



2003 Agricultural and Horticultural Studies GA 3: Written examination

GENERAL COMMENTS

Areas of strength and weakness

In preparing students for the examination, teachers need to revise the key knowledge and key skill content in the study design and the specific examination assessment criteria used to set the examination, and apply these to a range of land and plant management situations that may be found in agricultural and horticultural enterprises throughout Victoria.

Students demonstrated a general understanding of **soil, plant, and whole enterprise management practices**; however, knowledge of specific examples of these varies greatly. The application of this general knowledge to a broader range of specific situations needs to be strengthened.

The understanding of environmental **degradation types and rectification techniques** is limited. Students should be introduced to the broad range of possible environmental degradation types and the full process of treating these in both the short term and long term. When asked to suggest a solution to an environmental degradation type, students generally give one treatment rather than a process that combines a number of treatments.

More specific knowledge is required for a range of common **pests and diseases**. The difference between prevention and control is poorly understood and the concepts underlying Integrated Pest Management (IPM) need to be emphasised.

The ability to analyse agricultural and horticultural management problems using basic **sustainability** concepts is an area where improvement is required. In preparing students for this, emphasis needs to be placed upon skills of analysing a situation by collecting and interpreting **environmental indicators** that can be used to guide management techniques to achieve or maintain sustainability. Students should know what aspects enterprise managers need to monitor in order to maintain financial, biophysical and social sustainability.

Students gave little evidence that they are being exposed to the future of farming and horticulture. The ability to analyse and discuss real topical issues should be developed further through school-based activities that introduce students to a broad range of **mechanisation and recent technological developments** associated with Agriculture and Horticulture. Activities that evaluate and discuss a broad variety of articles in popular farming and horticultural journals and magazines would help develop this, as would reviewing one enterprise type for the full range of potential technological developments likely to influence it in the future.

Most students used their school-based enterprise experience to explain the activities involved in a specific enterprise. They listed the processes involved with planning and running of their enterprise. Aspects of marketing, production and financial planning were often all mixed in together. It would help if students learnt to clearly define the separate components of a **business plan**, and could relate from their enterprise to a full size commercial enterprise. This would ensure, among other things, that they have a realistic understanding of the **mechanisation** required for commercial production.

Choice of option

Students could choose between a range of different areas of Agriculture and Horticulture by selecting from provided lists of alternatives in Questions 1 and 4. Students handled the selection process well. In both questions a diverse range of options were chosen.

Marking policies

Marks were allocated to specific elements of the correct answer or according to descriptive criteria. Marks were not deducted if students provided answers that were not correct.

Where lists or alternatives were provided assessors had general guides for the answers as well as specific answers to the alternatives. The specific answers were provided to the assessors for their guidance in judging the accuracy of student's responses. They often contained more information than was expected of the students.

SPECIFIC INFORMATION

All the examination criteria were used to set the examination. The nature of the questions in the paper enables some questions to address several criteria. Allocation of marks to student answers was determined by comparing them with the marking scheme.

The following should be read in conjunction with the 2003 examination. The answers to each question, and any marking guidelines, are shown. These are followed by comments about the students' responses.

Question 1

Answers for 1a to 1d are in Table 1.

a

Marks	0	1	Average
%	28	72	0.72

One mark given for any specific type of agricultural or horticultural enterprise most affected by the pest or disease chosen in Table one. General 'plant' or 'animal' statements were not accepted.

b

Marks	0	1	2	3	Average
%	31	27	28	14	1.24

One mark for a brief one-item explanation; 2 marks given if it was clear that the student knew what the pest/disease does, and 3 marks for a detailed explanation, including link to loss of production. The information provided in the table below for Question 1b is in some cases more extensive than would be expected in a student response.

c

Marks	0	1	Average
%	73	27	0.27

One mark for any valid method of prevention listed. Actions that isolate the plant/animal from potential affected ones were not acceptable.

d

Marks	0	1	Average
%	58	42	0.42

One mark given for any valid method of control provided. Eradication activities were not acceptable.

