketing opportunity for an agricultural product	2
• Identifies a strategy that has improved the marketing opportunities for an agricultural product OR • Identifies a marketing opportunity for an agricultural product	1

Sample answer:

Agricultural Product: Sheep

The sheep industry in Australia often has had an oversupply of sheep suited in the mutton market. New marketing opportunity was identified given the increasing population in Australia from the Middle East. The controversy associated with the live export market also contributed to the identification of a strategy of ensuring sheep/mutton had been killed in accordance with particular religious beliefs. Halal certification is now common in a number of livestock industries and has therefore measured marketing opportunities available for Australian producers.

The use of specific lamb marketing campaigns at certain times of the year eg. The Australia Day lamb advertising and promotional campaign in an attempt to increase the sales of lamb through a nationalistic pride association.

Question 1 (c)

Outcomes assessed: H3.4

MARKING GUIDELINES

Criteria	Marks
• Identifies the features of sources of finance available to assist farm operations • Places a judgement on the value of each of these sources against criteria	7-8
• Identifies features of a source of finance available to assist farm business operations placing a judgement on the value of this source • Provides characteristics and features of one other source of finance available to assist farm business	5-6
• Describes a source of finance available to assist farm business operations and places a judgement on the value of this source against a criteria OR • Provides characteristics and key features of at least TWO sources of finance available to assist farm business operations	3-4
• Identifies source(s) of finance available to assist farm business operations OR • Outlines a source of finance available to assist farm business operations	1-2

Answers could include:

Sources of finance:
- Bank borrowings (fixed & variable loans, overdrafts)
- Agribusiness companies
- Solicitors
- Family/Friends
- Development banks/overseas borrowings
- Partnerships/Shareholdings/Raising capital

Criteria for evaluation may include;
- Costs/Fees/Charges
- Interest rates
- Security
- Long term/Short term
- Security
- Risks associated
- Repayment periods
- Liquidity

Question 2 (a)

Outcomes assessed: H4.1

MARKING GUIDELINES

Criteria	Marks
• Provides characteristics and features of the research methodology used in a study related to the use of a current technique/technology which is advancing productivity in animal production systems	3
• Outlines the research methodology used in a study related to the use of a current technique/technology which is advancing productivity in animal production systems	2
• Identifies a study related to the use of a current technique/technology which is advancing productivity in animal production systems OR • Identifies at least ONE research method used in a study related to the use of a current technique/technology which is advancing productivity in animal production systems	1

Sample answer:

A study was conducted on the effect of temperament in beef cattle. It was conducted by the Beef CRC and UNE. 1500 cattle of mixed breeds and sex were transported to a common property. All cattle were grazed together for 30 days (for familarisation) and then all cattle were moved through the same set of yards once, prior to flight time being measured. Cattle then had the "Flight time" measured one week later (time taken for them to move from one point in a race through the crush to another point).

Cattle were all grazed together and all had the same management practises conducted on them. Cattle were then transported to an abattoir where they were slaughtered. Results were collected on meat quality (pH and meat colour) and statistical analysis was conducted to assess the impact of temperament on meat quality.

Question 2 (b)

Outcomes assessed: H5.1

MARKING GUIDELINES

Criteria	Marks
• Outlines the relationship between the pest (genetic makeup) and the development of resistance to a chemical or chemicals used in an animal production system	4
• Provides characteristics and features of the development of resistance to a chemical or chemicals used in an animal production system	3
• Identifies a pest resistant to an identified chemical or chemicals used in an animal production system OR • Outlines the development of pest resistance in animal production systems	2
• Identifies a pest found in an animal production system	1

Sample answer:

Resistance is the ability of a pest to NOT be affected by a chemical. When a chemical eg drench with the same active ingredient is continually used, some worms will be killed but a small percentage of the population may survive the chemical, due to their genetic makeup. These worms then reproduce and pass this genetic resistance onto their offspring. Overtime a greater proportion of the worms population are resistant to the chemical and hence the chemical becomes ineffective.

