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1997 HIGHER SCHOOL CERTIFICATE EXAMINATION REPORT AGRICULTURE

This report should be read in conjunction with the 1997 2/3 Unit (Common) and 3 Unit Higher School Certificate Examination papers.

The number of candidates presenting for Agriculture in 1997 was 1871, of whom 1541 presented for 2/3 Unit and 330 for 3 Unit.

2/3 UNIT (COMMON)

Sections of this report written in italics are typical of either low or high scoring types of responses to the questions.

Students should be encouraged to give more consideration to answering the questions in the space provided on the examination paper. Many candidates failed to do so. In some instances extra examination booklets were attached. This practice should be discouraged as valuable time is wasted in over–answering some questions.

Section I

Question 1

No marks were awarded for naming the farm product studied.

(a) (i) The majority of candidates were able to identify two specific markets clearly, saying, for example, *export beef trade* (*Japanese Ox*) *and domestic trade* (*local butcher, supermarket, restaurant*).

Some candidates identified the domestic market in terms of either the product type, eg, *manufacturing milk, worsted wool*, or the market destination, eg, *Flemington Markets, retail shops*.

Marketing (selling) systems such as *auctions* were not accepted as potential markets.

(ii) No marks were awarded for stating the type of market.

Few candidates were able to state two market specifications precisely. The majority used very general terms such as a *good amount of butterfat*, rather that *4% butterfat*, when referring to the butterfat specification for market milk.

NB: No marks were awarded to those who stated the market rather than the *market specification*.

(iii) The majority of candidates had a clear definition of an *input* and thus gained the maximum mark in this question, saying, for example, *grain, pasture, nutritional requirements, sperm, replacement stock, fertiliser*.

(iv) Most candidates showed a good knowledge of how an input can be manipulated to affect the market specifications, eg, *Feeding grain supplements to dairy cattle leads to increased butterfat and protein content of milk or placing grower steers in a feedlot for 100–150 days on grain rations improves marbling quality*.

(b) (i) Many candidates did not understand the term *post–production* and, therefore, responded with examples of techniques involved in the *production* cycle.

Those who received maximum marks were able to state clearly the *post–production* technique and either described how it maintained the quality of the product, or described the technique in detail, saying, for example, *Milk is stored in refrigerated containers to reduce spoilage by micro–organisms or Milk is refrigerated to temperatures of 4°C or less after it leaves the cow*.

(ii) The majority of candidates had a good understanding of the term *adding value* and could describe one technique that may be used.

Some poorer responses failed to distinguish between *value–adding* and *normal production* techniques, eg, *drenching, vaccinating*.

Maximum marks were awarded to candidates who were able to state clearly a value–adding technique, describing how it adds value to the product, eg, *the application of a nitrogenous fertiliser increases the protein content of seed wheat or flavouring milk increases its appeal to children whose parents will pay a higher price than for standard milk.*

(c) Few candidates gained maximum marks for this question.

Full marks were awarded to those responses which related the demand for the product to a decision that changed the input in order to alter the nature of the product, eg, *for the Japanese beef market, which has a high demand for marbled meat, the farmer would have to alter the criteria for breed selection in an attempt to supply a product which meets this specification, such as using Murray Grey/Angus genetics which has good marbling qualities.*

It should be noted that, although the majority of candidates answered this question from a *farmer* perspective, it could have been successfully answered from an *industry* perspective. For example, in the Milk Industry, the processor has more scope for changing the nature of the product than the farmer.

Question 2

(a) The majority of candidates correctly identified the main general trend in prices as declining. Lower scoring candidates identified individual commodity trends or identified the trend as causing fluctuating prices.

(b) Most candidates correctly stated two factors contributing to the downward trend in prices received, eg, *over–supply of goods or reduced demand from consumers.*

Lower scoring candidates stated factors that related to individual commodities or accounted for only a short–term trend, eg, *climatic factors or drought.*

(c) This question was poorly answered. Candidates scoring maximum marks were able to outline two ways in which the government may influence commodity prices, eg, *impose tariffs on imports which raises the price of imported products and allows local products to compete*.

The majority identified one method of government intervention but failed to explain how that method affects the trend in prices received, saying, for example, *quotas to restrict supply of product*.

Low scores were awarded to those who failed to identify ways in which the government may influence price trends, eg, *government imports more*.

(d) Most candidates were able to describe clearly the conflict felt by many farmers between short–term profitability and long–term sustainability.

The better candidates linked a reduction in income to the inability of farmers to adopt environmentally sustainable farming practices in the short–term, saying, for example, *It's hard to be green when you're in the red*.

(e) (i) This question was well answered. Most candidates were able to identify the fact that the impact of falling commodity prices would result in *a reduced number of farmers*.

Lower scoring candidates were those who identified the effect on farms but failed to comment on the trend in farm numbers, saying, for example, *farmers will go broke*.

(ii) 1 This question was poorly answered. Poorer scoring candidates talked in general terms rather than identifying specific social implications, saying, for example, *farmers will have to sell the farm.*

Candidates scoring maximum marks outlined several specific implications for farmers of having to sell the farm, eg, *moving to town, seeking off–farm employment and depression.*

2 This question was better answered than the previous part.

Most candidates seemed to have a better understanding of social implications for the wider rural community than for the individual farmer.

The better candidates were able to identify several specific implications, eg, *people moving to cities, closure of shops, fewer amenities and services*.

Question 3

(a) Few candidates were able to give two distinct measures that could be made on pastures, eg, *pasture dry–weight or tissue analysis to determine micronutrient content.*

Many gave measurements which were not on pastures, eg, *soil nutrient analysis, pH*, or simply stated *growth.*

(b) Most candidates understood the question and gave adequate responses which included explaining or describing a feature of good experimental design, eg, *standardisation — all sites receive the same amount of superphosphate*.