Table 1 – answers to Question 1

Pest/disease	<i>General comments</i>
a. Enterprise/s effected.	<i>Chosen enterprise.</i>
b. What the disease/pest does to the plant or animal to reduce production quality or quantity.	<i>Causes loss of production, loss of quality of plant, destruction of tissue in plant thus loss of production.</i>
c. Prevention, besides quarantine.	<ul style="list-style-type: none"> • <i>for many diseases this is achieved by altering environmental conditions eg. changing from overhead watering to drip</i> • <i>growing resistant plant/animals</i> • <i>use of pharmaceuticals that develop resistance to infections</i> • <i>use of chemicals that provide a barrier to infection.</i>
d. Control, besides eradication.	<p><i>Main methods of control, besides eradication, come under the following headings</i></p> <ul style="list-style-type: none"> • <i>vaccination</i> • <i>chemical control – fungicide, herbicide, drenches, disinfectants, antibiotics</i> • <i>biological control</i> • <i>genetic control</i> • <i>management control</i> • <i>integrated pest management.</i>
Aphids	
a	Ornamentals such as roses, oaks, prunus. Affects new growth of many plants.
b	<p>Initially affect growing tips and underside of leaves. Cause wilting, reduced vigour, secondary diseases and sooty mould. Suck the sap. Plant quality drops.</p> <p>Aphids feed by inserting their beaks into stems, leaves, or roots, and sucking the plant juices. Usually they gather in large colonies.</p> <p>The life cycle of aphids is complex and varies in different species. In a typical life cycle, several generations of wingless females, which reproduce asexually (parthenogenesis) and bear live offspring, are followed by a generation of winged females, which bears a sexually reproducing, egg-laying generation of males and females. Mating usually occurs in autumn, and the eggs are laid in crevices of the twigs of the host plant; the first</p>

	<p>generation of wingless females hatches in spring. Different host plants and different parts of the plant may be used at different stages of the life cycle.</p> <p>Some aphids (e.g. the woolly apple aphid) secrete long strands of waxy material from wax glands, forming a conspicuous woolly coating for their colonies. Gall-making aphids live in <u>galls</u>, or swellings of plant tissue, formed by the plant as a reaction to substances secreted by the insects; galls of different aphid species are easily identified (e.g., the cockscomb gall of elm leaves). One group of aphids lives only on conifers (e.g. the eastern spruce gall aphid).</p>
c	Encourage Natural predators such as ladybirds. Control ants (help spread).
d	Use predators or spray with a systemic chemical, i.e. Folimate. Insecticide sprays, garlic spray, water blast.
Black spot	
a	Roses
b	Occurs on both sides of leaf. Dark coloured spots with fringed borders. Causes premature defoliation. Difficult to sell roses with black spots on leaves. Usually more serious in wet or humid conditions. Quality of product suffers.
c	Preventative spray with fungicide, maintain air movement. Spray with Mancozeb, lime sulphur, or Bordeaux. On roses use rose gun or Black Spot insect killer.
d	Spray with a fungicide when leaves are present.
Botflies	
a	Horses
b	Puts horse off its feed. The larvae damage the horse by interfering with the passage of food, causing stomach lesions that can become a site of secondary infection and by causing restlessness when the larvae are in the rectum prior to passage. Horses with large numbers of bots become run down and inactive.
c	Remove eggs.
d	Drench. Control of horse bot flies is directed at the larvae in the stomach during the winter by using oral doses of an approved boticide.
Cabbage moth	
a	Vegetables, i.e. cabbages, broccoli, brussel sprouts, cauliflowers and ornamentals, i.e. stocks, wallflowers.
b	Larvae cause damage to outer leaves. Caterpillars eat leaves. Quality of product suffers.
c	Don't monoculture, companion plants.
d	Insecticide Hand remove, introduce parasitic wasp, Spray with Dipal (bacteria) or Chemical.
Coccidiosis	
a	Poultry
b	<p>Birds off their food. In poultry caused by protozoan that enters during feeding. Parasite multiplies in intestine and burrows into the wall of intestine and caeca. Animals don't eat and have dirty ruffled feathers. Loss of production and quality.</p> <p>The clinical effects are aggravated by concurrent worm infestations. Signs are scouring with watery faeces that may contain blood, lack of appetite, and dehydration, with anaemia and ill thrift in some cases. Consider a faecal worm test to differentiate from worms and fluke and consult a veterinarian for treatment and management advice.</p>
c	Hygiene
d	Coccidiostat in feed.
Crown gall	
a.	Fruit trees. Stone fruits, roses, pomefruits, grapes.
b	<p>Roughened lumps mainly on roots and base of trunk, wilting and stunting. Affects food and water supply.</p> <p>Characterised by the formation of galls on the roots or stems usually at or below ground level. Despite its name (the crown is the head of foliage), the tumorous growths usually occur on the stem below ground level.</p>
c	Anti bacterial dip on propagation material, selected resistant rootstocks.
d	Treat with Isolate.
Hydatids	
a	Sheep, dog breeders or handlers.
b	Form cysts in its host. Animal unwell. This worm is spread from dog to dog only via an intermediate host – usually sheep, wallabies or kangaroos. The sheep eat the worm eggs from pasture contaminated with dog faeces, which hatch inside them, forming cysts. These cysts are usually in the offal (particularly the liver and lung), and if they are then eaten by a dog, the life cycle is complete. Hydatid disease in humans is seen as large cysts in various organs, particularly affecting the liver.
c	Hygiene