Question 2 (c)

Outcomes assessed: H3.4

MARKING GUIDELINES

Criteria	Marks
• Describes techniques available to farmers to manipulate reproduction in farm animals • Places a judgement on the value of each of these techniques against criteria	7-8
• Describes a management technique available to farmers to manipulate reproduction in farm animals • Places a judgement on the value of this technique • Provides characteristics and features of one other management technique available to farmers to manipulate reproduction in farm animals	5-6
• Describes a management technique available to farmers to manipulate reproduction in farm animals • Places a judgement on the value of this technique against a criteria OR • Provides characteristics and key features of at least TWO management techniques available to farmers to manipulate reproduction in farm animals	3-4
• Identifies management technique(s) available to farmers to manipulate reproduction in farm animals OR • Outlines a management technique available to farmers to manipulate reproduction in farm animals	1-2

Answers could include details on:

Management Techniques:
- Oestrus synchronisation using progesterone sponges (RCIDR)
- Oestrus synchronisation using prostaglandins
- Multiple ovulation and embryo transfer
- Artificial insemination
- Use of artificial lighting in layer sheds
- Use of artificial lighting for mares
- Using the ram effect

Criteria may include:

- Oestrus synchronising allows for concentrated calving/lambing which makes management more efficient
- Oestrus synchronisation allows ”even” pens of lambs to be sold which can increase returns
- Multiple Ovulation and Embryo Transfer can increase the genetic pool and improve the rate of genetic gain in shorter time periods
- Artificial lighting can increase laying times which will increase egg production
- Costs associated with using chemicals
- Labour requirements

Question 3 (a)

Outcomes assessed: H4.1

MARKING GUIDELINES

Criteria	Marks
• Provides characteristics and features of the research methodology used in a study of a technological innovation aimed at improving the productivity in a horticultural industry	3
• Outlines the research methodology used in a study of a technological innovation aimed at improving the productivity in a horticultural industry	2
• Identifies a study of a technological innovation aimed at improving the productivity in a horticultural industry OR • Identifies at least ONE research method used in a study of a technological innovation aimed at improving the productivity in a horticultural industry	1

Sample answer:

Partial Root Dry Zone (PRD) is a technique that can be used in the horticultural industry. A trial investigating the effects of PRD on the water use, water use efficiency, yield and sugar contents of grapes was conducted on 5 different varieties of grapes. Replications of grapevines were either grown using the traditional method of watering by drip irrigation or by using PRD (2 pipes on either side of the plant are used but only one side is watered at a time whilst the other side is allowed to dry out).

Randomly selected rows of grapevines were grown using either system within the same vineyard for an entire season. Data was collected on total water used, water use efficiency and sugar content of the grapes.

Question 3 (b)

Outcomes assessed: H5.1

MARKING GUIDELINES

Criteria	Marks
• Outlines the relationship between the changing domestic market and the types of products produced within a horticultural industry	4
• Outlines the relationship between the changing domestic market and ONE type of product produced within a horticultural industry	3
• Outlines a change in a domestic market within a horticultural industry OR • Outlines a type of product produced within a horticultural industry	2
• Identifies a type of product produced within a horticultural industry OR • Identifies a domestic market within a horticultural industry	1

Sample answer:

The domestic market production of Pink Lady apples has increased due to greater consumer demand. This has affected apple growers as other varieties such as Jonathan have decreased in demand. Due to this growers have had to increase the production of Pink Lady. Some growers have cut down Jonathan-producing trees and grafted the Pink Lady varieties onto the Jonathan root stocks.

