



B O A R D O F S T U D I E S
NEW SOUTH WALES

2012 HSC Agriculture 'Sample Answers'

When examination committees develop questions for the examination, they may write 'sample answers' or, in the case of some questions, 'answers could include'. The committees do this to ensure that the questions will effectively assess students' knowledge and skills.

This material is also provided to the Supervisor of Marking, to give some guidance about the nature and scope of the responses the committee expected students would produce. How sample answers are used at marking centres varies. Sample answers may be used extensively and even modified at the marking centre OR they may be considered only briefly at the beginning of marking. In a few cases, the sample answers may not be used at all at marking.

The Board publishes this information to assist in understanding how the marking guidelines were implemented.

The 'sample answers' or similar advice contained in this document 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.

Section I, Part B

Question 21

Sample answer:

The role of all pasture species in a pasture-based animal production system is to provide animals with the nutrients that are essential for growth and production.

Native pastures are adapted to Australia's soils and climatic conditions and are commonly used in drier areas or areas with poor soils. Introduced species are more productive in higher rainfall areas and in more fertile soils. Hence, they are commonly used in more intensive animal systems such as dairying or prime lamb production.

Answers could include:

- Grasses versus legumes
- Shallow versus deep-rooted species

Question 22 (a)

Sample answer/Answers could include:

Mean = 213

Standard deviation = 7.87 (accept 7.9 too)

Question 22 (b)

Sample answer:

Fifteen identical pots of soil would be planted with the same number of seeds. These pots would then be randomly divided into three groups of five pots.

One group of pots would be placed under heavy shade cloth, eg 30%, another group of pots under light shade cloth, eg 10% and the third group kept with no shade to act as a control.

Each group of pots would be kept under identical conditions such as watering regime and fertiliser application.

Answers could include:

An appropriately labelled diagram showing details of a trial.

Question 23 (a)***Sample answer:***

- Farm dams
- Rivers

Answers could include:

- Creeks
- Groundwater bores
- Wells
- Town water supply
- Irrigation storage dams

Question 23 (b)***Sample answer:***

Planting vegetation along the banks of watercourses helps maintain water quality by reducing the amount of run-off that may contain nutrients and soil particles entering the water.

Construction of dams to collect effluent from intensive animal production industries prevents nutrients entering the water where they may cause algal blooms.

Answers could include:

- Appropriate fertiliser practices
- Controlling access by stock to watercourses
- Grassed waterways
- Appropriate management of chemical application

Question 24 (a)***Sample answer:***

The graph indicates that as carcass weight increases, so does the fat percentage in it. Hence, to produce a fat carcass for the export market, animals are slaughtered at a higher bodyweight.

Question 24 (b)***Sample answer:***

Hormone growth promotants can be used to increase the amount of muscle in carcasses. Although this is an effective method of increasing muscle percentage, there are issues with market acceptance and consequently it is not universally practised.

Cross breeding can be used to produce carcasses containing different proportions of fat and muscle. It is a commonly used method and is a valuable way of producing animals to suit various market specifications.

Answers could include:

- Feed additives
- Lot feeding
- Breed selection
- Castration
- Restrictive feeding
- Use of cryptorchids

Question 25 (a)***Sample answer:***

By improving the disease resistance of crop plants their photosynthetic capacity will be increased, leading to an improvement in production.

Answers could include:

- Drought resistance
- Frost tolerance
- Tolerance to soil acidity/salinity
- Maturity times
- Quality factors
- Dwarfing
- Pest tolerance

Question 25 (b)***Sample answer:***

Hybridisation is a method of plant breeding in which two inbred lines of a plant are produced and then crossed with one another to produce seed for a commercial crop. The inbreeding process requires several generations of seed pollination to produce two distinct pure lines of the plant. The hybrid plants produced are genetically uniform and more vigorous than non hybrid varieties.

Selective breeding involves choosing varieties of a crop that display desirable traits and then crossing them. Plants from these crosses that possess desirable characteristics are then kept to provide seed for commercial production.

Answers could include:

- Mass selection – simply retaining seed from the best plants of each generation and re-sowing them.
- Genetic engineering
- Chromosome doubling
- Induced mutation

Question 26 (a)***Sample answer:***

Conservation tillage is a technique where farmers use low-impact machinery, complete fewer passes over a paddock, direct drill and use herbicides to control weeds rather than conventional cultivation. All of these strategies will result in less soil compaction, allowing greater aeration, easier root penetration and an increase in soil carbon. All these factors improve the long-term sustainability of soil fertility.