	Humans become infected by ingesting the eggs from the dog faeces, and take the place in the life cycle of the sheep, wallaby or kangaroo. Again, basic hygiene, such as washing hands with soap after gardening or touching the dog and washing vegetables that may have been contaminated by dog faeces, is important in prevention of this disease. Also, not allowing your dog access to raw offal from infected sheep or kangaroos will prevent the life cycle continuing. Treating dogs with a deworming tablet that contains praziquantel (a deworming preparation specifically for tapeworm) every six weeks in rotation with a broad spectrum deworming preparation will break the life cycle of the parasite and the disease in dogs will be prevented. In 1999, of the 27 cases of hydatid disease diagnosed nationally in humans, 17 were from Victoria.
d.	Remove cyst.
Itch mite	
a	Sheep
b	<p>Irritates the animal, rubbing reduces the value of the fleece. Itch mite is a small mite found on sheep in Australia. It is of minor importance as a cause of economic loss. Although not common, when it does occur, itch mite frequently causes fleece derangement. Itch mite causes irritation, leading to self-trauma and damage to and loss of wool, due to rubbing and biting.</p> <p>Although the itch mite does not burrow and typically lives on the surface of the skin, it is not unusual for it to be found beneath the superficial layers of the epidermis.</p> <p>Diagnosis of itch mite infestation is made by the presence of clinical signs in the absence of keds and lice. Skin scrapings are often necessary to reach a definitive diagnosis.</p> <p>Itch mite is transmitted from animal to animal by close contact, although mites can survive off the host for 2–3 days. They are slow to spread over the animal and light infestations tend to have a patchy distribution, whereas heavy infestations will be all over the animal’s body, especially along the backline. There is no correlation between the size of the mite population and the amount of wool damage. Itch mite tends to be a problem mostly in the fine-woolled breeds.</p>
c	Minimise time in shearing shed and yards – spread by close contact.
d	Lime sulphur dip.
Liver flukes	
a	Sheep
b	<p>Flukes invade sheep, sheep become weak.</p> <p>Liver fluke is more common in dry times when sheep graze wet fluke-prone areas such as wet gullies and creek beds. Chronic fluke results in anaemia and illthrift. Severely affected sheep can develop bottle jaw and die suddenly. It can be confused with barber’s pole worm. If in doubt consult a vet or submit faeces for a worm and fluke egg count.</p>
c	Keep sheep away from wet fluke prone areas.
d	Drench affected sheep should be treated with Fasinex®, which will remove both mature and immature fluke.
Powdery mildew	
a	<p>Cucurbits, i.e. rock melon</p> <p>Cereal crops.</p> <p>Fruit trees.</p>
b	Circular white powdery spots on older leaves and main stem. Coats the plant in a powdery layer of fungus. Fungus that spreads a white or ash grey film over the upper and lower surfaces of leaves, usually older leaves. Destroys tissue.
c	<p>Ventilation, air movement.</p> <p>Select resistant plant species.</p>
d	Fungicides. Rogue out, spray with a fungicide, i.e. Benlate.
Ringworm	
a	Sheep, Goats, Cattle, Horses.
b	Ringworm gets its name because it produces an irritating red circular rash on the skin of its host. It makes the animal unhealthy. Ringworm is a generic term used to describe a number of fungal skin infections in animals and humans. This range of fungal diseases is spread to people by contact with the fungal organisms. However, it is not necessary to have direct contact with an infected animal, as the fungal spores can live for months on bedding, brushes, leads etc.
c	<p>Hygiene</p> <p>Prevention of infection can be achieved by careful handling of any animals with skin lesions, and good personal hygiene. It should also be remembered that infected people may spread ringworm to their animals.</p>
d	Fungicide treatment from vet or medical practitioner, e.g. Canestan.
Stem and root rots	
a	Vegetables, roses and seedlings.
b	Affects all above ground parts of plant – covered with mycelium (white) or phytophthora causes yellowing and die