Lower scoring responses simply stated the features which were evident, eg, *used a control* but did not describe such features.

Some stated features for experimental design which were not evident in the stimulus material, eg, *randomisation.*

(c) The majority of responses did not adequately describe further work that the experimenter should undertake. These candidates gave generalised lists or limited an experimenter's further work to the analysis of this experiment only, eg, *calculations of standard deviation, mean, or standard error.*

Those who gained maximum marks fully described research work such as *determining specific micronutrient deficiency, repeating this experiment across a wide range of conditions (plant species, seasons, soil types) and even determining economic viability*.

Section II

Question 4 (95% of candidates attempted this question)

(a) (i) The majority of candidates were able to identify two agricultural practices from Figure 2 eg, *increased stocking rates, removal of trees and shrubs.*

A few candidates wrote more in order to give an effect of the practice.

(ii) The better candidates described both relationships shown in Figure 2. Some failed to carry their descriptions through to a general reduction in tree numbers saying, eg, *Increased stocking rates cause damage to saplings, no young trees to replace dying ones, leading to tree decline. OR Increased nutrients' status in soil increases leaf nutrients, increasing population of insects which causes stress, death and decline in tree numbers.*

(b) (i) The better candidates were able to describe a cause and effect relationship, eg, *Trees act as a windbreak to provide shelter for stock to reduce stress and increase productivity.*

Many were confused about the relationship between tree roots and soil structure, stating: *tree roots improve soil structure*.

(c) Most candidates were able to identify burning as a practice used by Aborigines to rejuvenate plant growth. The better candidates linked this to improved hunting opportunities, eg, Aboriginal people burned off areas of land which allowed grasses to regenerate, with fresh green shoots attracting animals to graze.

Few candidates were able to discuss the practice in ecological terms.

(d) (i) Many students failed to connect the agricultural practice with the damage to waterways. The simple answer *Fertilisers*, did not identify the potential damage of the movement in run–off of excess nutrients to waterways which the better responses clearly showed, eg, *Erosion run–off leads to saltation of waterways thereby decreasing water quality*.

(ii) A complete answer needed candidates to qualify each specific practice by stating how it reduces the impact on waterways in both parts of the question. There was a misconception that organic fertilisers and practices would never harm the waterways.

(e) (i) The majority of candidates listed the *forms* in which products are sold or *where* the products are sold, rather than the *ways* in which products are sold. The better responses included *direct selling, sale by classification (CALM) and saleyard auctions.*

(ii) No marks were awarded for naming the farm product studied.

1 Many candidates failed to give a complete marketing process. The better candidates linked the marketing process to their named product rather than giving a generic marketing chain.

2 In the better responses candidates showed the relationship between the role of advertising and promotion of their named product.

Many candidates did not show an understanding of the term role and simply described types of advertising and promotion instead of outlining the impact of a marketing campaign, saying, for example: *Advertising such as 'New fashioned pork' plays a big part in attracting domestic and export markets. It promotes lean, healthy, flavoursome pork which attracts buyers and increases consumption*.

Question 5 (61% of candidates attempted this question)

No marks were awarded for naming the animal production system. A few candidates failed to identify an animal production system correctly.

(a) (i) The majority obtained marks for listing two specific traits that are significant in a breeding program for a particular animal production system, eg, *growth rate, eye muscle, testicle size*. Marks were not awarded for general characteristics such as *genetics* and *health.*

(ii) Most candidates were able to give details of how characteristics are measured. Higher scoring responses named units of measurement, eg, *diameter of wool in microns, litres of milk per cow*.

(iii) This question was not well answered. A large number of candidates were able to identify a change in market specification, such as *lean beef, marbling, low fat milk*, but failed to link this to a change in a breeding program for a specific animal production system, saying, for example, *selective breeding*.

(iv) The greater number of candidates were able to name a specific disease or climatic factor for their chosen system and outline its effects on the animal, eg, *mastitis causes infection in the udder.*

The better responses elaborated by explaining the resulting limitation to production, eg, *lower milk production*.

(v) The majority of candidates listed only two or more ways of minimising the effects of the disease or climatic factor. Most gave a poor outline of how such practices counteract the disease or factor.

The best responses clearly linked the management practices to reduction of the negative effect of the disease or factor, eg, saying, for the climatic factor *temperature — provide water to aid the animal in temperature control and reducing heat stress OR provide windbreaks, shelter to control heat loss in cold conditions.*

(b) This question was well answered by the majority of candidates. To score full marks candidates were required to state a specific breed type, outline a particular environmental problem and explain how the appropriate breeding program can be used to produce animals better adapted to the environment, eg, *cross–bred Brahman cattle for hot climates and tick resistance.*

(c) Most candidates had only limited understanding of the terminology used in the question. They were usually able to state one feature of a ruminant digestive system but failed to link this to FCR or to compare it with that of monogastrics.

The best responses explained two differences between ruminants and monogastrics, saying, for example, *methane production, energy loss, microbial action* and related these to efficiency of feed conversion.

(d) No marks were awarded for naming the plant production system.

(i) Almost all candidates successfully named two soil properties that can limit the production system of a specific plant, eg, *pH, texture, moisture content, nutrient level*.

(ii) In low scoring responses candidates simply stated the effect of one particular soil property on plants, eg, *soil acidity kills plants*.

Higher scoring candidates related the effect of a soil property on plant processes involved with growth and development, eg, *low pH restricts nutrient availability which limits photosynthesis, resulting in reduced growth rate and reproductive processes*.

(iii) Full marks were awarded to those who clearly described how one specific soil property affects an aspect of product quality, eg, *lack of nitrogen will reduce protein content in wheat grain, reducing quality of the product and thus the price paid.*

Question 6 (77% of candidates attempted this question)

(a) (i) 1 In high scoring responses, candidates acknowledged the link between uptake of soil nitrogen by plants and its eventual return to the soil.