Crop rotation is a technique where farmers change the crop that is grown in a particular paddock on a regular basis. This is done to break a disease cycle, or potential weed problem, and to add nutrients to the soil. A legume is included in the rotation to add nitrogen to the soil.

Answers could include:

- Green manure cropping
- Deep-rooted plants
- Pasture lay phase
- Organic fertilisers

Question 26 (b)***Sample answer:***

Farmers in the mid-1900s commonly grew the same crop for a number of years in a paddock, adding inorganic fertilisers such as superphosphate. Continuous cultivation practices at the time decreased soil carbon levels, resulting in decreased nutrient-holding capacity. There was little use of legume crops in rotation with other crops.

Farmers in the present day still use a wide range of inorganic fertilisers where necessary. They also retain soil carbon where possible. This is achieved by using conservation tillage practices and crop rotation. Legume crops are often used to replenish soil nitrogen levels.

Answers could include:

- The use of slow-release fertilisers
- Liming
- The use of deep-rooted plants
- Wider availability of nitrogenous and compound fertilisers
- The use of satellite mapping of soil fertility
- Yield mapping and targeted fertiliser application

Question 27 (a)***Sample answer:***

Farmers can sell their milk directly to a processor. They sign a contract to deliver milk of a minimum quality standard.

Answers could include:

Relevant selling technique for any product.

Question 27 (b)***Sample answer:***

Governments may set minimum health standards for the sale of milk. Consequently, farmers must ensure that bacterial contamination of milk is minimised.

Answers could include:

- Taxes on inputs
- Workplace health and safety legislation
- Animal health regulations
- Animal welfare legislation
- Chemical usage legislation
- Environmental protection legislation

Question 27 (c)***Sample answer:***

The butter fat content of milk can be increased by feeding cows a high-fibre diet. This is usually achieved by giving them access to hay or silage in addition to pasture. While there is additional cost associated with this, it effectively increases butter fat content and raises the price received per litre of milk.

Keeping a mixed herd of cows containing high milk producers such as the Holstein and high butter fat producers such as the Jersey is also an effective means of raising the butter fat content of milk sold from the farm. Less milk may be produced but each litre of it will sell at a higher price.

Question 28 (a)***Sample answer:***

Rising input costs affect a farm by reducing profitability and increasing the capital needed to purchase inputs. Farmers may respond to these pressures by investing in technology to utilise expensive inputs more efficiently. Examples of this include soil testing or yield mapping to allow less fertiliser to be used in a crop.

Farmers may change the way they operate an enterprise. An example of this would be to carry more breeding cows and sell more weaners rather than sell lower numbers of finished stock.

Answers could include:

- Substituting capital for labour
- Low input/low yield choices
- Enterprise change

Question 28 (b)***Sample answer:***

Gross margins are used to compare the relative profitability of alternative enterprises that can be part of a farm system. They take into account the gross income from each enterprise and the variable costs associated with it. Fixed costs which relate to the whole farm are not included. The main benefits of gross margin budgeting include:

- They are quick and easy to calculate
- They give a good comparison between enterprises which have similar inputs.

The major problems with their use include:

- They do not give an accurate measure of overall farm profitability
- They cannot be used to make valid comparisons between enterprises with very different resource inputs.

Section II

Question 29 (b)

Answers could include:

- Pest/disease resistant genetically modified crops eg Bt cotton
- Herbicide resistant crops eg Roundup Ready™ canola
- Other relevant crops eg Bt maize, tomatoes (ripening gene)
- Improved production, lowered input costs, reduced chemical usage, consumer resistance, religious beliefs, legislation, contracts

Question 30 (b)

Answers could include:

- Plant variety or animal breed
- Improved irrigation methods
- Improved agronomic methods – planting time, row spacing
- Soil moisture conservation practices
- Stocking rates
- Fodder conservation
- Grazing strategies

Question 31 (b)***Answers could include impacts of:***

- Satellite technologies
 - GPS
 - Global imaging
 - Soil mapping, yield mapping
- Computer technologies
 - Financial record keeping and analysis
 - Animal records
 - Paddock records
 - Internet weather forecasting
 - iPad and apps eg Ag World
- Biotechnologies
 - GM crops
 - Vaccines, bio-insecticides
- Robotics
 - Milking
 - Smart gates
 - Automatic drafting
- Electronic identification
 - NLIS
 - QR codes

Impacts could include:

- Reduced labour costs
- Improved access to information
- Improved record keeping
- Improved animal identification
- More efficient usage of inputs such as water and chemicals
- Increased capital expenditure
- Increased training of employees needed