Question 3 (c)

Outcomes assessed: H3.4

MARKING GUIDELINES

Criteria	Marks
• Describes practices that are involved in manipulating a horticultural system that aim to balance both economic and environmental sustainability • Places a value judgement on the managers role for each of these practices based on criteria	7-8
• Describes practices that aim to manipulate the horticultural system to balance economic viability and environmental sustainability with reference to the value of the role of the manager in one of the practices related to a criteria	5-6
• Describes practices that are involved in manipulating a horticultural system that aim to address either economic or environmental sustainability, evaluating the managers role in this OR • Describes practices that aim to manipulate either the economic viability or the environmental sustainability of a horticultural system	3-4
• Outlines a management practice used in a horticultural system OR • Identifies management practice(s) used in a horticultural system	1-2

Answers could include:

The manager balancing:

Economic viability
- reducing level of input
- reducing input costs
- searching for cheaper input alternatives
- look to improve productivity
- changing to more productive varieties

Environmental sustainability
- use of chemicals to control pest/disease
- use of fertilisers leads to futrophocation
- reduce the level of water use

Criteria for evaluation may include:

Managers role in
- keeping the business afloat
- having cash flow within business
- environmental impact of farm on the local environment
- species diversification
- loss of predator species (biological control)
- pest levels (economical thresholds)
- levels of local salinity
- water table levels

Question 4 (a)

Outcomes assessed: H4.1

MARKING GUIDELINES

Criteria	Marks
• Provides characteristics and features of the experimental design used in a study that led to the implementation of an alternative production system or technology	3
• Outlines the experimental design used in a study that led to the implementation of an alternative production system or technology	2
• Identifies a study that led to the implementation of an alternative production system or technology OR • Identifies at least ONE component of an experimental design used in a study that led to the implementation of an alternative production system or technology	1

Sample answer:

A study was carried out to determine the effectiveness of the introduction of a new feeding regime into a commercial piggery.

This study involved introducing a feed supplement to improve the growth rate of porkers.

This involved selecting an area of the existing piggery shed and then randomly allocating 80 pigs of the same age to each of 10 adjacent pens with 8 weaners in each pen. The 80 pigs were of mixed sex (40 male and 40 females) with male and female weights recorded separately when weighing occurred. This allowed for an analysis of variance to be conducted for sex, as well as the effect of the feed supplement when the trial was completed.

Five of the pens were then randomly chosen to be fed feed without the supplement, with the remaining 5 pens having the same feed/amount with the supplement also included. All other conditions remained the same for all pens.

Pigs were weighed daily over a period of 8 weeks and the final results were then analysed using ANOVA to determine if results indicated a significant difference in pigs of both sexes where the supplement was included in the ration.

Question 4 (b)

Outcomes assessed: H5.1

MARKING GUIDELINES

Criteria	Marks
• Outlines factors and shows their relationship to the development of an alternative agricultural system or technology	4
• Outlines a factor and shows the relationship to the development of an alternative agricultural system or technology • Identifies a second factor OR • Outlines factors that led to the development of an alternative agricultural system or technology	3
• Outlines a factor that led to the development of an alternative agricultural system or technology • Identifies a second factor OR • Outlines a factor and shows the relationship to the development of an alternative agricultural system or technology	2
• Identifies a factor that led to the development of an alternative agricultural system or technology	1

Sample answer:

The use of the National Livestock Identification Scheme (NLIS) resulted from the advances in computer technology and animal identification systems and the need for a trace-back system to ensure a safe, secure and reliable market for red-meat industries. The development of the tag is patented which prevents similar products being marketed. Although producers were hesitant to adopt the use of NLIS, education and promotion via the Department of Primary Industries and MLA has aided in the smooth transition of this technology.