2 The better responses identified the fact that soil nitrogen is incorporated into plant material which was then removed from the system therefore less nitrogen is returned to the soil.

3 Higher scoring candidates identified the fact that nitrogen taken into plants from the soil is eaten by animals and either returned to the soil as waste products or left in the system as animal product.

(ii) Most candidates were able to outline briefly two different management strategies that ensured sustainable production in pasture systems, eg:

1 paddock rotation — to reduce overgrazing

2 stubble mulching or green manuring in order to maintain fertility

Poorer candidates simply listed two management practices, eg, *windbreaks and erosion banks.*

(iii) Higher scoring candidates either outlined two appropriate management strategies or described one strategy in detail, eg, *soil tests to determine nitrogen status: measure pasture yields (DM/hs).*

Poorer responses did not quantify or qualify the strategy, saying, for example, *do a soil test.*

(iv) The more capable candidates were able to relate the importance of soil nitrogen to the growth and nutrient requirements of plants and linked this to animal production.

Poorer candidates related the importance of soil nitrogen to plant production but failed to identify a link to animal production.

(v) Many students scored well in this question, relating pH either to the soil micro–organism numbers or the availability of nutrients in either deficient or toxic levels. These candidates successfully linked these to the productivity of the pasture system.

Lower scoring candidates stated: *a reduction in plant growth or productivity occurred.*

(b) (i) The better candidates correctly labelled the *x* axis as *age* (*years*) and the *y* axis as yield (*t/ha*), showing the correct scale and units for each.

Higher scoring candidates realised that the data was continuous and graphed accordingly, drawing a line graph and identifying different plots by using a key or labels.

Lower scoring candidates used inappropriate plotting techniques, eg, column graphs or labelled axis incorrectly.

(ii) Most candidates could identify the fact that irrigation resulted in increased yield of jojoba, with the better candidates also mentioning the accelerated rate of growth of the irrigated crop.

(iii) The higher scoring candidates could identify the fact that the farmer would need to do a *partial budget or a return to capital analysis to determine if it was worthwhile outlaying the capital.*

Average candidates simply stated *Gross Margin analysis and then compare irrigated and dryland production.*

Poorer candidates mentioned only a simple comparison of yields, eg, *look at the graph.*

(iv) The better scoring candidates were able to identify the relationship between deep roots and the maintenance or reduction of the water table, as well as the capacity of a salt–tolerant plant to produce in saline soils.

Poorer candidates simply linked irrigation with the development of soil salinity.

(v) Higher marks were awarded to those candidates who could describe processes such as *decomposition, mineralisation, ammonification, nitrification* and relate them to the release of nutrients from organic matter that could be made available for future uptake by plants.

Poorer candidates simply stated *microbes break down organic matter*, failing to acknowledge processes or the link to future uptake in the recycling process.

Question 7 (80% of candidates attempted this question)

(a) (i) Most candidates were able to identify the question correctly as relating to the pest–host–environment triangle. The better scoring candidates related their answers to the diagram, giving both a factor and an example: *Factor 1 and example = environment, eg, rainfall.*

(ii) The poorer candidates merely listed management techniques, eg, *drenching* but failed to outline how the farmer could manipulate a factor to decrease disease.

(b) (i) The majority of candidates could clearly define IPM.

(ii) A small number of candidates answered this question on a plant production system. Those who did not gain full marks tended to list rather than describe the components of an IPM program or described only one component of their elected IPM program.

(iii) Most candidates were able to identify one problem clearly, although many failed to recognise the fact that the question asked for *problems.*

(c) (i) Almost all candidates were able to interpret the graph correctly and identify the demand line as *b–b.* The single letter *b* was also accepted.

(ii) The majority of candidates scored full marks in this part of the question. Marks were awarded to those who stated: *market price will decrease.*

(d) (i) Most candidates did not answer this part of the question well. They were able to define *return* or *capital* but were not able to relate the comparison of the two without defining profit. Many candidates interpreted *capital* as being *variable costs* rather than *investment.*

(ii) Almost all candidates successfully stated *a decrease in interest rates would result in a decrease in farmers' debt.*

(iii) Full marks were awarded to those who could name and describe a method of financial analysis, relating it to changing management strategies, eg, *Gross Margins (GM) — GMs are calculated by Income–Variable cost. For each enterprise GMs can be used to compare enterprise profitability.*

(e) (i) The majority of candidates obtained maximum marks by listing two factors that contribute to reproductive efficiency.

(ii) Although most candidates were able to list the factors affecting reproductive efficiency, few were able to explain it fully. High scoring candidates described it as follows: *With increased reproductive efficiency more animals are being produced, hence greater profit. It also allows for greater genetic gain, ie better animals.*

(f) (i) The majority of candidates were able to name one hormone involved in regulating the reproductive system.

(ii) Using brief and general statements, most candidates were able to outline the role of their stated hormone in the reproductive system. The better candidates showed complete understanding of the named hormone, eg, *oestrogen is produced in the ovary of the female and is involved in behavioural oestrus (heat) and mammary development.*

Section III Electives

Question 8 Plant Production (12% of candidates attempted this question)

(a) (i) The majority of candidates successfully identified two inputs that affect the photosynthetic process, eg, *carbon dioxide, water or light.*

(ii) Most candidates correctly nominated two management techniques that can be used to manipulate the specific inputs. The better candidates linked the management technique with optimising the rate of photosynthesis, eg, *irrigation to ensure adequate water for photosynthesis.*

(b) (i) Few candidates scored maximum marks, some confused the xylem with the phloem.