	back. Poor growth leading to death if unchecked.
c	Crop rotation, space plants to reduce humidity, improve drainage.
d	Steam treat media, spray with a fungicide, e.g. Benlate.

e

Marks	0	1	2	3	Average
%	47	29	14	10	0.87

Two marks for monitoring of indicators that predict pest or disease likelihood.

One mark, up to a maximum of 3, for any of the following:

- only take action when necessary
- reduce the number of chemicals and frequency of application to reduce the possibility of resistance being developed
- preference for 'natural' biological controls
- weigh up cost/environmental considerations
- full knowledge of the pest/disease.

Most answers were too general. Specific knowledge about common pests and diseases is required. The difference between prevention and control is poorly understood. The concepts underlying Integrated Pest Management (IPM) need to be emphasised.

Question 2

a

Marks	0	1	2	3	4	5	Average
%	1	3	8	23	34	31	3.78

One mark for each item listed, up to 5:

- use of area
- desired effect
- ease of maintenance
- cost
- plant size and growth habit
- rainfall
- temperature (seasonality)
- amount of sun or shade
- pH
- soil bulk density
- soil structure
- soil fertility
- soil organic matter
- wind
- availability of irrigation
- presence of pests or disease.

b

Marks	0	1	2	3	4	5	6	7	8	Average
%	7	7	9	13	18	15	18	6	7	4.15

For a basic listing of the way the tree will influence the environment, 1 mark was awarded. If the impact was also described 2 marks were given for each.

- shading of other plants, create a micro climate effect
- host wildlife – both positive, i.e. birds (control pests) and negative (damage to plants)
- add nutrients/organic matter to soil via leaf fall
- smoother plants at leaf fall
- competes for moisture and nutrients from soil, affecting surrounding plant growth
- reduce frost damage to plants below it
- act as a windbreak and reduce wind damage and evaporation of moisture.

ci

Marks	0	1	2	3	Average
%	25	48	19	8	1.09

One mark up to 3 for each aspect of the description of what John should do to solve the soil compaction problem.

- the compaction below the clay-loam topsoil needs to be broken. The compaction can be deep ripped
- organic matter or gypsum in appropriate amounts should be added to assist in the formation of larger stable soil aggregates. The larger aggregates will reduce the reformation of the clay pan when the soil is wet
- the area should be mulched to encourage worm activity
- traffic over the area should be reduced.

cii

Marks	0	1	2	3	Average
%	42	42	13	3	0.77

One mark up to 3 for each aspect of the description of what could be done about the weed seeds in the topsoil.