Question 4 (c)

Outcomes assessed: H3.4

MARKING GUIDELINES

Criteria	Marks
• Describes marketing techniques used in the introduction of an innovation • Places a value judgement on the importance and/or success of these techniques compared to criteria (or factors that were involved with the introduction)	7-8
• Describes marketing techniques used in the introduction of an innovation • Places a value judgement on one of these techniques in relation to criteria (or other factors involved with the introduction of the innovation)	5-6
• Describes a marketing technique used with the introduction of an innovation • Places a value judgement on the importance and/or success of this technique compared to other criteria (or factors that were involved with the introduction) OR • Describes marketing techniques used in the introduction of an innovation	3-4
• Identifies marketing technique(s) used with the introduction of an innovation OR • Outlines a marketing technique used in the introduction of an innovation	1-2

Answers could include:

- Advertising and promotion of innovation in rural magazines, field days
- Support and education provided by company on use of innovation eg DPI education days on NLIS
- Use of "samples" to market product increases consumer awareness of product
- Poor marketing – lack of staff enthusiasm can hinder adaption
- Clear guidelines on benefits of innovation in marketing campaign (valid research)
- Inexperienced marketing company may hinder adaption

- Testaments/testimonials of people who have used innovation
- A competitor marketing at the same time with a better campaign may hinder adaption
- Marketing to a range of consumers (producers, retailers, processors and the final consumer) to reduce consumer resistance (eg GM foods)
- Timing of campaign eg when product is available

Criteria for evaluation may include:

Successful introduction
Unsuccessful introduction
Time/timing
Expense/resources available
Expertise level

Question 5 (a)

Outcomes assessed: H4.1

MARKING GUIDELINES

Criteria	Marks
• Provides characteristics and features of the types of data collected in a study related to improving plant productivity	3
• Outlines the types of data collected in a study related to improving plant productivity	2
• Identifies a study related to improving plant productivity OR • Identifies at least one type of data collected in a study related to improving plant productivity	1

Sample answer:

A study was undertaken to determine the importance of the addition of strains of Rhizobium inoculum on the early growth and establishment of a particular lucerne variety. Following the inoculation and growth of the lucerne plots, plants were collected and from those samples:

1. the dry matter weight was determined for each treatment by oven drying the fresh samples
2. the number of nodules were observed and placed into a category high, average or low, by counting nodules on the root samples over a 10mm length
3. the size an colour of nodules was recorded using a standard colour chart/chip as an indicator of healthiness/activity of the nodules and converted to an average numerical score

All of this data was then analysed for each strain of Rhizobium using analysis of variance.

Question 5 (b)

Outcomes assessed: H5.1

MARKING GUIDELINES

Criteria	Marks
• Outlines relationships between management techniques and their influence on nutrient cycling in a plant production system	4
• Provides characteristics and features of management techniques on a plant production system OR • Provides characteristics and features of a nutrient cycle in a plant production system	3
• Outlines the management of a plant production system OR • Outline a nutrient cycle in a plant production system	2
• Identifies a management technique in a plant production system OR • Identifies a nutrient cycle in a plant production system	1

Sample answer:

Management techniques can influence the cycling of nitrogen. Inoculation of legume seeds with the correct strain of rhizobium can ensure maximum nitrogen production (due to nitrogen fixation) by the plant. This nitrogen can then be (carried over) used for a cereal crop which would fallow a leguminous crop in a rotation system.

Nitrogen can be lost due to leaching and denitrification. Timing of fertiliser application is important to ensure leaching is reduced. Soils prone to waterlogging are prone to denitrification, so fencing off these areas or planting these areas with plant species that will cope with waterlogging may increase aeration of these soils and reduce denitrification and therefore more effectively utilise available soil nitrogen.

Question 5 (c)

Outcomes assessed: H3.4

MARKING GUIDELINES

Criteria	Marks
• Describes effects of plant density on both vegetative and reproductive yield • Places a value judgement on the importance of plant density compared to other factors/criteria that may influence yield	7-8
• Describes effects of plant density on both vegetative and reproductive yield in plant production systems	5-6
• Describes effect(s) of plant density on either vegetative or reproductive yield • Places a value judgement of their impact on plant production systems OR • Describes effect(s) of plant density on either vegetative or reproductive yield in plant production systems	3-4
• Identifies an effect(s) of plant density on vegetative and/or reproductive yield OR • Outlines an effect of plant density on vegetative or reproductive yield	1-2