(ii) Most candidates outlined how *stomates are responsible for control of transpiration*. The better candidates showed an understanding of the connection between stomatal behaviour and control of transpiration. Some identified other mechanisms of control such as the *waxy cuticle and leaf rolling.*

(c) (i) Most candidates correctly named one plant hormone eg, auxin, some gave the trade name, eg, *Rootex,* of a synthetic hormone.

(ii) Maximum marks were awarded to responses in which the hormone's function was stated and then linked to the way in which it can be used to manipulate plant production, eg, *Ethylene — responsible for post–harvest ripening of fruit to avoid handling damage, thus maximising market value.*

(d) Very few candidates were able to relate plant density to vegetative and reproductive yield. High scoring responses contained a graphical representation of the relationships. Many candidates had some concept of the effect of high density on depression of yield but failed to differentiate clearly between vegetative and reproductive yield and planting density.

(e) Many candidates appeared to have only a superficial understanding of these plant technologies. The majority had some knowledge of basic processes but failed to describe adequately the role of these technologies in producing variation in production systems.

Poorer responses confused variation with the ability of these technologies to produce large quantities of plants.

High scoring candidates clearly outlined steps involved in two specific plant technologies, then identified the fact that genetic variation could be either increased, creating a larger gene pool, or diminished resulting in uniformity in crops for crop production management, depending on the technology discussed.

Question 9 Animal Production (31% of candidates attempted this question)

(a) (i) Almost all candidates identified the initial vaccination at *three weeks* and booster vaccination at *six weeks.*

(ii) The better candidates recognised the dotted line as being t*he minimum level of antibodies required for protection against disease.*

(iii) Few were able to outline accurately the role of antibodies, while many failed to state: *antibodies are antigen–specific.*

(iv) A number of candidates identified a disease and a list of management practices for its control but failed to describe a program, as required by the question.

(v) High scoring candidates outlined at least two advantages and disadvantages specifically related to the nominated control program. Marks were awarded for a list of advantages and disadvantages of IPM.

(b) (i) Although a mark was awarded for old technologies, eg *AI in cattle*, the better quality responses used more recent examples, eg, *multiple ovulation/embryo transfer, gene splicing.*

(ii) Most candidates were able to describe the specific technology in some detail, but failed to show how it was used to increase animal productivity.

(iii) The majority of candidates were able to state two factors that need to be considered, eg, ethical issues and *the farmer's knowledge*. The *cost of technology* was the most commonly stated factor.

(c) High scoring responses recognised the fact that some market–responsive organisations supply farmers with feedback for their products, eg, *Aus Meat, Australian Dairy Corporation.*

High marks were awarded to responses which listed the type of data and explained the ways in which farmers adjusted the management practices.

Many candidates failed to recognise how these decisions can improve efficiency of production. Marks were awarded for responses such as: *Efficient use of resources (such as feed), maximising genetic potential, reduction of unnecessary fat production and a thorough utilisation of feedback information to meet market specifications, improving returns.*

Question 10 Land Management (57% of candidates attempted this question)

(a) (i) The majority were able to identify at least two trends, eg, *an increase in gully and sheet erosion, whilst wind erosion remained constant.*

Those scoring lower marks could identify only one trend.

(ii) Some candidates failed to describe how the practice has contributed to the trend.

Good candidates were able to name one agricultural practice and describe fully how it has contributed to erosion, saying, for example:

Cultivation: excessive cultivation has led to a lack of soil cover and a breakdown in soil aggregate size, enabling soil to be carried away by water more easily, eg, sheet and gully erosion.

(iii) Many candidates failed to give a good explanation of each practice. Many candidates merely listed a practice.

The better candidates were able to outline fully two separate practices and to show how each helps to overcome soil erosion. An example of a good answer is:

Minimal cultivation techniques, such as direct drilling of seeds, reduce the amount of soil disturbed and vegetation removed.

Revegetation — planting of natives which hold the soil together, as well as slow water running across the ground.

(iv) This question was poorly answered.

The better scoring candidates listed three factors that influence farmers' adoption of specific land management strategies or explained two separate factors well, stating, for example:

The cost of implementing strategies, the technology available, government pressure and peer group pressure.

A wide range of possible answers came from environmental, economic and social perspectives.

(b) This question was poorly answered. Many candidates described the role of the organisation rather than the structure of the organisation.

The higher scoring candidates included in their response three levels of organisation including: *Federal funding, State funding and Landcare groups.*

(c) This question was poorly answered by the majority of candidates, who did not respond quite accurately to the question. Many failed to identify the *local area* and confused *land capability with stocking rates.*

A number of candidates showed a poor understanding of land capability assessment. The better responses identified land use in the local area, the suggested land capability classification number and assessment, stated what the number means and indicated whether the land use agreed with the suggested land capability.

Poor scoring candidates stated that local land use was in accordance with suggested land capability, but failed to show any depth of knowledge.

(d) Many candidates failed to explain more than one process fully. The better candidates fully explained three or more processes that led to the particular land degradation problem.

The majority showed a good understanding of strategies and the better candidates described at least three strategies well.

Poorer responses merely listed possible strategies.

Section IV Extended Free Responses

Question 11 (37% of candidates attempted this question)

In general candidates' answers to this question were not good. Part (a) was generally answered better than Part (b).

(a) The better candidates successfully extrapolated important aspects of chemical usage from the label provided. Such candidates described the hazards associated with a number of points from the label and discussed practical scenarios designed to provide farm/farmer safety and safety in the wider community.

These candidates stated: *Correct spray/application methods reduce spray drift or run–off which would therefore minimise the contamination of waterways and hence decrease the risk of sickness or death of farm livestock which accessed the water within the farm environment. In relation to the wider community, the better candidates described the importance of the farmer noting the time of spraying in relation to the withholding period. They also described the risk of consumers becoming affected by chemical residues remaining in the marketable product if the withholding period was not strictly adhered to.*

To receive full marks candidates were expected to provide two such responses for both the farm environment and the wider community. Lower scoring responses described only one or two activities or technologies.

In the average responses, candidates listed data from the label provided but described only the hazards that would occur. They did not provide any information on how the farmer could safeguard against such hazard.

In poorer responses candidates simply listed the information given on the label. Such candidates failed to discuss relevant safety issues or the hazards that might occur with respect to this information.

(b) Many candidates failed to describe a range of techniques that farmers could incorporate into their management programs to ensure safe chemical usage.

The better candidates provided responses which:

(i) described farm chemical usage practices; and

(ii) went on to discuss how these practices reduce potentially harmful effects.

For example, students described: *The type of protective clothing that should be worn and how this clothing protects the operator from poisoning; the importance of having a lockable chemical storage area with cement floor, adequate ventilation, fireproofing and mixing areas with wall surrounds; management strategies which reduce chemical usage (eg IPM, incorporating genetic resistant species, rotational cropping, biological control) and the importance of timing, planning and education.*

In lower scoring responses candidates outlined only one simple management strategy, eg, *do not spray on a windy day*, and did not extend it further to describe how this would provide a reduction in the harmful effects of chemicals.

To gain the full complement of marks, students were expected to describe fully at least three aspects of farm chemical usage that could be incorporated into the management of the farm in order to reduce potential hazards.

Question 12 (18% of candidates attempted this question)

(a) Higher scoring responses outlined five or more major features of a sustainable agricultural system, eg, *maintenance of long–term production, recycling of nutrients, prevention of land degradation, keeping the environment in the same or an improved state and a holistic view of the farm.*

Lower scoring responses only listed features or gave only a general description of sustainability without supplying specific features.

(b) Higher scoring candidates described a minimum of five or more technologies and/or management activities that have been developed to maintain and enhance the sustainability of agricultural systems and the ways in which they contribute to the system's sustainability, eg, *cultivation strategies (such as sod seeding) which maintains soil structure and prevents erosion. IPM, tree planting, crop rotation, drip versus spray irrigation, ley farming, organic farming, grazing management were also frequently mentioned.*

(c) The better candidates identified five or more factors, linking them back to sustainability. Some examples given included: *financial (technology costs), cultural/social attitudes, educational/lack of skills, lack of support agencies, labour availability, short–term productivity.*

Poorer responses identified only one or two factors which would hinder the adoption of sustainable practices.

Question 13 (10% of candidates attempted this question)

The majority of candidates scored well in this question, showing good knowledge of farm practices that contribute to the quantity and quality of a product.

(a) The best candidates related an increase in production and an improvement in quality to an increase in income, saying, for example: *more dairy cows lead to more milk — and therefore, more income and high protein feed leads to increased butterfat and protein percentage and a premium price.*

These candidates then discussed the relationship between the increased costs associated with increased quantity and quality and compared it with anticipated income.

Many students were unable to describe *profitability* in terms of *costs* and *returns.*

(b) Here students were able to describe at least three decisions that farm managers can make and their effect on the product.

Higher scoring responses then linked the decisions not only to the effect on quantity and quality but the costs and income associated with the decision. For example:

Grain feeding of steers during the last 100 days before slaughter would increase marbling and weight of the carcass (quality and quantity). This would result in the income increasing. The cost associated with grain feeding would have to be exceeded by the increased return for the farmer to make a profit.

Poor responses were able only to list and partly describe decisions.

Question 14 (35% of candidates attempted this question)

(a) The majority of candidates scored well here, providing specific examples of the components in a marketing chain for a product they had studied.

The better candidates were able to identify at least four distinct stages in the marketing chain apart from the producer and consumer. These candidates successfully showed how the stages were linked together and also the importance of feedback at relevant points along the marketing chain.

(b) In the better responses candidates identified shifts in market needs and fully discussed at least two recent changes that have occurred in relation to their named product at the post–production stage as a result of these needs. For example, *whole milk processed into Lite White or Shape in order to meet the current market trend for low–fat products.*

Many low scoring candidates were unable to distinguish clearly between pre– and post–production aspects. Although some could identify changes in storage or processing, they failed to link them to the market shift.

(c) Most candidates were able to give examples of how farmers and farmer organisations have changed marketing strategies as a result of changing consumer preferences.

A common response was to discuss advertising strategies such as: *the 'Heart Foundation — Tick of Approval' for Farmer's Best milk and recent advertising about the benefits of lean meat.*

Some candidates linked a current trend in consumer preferences back to the production strategies, eg, *the current trend for lean beef is being met by producers changing their production methods to suit this specification.*

3 UNIT (ADDITIONAL)

Section I

Question 1 Compulsory

(a) The majority of candidates identified a specific area of research, with *cloning* and *genetic engineering* being the most popular choice. Many, however, did not identify an issue related to this research. The better candidates outlined an issue such as the *decrease in the gene pool* or *the risk of genetically engineered products getting into the 'wild' population.*

Some candidates selected their 3 Unit Project as the area of research they had studied.

Poorer candidates just stated an item such as *genetic engineering* without outlining this area of research or identifying an issue related to it.

(b) The majority of candidates were able to construct a table and outline two contrasting arguments. Full marks were given for a minimum of four well described aspects, with at least one opposing argument. Many, however, were unable to produce any contrasting arguments to answer this part.

(c) This section was answered well. The majority of candidates scored the maximum two marks and showed a clear understanding of the researcher's responsibility. Examples included: *animal welfare aspects, honest reporting of all results, correct experimental procedure and obtaining the approval of regulatory bodies before commencing any research.*

Section II

Question 2 Animal Breeding and Reproduction

EITHER

(a) 93 candidates attempted this question.

The better students had an excellent understanding of a wide range of hormones involved in reproduction in both male and female animals and could give 2–3 main points on each, eg, *FSH stimulates ovaries to produce ovules.*

Less able candidates referred to only one or two hormones and wrote in general terms without reference to specific hormones.