Answers could include:

- plant plasticity
- tillering
- reaches upper limit and plateaus
- reproductive – reaches upper limit and then falls with increasing density
- nutrient availability
- pest/disease
- weed levels vs crop pasture plants

Criteria may include:

- knowing environmental conditions of farm so as to plant at "correct" density
- assessing interactions with sowing date
- matching to moisture availability
- matching plant variety

Question 6 (a)

Outcomes assessed: H4.1

MARKING GUIDELINES

Criteria	Marks
• Provides characteristics and features of the experimental design that contributed to the reliability of results in a study that is assisting with the conservation and efficient use of water	3
• Outlines the experimental design that contributed to the reliability of results in a study that is assisting with the conservation and efficient use of water	2
• Identifies a study that is assisting with the conservation and efficient use of water OR • Identifies at least ONE component of an experimental design that contributed to the reliability of results in a study that is assisting with the conservation and efficient use of water	1

Sample answer:

Experimental design included the following components; for a study carried out to determine the effect of two different irrigation systems on the growth and production of shiraz grapes.

– Replication – 20 rows of vines were treated with two different types of watering system to ensure that the results were reliable and repeatable (ie no one vine had results entirely due to chance)

– Randomisation – the row of 20 vines were numbered 1 – 20 and 10 rows were randomly allocated to be watered using a spray system and the remaining 10 using traditional drip irrigation

– Standardisation of conditions – all other management practises (weed control, chemical application, pruning) were the same so the only factor affecting the grapes production was the watering system that was used for each treatment group

Question 6 (b)

Outcomes assessed: H5.1

MARKING GUIDELINES

Criteria	Marks
• Outlines the relationship between the role of government in land and resource management using examples	4
• Outlines a role of government in land and resource management • Provides examples	3
• Outlines a role of government in land and resource management • Providing an example OR • Identifies a role of government in land and resource management • Provides an example	2
• Identifies a role of government in land and resource management	1

Answers could include:

The role of government in land resource management can include:

- Funding for projects eg Envirofund – a funding system for projects whereby land holders or community groups can apply for grants for large projects that have a positive environmental impact
- Education and information on resource management issues eg information provided on DPI websites and NRM website
- Policy – National Water Reform
- Research and Development by DPI
- Imposition of taxes/levies/fees on certain land/water resources

Question 6 (c)

Outcomes assessed: H3.4

MARKING GUIDELINES

Criteria	Marks
• Describes management strategies related to water quality and water supply • Places a judgement on the value of each of these strategies against criteria	7-8
• Identifies a management strategy related to water quality and water supply • Places a judgement on the value of this strategy • Provides characteristics and features of one other management strategy used to deal with issues of water quality and water supply	5-6
• Describes a management strategy related to water quality and water supply • Places a judgement on the value of this strategy against a criteria OR • Provides characteristics and key features of management strategies used to deal with issues of water quality and water supply	3-4
• Identifies management strategy(s) related to water quality and water supply OR • Outlines a management strategy related to water quality and water supply	1-2

Answers could include:

Management Techniques:

- Use of technology such as Partial Root Drying to increase water use efficiency
- Storage dams
- Fertiliser management to reduce run off of nutrients into waterways causing eutrophication
- Chemical application management to reduce spray drift into waterways
- Fencing off of rivers/dams to prevent erosion of river walls
- Water testing to monitor water quality
- Water management to prevent impacts down stream
- Implementing strategies such as covering irrigation channels to reduce evaporation
- Use of recycled water
- Water table monitoring to reduce salinity

Evaluations could include:

- Amounts of water used
- Storage dams improve a properties water holding capacity and value of property
- Improvement of water quality and associated benefits on animal and plant production
- Improved sustainability through droughts
- Costs associated
- Equipment available/equipment required
- Level of expertise that may be required