Most students referred to *AI, embryo transfer and synchronisation of oestrus*, but many had difficulty in describing the role of the hormone in these processes. There was a tendency to digress into general reproduction processes and genetics rather than hormone–directed responses.

In the better responses candidates gave details of how these processes are performed and the role of the specific hormones in them. Only the best responses were able to link the purpose of these processes in breeding programs and develop an idea of the direction of a breeding program, eg, *improving genetic quality and herd–size in a short time period.*

OR

(b) 102 candidates attempted this question.

(i) In higher scoring responses, candidates named a new reproductive technology, eg, *embryo transfer, EBV* and then gave a detailed description of the technology, linking it to improved productivity.

Low scoring candidates merely named the new technology but failed either to describe it and/or to link it to the improved technology.

(ii) In the better responses, candidates were able to link the new technology named to a range of other technologies used in a farm system, eg, *crossbreeding, EBV*.

In lower scoring answers candidates were unable to link the technology to a farm system or breeding program.

(iii) This part was well answered. The majority of candidates showed a good understanding of the effectiveness of the named technology and its effectiveness in improving the outcomes, eg, *niche markets, domestic export, quality and quantity.*

Question 3 Horticulture

EITHER

(a) Nine candidates attempted this question.

(i) Most candidates were able to give at least two reasons to show why, economically, horticulture is particularly important internationally to Australia. The better candidates were able to use specific information, eg, *reversal of seasons between Southern and Northern Hemispheres, projected income for Australia, job creation in the Agriculture sector.*

(ii) The best candidates were able to give specific examples of variation in product types, production techniques and post–harvest handling, eg, *cut flowers for the Asian market; using lighting to enhance flowering; packaging, storage and transport.*

In poorer responses, candidates made general comments without mentioning any examples.

(iii) This section was not well answered. Few candidates were able to name and assess specific or relevant innovative marketing strategies. The better candidates, however, gave at least two specific examples of innovative marketing strategies, eg, *colourful, relevant, eye–catching packaging; promoting the clean image of the Australian product.*

OR

(b) Six candidates attempted this question.

This question was generally well answered by the small number of candidates. Those who scored the best marks clearly related their answers to a specific horticultural industry. They were able to specify the role of the manager in terms of his/her ability to balance economic viability, environmental sustainability and new markets.

Poorer scoring candidates tended to write in very general terms.

Question 4 Alternative Agricultural Systems

EITHER

(a) 109 candidates attempted this question

(i) The better candidates were able to name and describe general economic and management factors that a potential investor should consider to ensure viability of an enterprise. Some of the economic factors included: *start–up costs; access to capital; interest rates; long–term versus short–term profitability; supply/demand in market size.*

Poorer candidates misunderstood the meaning of the term *economic factors*, provided irrelevant information and used the term *niche markets* without understanding its meaning.

The better candidates described and discussed management factors such as: *the possession of skills; knowledge of disease; nutrition and other husbandry factors as well as provision of adequate yards, fencing and water.*

Poorer candidates failed to identify such factors.

Evaluation of a particular enterprise was often confused with the economic and management factors in the first part of the question, resulting in repetition in the answer.

A large number of candidates answered the section on existing viability in considerable detail, but provided very little information on the potential of the enterprise.

The better candidates gave examples which were well qualified such as: *lack of certified ostrich abattoirs is a limiting factor in the development of the ostrich meat industry.*

Poor responses were unqualified, stating, for example: *alpacas have great potential.*

OR

(b) 31 candidates attempted this question.

(i) Most candidates responded by discussing an alternative agricultural system but failed to explain that changes/innovations would occur to the existing enterprise.

The better candidates described several factors relating to the biology of the specific plant/animal that would need to be considered by the manager during the production cycle. Poorer responses described aspects of the enterprise in great detail but did not relate such aspects to the biology of the plant or animal involved and its environmental needs.

Most students were able to identify environmental constraints in general terms. The better candidates illustrated their answers by using precise management strategies in discussing the environmental needs of the plant or animal involved, eg, *In free range egg production mobile nesting coops are used to limit pasture–damage caused by the birds' habit of feeding close to the nesting coop.*

(ii) The term *evaluating the future* was poorly understood and candidates did not know how to show the value of a process, activity or trend in relation to production, marketing and research.

Poorer responses simply stated the *future looks promising* or *the export market is growing* and did not make any evaluative statement in terms of trends over a period of time or increased productivity over such time, etc. Candidates showed a poor understanding of the value and need for research in further developing the specific innovative enterprise.

Question 5 Technological Perspectives in Agriculture

EITHER

(a) Six candidates attempted this question.

Most candidates provided poor answers here.

(i) The majority of candidates did not separate issues in production and marketing processes in relation to computer technology. Such candidates were unable to use clear examples of computer–use in the processes of *production* and *marketing.* To score full marks they needed to give two examples for each of production and marketing, eg, *CALM, SIROTAC.*

(ii) The better candidates were able to assess the impact of computer technology on farm management practices, stating, for example, *more efficient record–keeping, use of the Internet to aid marketing information. Poorer responses failed to assess this impact.*

OR

(b) Two candidates attempted this question.

(i) Here candidates were required to name and describe factors such as *farmer expertise* in relation to the implementation of new technologies.

(ii) This part was not answered well since candidates simply listed management practices, eg, *minimum tillage*, but did not describe such practices.

(iii) This part was answered well, with full marks being awarded to those who gave a complete description of quantitative, qualitative and/or economic techniques.

Question 6 Pasture Production

EITHER

(a) 124 candidates attempted this question.

(i) This part of the question was generally well answered since the majority of candidates were able to list at least six factors that should be considered in establishing a pasture for grazing animals.

Higher scoring responses included a brief discussion of why the named factor might be considered to be important to pasture establishment. Some of the most commonly listed factors included *palatability, digestibility, resistance to disease, plant mix (60% grass, 40% legume), ability to fill feed gap, soil properties and topography.*

Lower scoring candidates failed to expand on why the factors mentioned were important in the establishment of a pasture.

(ii) The majority of candidates did not correctly interpret the key word quality and proceeded to describe strategies available to ensure the ongoing productivity and quality of the pasture for animal grazing. Most candidates were able to discuss at least four strategies involved in managing a pasture such as type of grazing (strip, cell, rotational) then proceeded to explain why they were a useful strategy. Other strategies included were fertiliser application, irrigation, pasture phase, weed and disease control.

The best candidates were able to discuss and justify each strategy, relating the management practices to the establishment and ongoing productivity and quality of the pasture.

Lower scoring responses were able only to list those strategies without discussing any further relationships between the strategies available to ensure the ongoing productivity and quality of the pasture for animal grazing.

OR

(b) 16 candidates attempted this question.

(i) Most candidates were able to describe in very general terms the basic characteristics of a pasture for grazing animals. In the majority of cases students could support such characteristics with specific examples. Many were unable to describe biological characteristics of a plant and show the link between these characteristics and the example's suitability as a pasture plant. For example:

Phalaris is a suitable pasture species because it cannot be pulled out of the ground by grazing animals due to the plant's extensive root system.

(ii) All of the candidates were able to list a range of pasture management techniques. Unfortunately, the majority failed to link the impact of the introduced species on pasture management techniques. Typical responses included: *fertiliser application, irrigation, because of soil problems.*

Higher scoring candidates successfully linked the components of the question, with points that included:

Regular application of superphosphate fertiliser to overcome Australia's phosphate–deficient soils is particularly important for legumes.

There is a need for irrigation to allow introduced species to survive the harsh Australian conditions.

In addition, such candidates were able to assess the relationship between native plants and introduced species and their requirements for water.

Question 7 Coping with Climate

EITHER

(a) 16 candidates attempted this question.

This question was well answered. Most candidates had a broad knowledge of a range of strategies to overcome climatic hazards.

The best responses included very good descriptions and detailed evaluations. Some students showed a deep understanding of the influence of climate on agriculture and the strategies used by farmers to reduce its effects. Suggested strategies included: *fodder conservation, diversification of enterprises, water supply, off–farm investment, insurance and the use of forecasts.*

Most candidates simply described *floods* and *droughts* as examples of climatic hazards, while a number simply padded out their essays with superfluous information and repetition.

The better responses were well structured and contained clear and concise information.

OR

(b) Eight candidates answered this question.

The many poor answers indicated that candidates did not have a good understanding of the relationships between weather, global cycles and agricultural production.

(i) Many showed a poor understanding of the relationship between timing of operations and aspects of weather. The better responses included a range of weather components, eg *rainfall, temperature, wind and frost and cited specific examples of farming operations.*

(ii) Many candidates had a reasonable understanding of global cycles but few could relate these well to long–term strategies.

Question 8 Agribusiness

EITHER

(a) Two candidates attempted this question.

(i) Candidates were required to identify and describe at least three international forces which have a direct impact or influence on farm business management, as well as three domestic forces which influence farm management.

For example: *Beef Production — Mad Cow disease in the UK has led to 60% drop in the Japanese supermarket beef trade. This has caused an 80% drop in Japanese contracts for Australian Beef. As a result Australian producers have swung to the European market and are trying to satisfy EC market specifications.*

(ii) Both candidates identified and discussed the role of at least three farm advisory services.

For example: *A Planning and Financial Consultant is able to develop a whole farm long term plan and associated budget aimed at long term economic and environmental sustainability.*

OR

(b) 18 candidates attempted this question.

The majority of candidates answered this question well. Almost all could identify a product that could be value–added.

(i) Candidates clearly identified on–farm and off–farm value adding. Those receiving full marks could outline three on–farm and three off–farm methods of value–adding. For example: *in beef, on–farm value–adding includes grain feeding, breed selection and handling practices, while off–farm value–adding includes cut selection, advertising/promotion and packaging. Lower scoring responses outlined fewer on–farm and off–farm value–adding methods.*

(ii) The majority of candidates could name and describe a series of alternative selling systems for their named products. Higher scoring candidates could describe at least three such systems and then clearly evaluated them. For example: *In beef, cattle taken to saleyards for public auction. This exposes cattle to a cross–section of buyers where optimum prices could be gained on the day for quality cattle. However, cost of transport, the risk of disease infection and the need to sell the cattle, no matter what the price, could be drawbacks.*

Poorer responses could name only one selling system and were unable to evaluate it effectively.

Question 9

EITHER

(a) 95 candidates attempted this question.

(i) Most candidates were able to list factors involved in developing a whole–farm plan, such as *farmer's goals, topography, non–productive areas, etc.* The better scoring candidates discussed these factors fully.

(ii) Candidates scoring well in this section discussed factors that related directly to the rate of implementation of a whole–farm plan and included indicators of the rate of implementation.

(iii) Many candidates identified the role of whole–farm planning in enhancing the sustainability of the farm ecosystem. The better scoring candidates, however, expanded their answers to include other areas of sustainability, eg, *social, community and financial*. Few candidates showed ability to form a sound evolution.

OR

(b) Nine candidates attempted this question.

(i) The higher scoring candidates identified several off–farm agencies, ie, *Landcare, CALM, consultants, etc.* These candidates were able to outline thoroughly the role of these agencies, including specialised techniques, such as *financial planning, satellite imaging*. The more successful students assessed the role of off–farm agencies, giving both achieved outcomes for implementation and the planning of whole–farm plans. The poorer answers gave limited examples of agencies and tended to outline the function of the agency rather than providing an assessment of the implementation of whole–farm plans.

(ii) Most candidates were able to outline improvements in interactions between the farm and the wider ecosystem. The better candidates, however, included a wide range of interactions involving the rural community. Examples included *employment, community empowerment, social interaction and responsibility and community cash flow*. Candidates could give a brief outline of the role of whole–farm plans but had difficulty in presenting a thorough analysis of its role.

3 Unit Research Project

The projects continue to explore an exciting range of agricultural problems and issues. The increasing mix of quantitative experimental projects and more qualitative surveys, interviews and comparative case studies has been pleasing and reflects the diversity of agriculture.

A General Comments

1 Secondhand Data

The use of secondhand data is becoming an issue in a small but significant number of projects. The following are legitimate uses of data generated by other people.

(a) Use of market information from saleyards, Land Newspaper, stock and station agents etc.

(b) Use of data from sources such as breed societies, feedlots, studs etc, which can be re–sorted or correlated with other data (eg weather) to develop an answer to an issue or problem.

(c) Where a student's trial is destroyed (eg, flood, stock entry, crops) data from another source or made–up data can be used to show the student's ability to analyse and use data.

On the other hand, the use of secondhand data as described in the following examples represent illegitimate use of data. Unfortunately a number of such examples occurred in this year's research projects.

(a) Using the data (and method) from a trial already done by a research worker at places like the local research station. In such cases the student(s) had no input into experimental design, or in developing the skills associated with data collection and analysis. For example, in a project situation where the following is stated: … *the experiment was done in 1995 and 1996 so I will analyse the data and make conclusions from there* … or, in some cases, not even acknowledging that someone else did it; this fact, however, becomes obvious as the project develops.

(b) Simply observing another researcher doing an experiment, describing his/her method and analysing his/her data is also not appropriate. If the student selects a subset of animals, for example, from a large trial and collects and records the data and reports this, this is reasonably acceptable.

2 Agriculture Related Projects

A small but significant number of projects were vaguely related, or, in some cases, not related at all to agriculture. Projects should have an agricultural purpose, that is, be rooted in an agricultural problem or issue. Environmental projects on land reclamation from mining, many mice/rat orientated trials and some laboratory activities are better described as being geography or biology projects. In some cases they resembled reworked studies from such subjects.

3 General Setting Out and Presentation

Many projects still included large amounts of raw data in the body of the project, rather than in the appendices.

Where projects are word processed (the majority), the failure to use a spell checker detracts from the project.

4 Referencing

Many research projects still give no citations in the body of the report, then put a bibliography at the end. This is not the format for research reports. Any material or information from a source should be cited in the report, generally by name and date (eg, Smith(1994)) and then fully described in an alphabetical reference list at the end of the report.

5 Linking Sections of the Project

The better projects continually link the component parts throughout the project. Conclusions refer back to the research question, the literature review and the methodology; the methodology is linked to the literature review and critical analysis of each part in the light of subsequent parts occurs regularly. Average projects tend to handle each part of the project adequately but do not link the parts.

6 Acknowledgments

Over 20% of projects still acknowledge people by name, name companies or identify towns. It is important to acknowledge work or input done by others; the project should, however, not be potentially identifiable by school through inappropriate acknowledgments.

B Comment on Specific Sections

1 Synopsis

The better projects included a well constructed synopsis. A good synopsis should outline the research questions, what was done, what was found out and the implications in about 280–30 words, ie, the synopsis should conceptualise the whole project. In too many reports the synopsis is a general introduction only or it says what was done and most commonly omits the outcomes of the project. This may reflect the fact that students write the synopsis early in the project, whereas it should be the last component written.

2 Literature Review

It is obvious that many students write their literature review early and then generate their reference list. In later sections, however, they use other references and fail to add them to the reference list. They also fail to make links between the literature review and other sections, particularly the methods component.

Many literature reviews discuss key words rather than the research question, eg, the project might be investigating the effect of *urea on grazing oats at various application levels*. The literature review then examines: *urea, grazing and oats* as separate parts.

A further common problem in this section is the essay style of literature review — this type covers everything about a topic area like a project but does not address the specific research question.

Some literature reviews are still presented as a series of readings or as dot points in the form of an annotated bibliography. This provides information and should be the first step a student takes in collecting his/her reference material. It is **not** a literature review, however.

3 Methods

The good understanding students showed of scientific methods and experimental design was commendable.

Where students engaged in more qualitative survey, interview or comparative case study research, the methodology was not always appropriate. Surveys, for example, need to be focused on the research question, they need piloting to explore the validity of the questions, while correlations between factors (question) within a survey can be explored statistically. It is important that the methodology follows valid and acceptable steps as does the experimental scientific methodology. Of significance however, is the fact that some of the best reports presented described survey/qualitative research.

4 Results and Analysis

Statistical analysis of results continues to show improvement and increased sophistication in both research and presentation. Some problems still occur, in particular:

(i) several potentially high scoring reports appeared to have carried out no statistical analysis;

(ii) situations in which students used the statistics done principally by others but failed to explain: *why such people were doing the statistics, why those were the most appropriate statistics and what the statistics mean.*

Graphs still cause some problems, the main ones being:

(i) incorrect units (eg, giving *kg* or no *g*);

(ii) placing the independent and dependent variable on the wrong axes;

(iii) placing different treatments on separate graphs rather than on a single graph so that a visual comparison can be made.

5 Discussion/Conclusion

Whilst many students do this section quite well, this is the section that often decides whether a report is a good or average report. Common problems include:

(i) a mere statement of the obvious in two to three lines — much like a simple Science practical report;

(ii) the conclusions contradict the results, particularly where such results were unexpected;

(iii) the conclusion makes no reference back to the research question, literature review or the results.