- encourage germination by tillage and watering. Wait until there is reasonable weed seed germination. Spray with glyphosate, cultivate to kill germinated seeds
- the second method involves preventing the weed seeds from germinating. Use a weed mat or a physical barrier, such as a heavy mulch to prevent the emergence of the weeds, do not cultivate
- remove topsoil and replace with weed free soil.

d

Marks	0	1	2	3	Average
%	27	36	31	6	1.14

One mark up to 3 for each reason for recommending the best organic solution to help solve the soil problem.

The organisation suggested must be justified by students explaining that the organisation has expertise because:

- they have research/knowledge
- sell the necessary range of products
- advise or teach in the soil related areas
- awareness of bias that may come in if the organisation sells or distributes a limited range of products or have a limited view
- the range/extent of experience of the organisation
- relative cost of the service.

e

Marks	0	1	2	Average
%	48	32	20	0.72

One mark for a listed item, 2 for a description that shows understanding of how the garden could be made environmentally sustainable.

- use indigenous species
- don't introduce weed species
- reduce the soil problems
- use recycling
- compost and return organic matter to soil
- choose plants that don't have a high water demand
- use appropriate irrigation methods.

Parts 2a and 2b were well answered. In part 2c students responded by only giving part of the total treatment required to solve each problem. Students need to be aware that sustainable solutions to environmental problems usually involve the combination of a number treatments, or aspects of management. Selection of appropriate organisations to help in given situations, part 2d, needs more thought by students. Many students used 'Landcare' as their example for this question yet the case is set in an urban environment.

Question 3

a

Marks	0	1	2	3	Average
%	53	23	11	13	0.85

One mark for listing a benefit of growing a legume crop in rotation with wheat. Two marks for students who could explain the benefit but with little detail. Three marks for detailed explanation of the benefit.

- legume crops provide considerable amounts of nitrogen to the following crop, reducing the amount of nitrogen fertiliser required for achieving the crop's potential yield. This is achieved because legumes have nitrogen-fixing bacteria (Rhizobia) on their roots. Thus reduces pollution risks and costs
- wheat diseases and weed grasses will be less of a problem in the following crop after growing legumes for a year due to them not being a cereal.

b

Marks	0	1	2	3	Average
%	24	44	24	8	1.16

One mark for listing a benefit turning the wheat stubble into the soil. Two marks for students who can explain the benefit, but with little detail. Three marks for a detailed explanation of the benefit:

- it increases the organic content of the soil which improves the soil structure (by making larger stable soil aggregates)
- most of the available nitrogen is held in the organic content in the soil
- water holding capacity of the soil is increased with more organic matter
- higher moisture levels and greater nitrogen levels will mean increased soil microbial activity and higher wheat yields

- whilst stubble is present erosion is prevented.

ci

Marks	0	1	2	Average
%	58	32	10	0.52

One mark for a partial understanding of minimum tillage. Two marks if response indicates a full understanding. Minimum tillage cropping is a conservation farming system, which may encompass reduced tillage, direct drilling and zero tillage. It minimises soil disturbance and retains crop residues when sowing.

cii

Marks	0	1	2	3	Average
%	56	24	14	6	0.69

One mark for a very brief comment on the benefits of minimum tillage. Two marks for a slightly more detailed answer. Three for a response showing greater depth of understanding.

Soil degradation is prevented by protecting soil with plant residues and improved soil structure by retaining organic matter and promoting growth of soil organisms from minimal soil disturbance. Improving the soil condition increases the production potential of farming land in the short term (within five years) and ensures sustainability for the long term. Because it reduces disturbance to seed banks, weed growth should be less of a problem.

di

Marks	0	1	2	3	Average
%	35	15	14	36	1.50

One mark each for stating what NPK means:

Nitrogen, Phosphorus, Potassium

dii

Marks	0	1	2	Average
%	61	25	14	0.52

One mark for a partial/vague explanation, 2 for a full explanation of which fertiliser should be used.

The better pasture fertiliser would be the one richer in nitrogen.

Nitrogen is important for vegetative growth, which is what is required for pasture growth (akin to supplying nitrogenous fertilizers for lawns).

ei

Marks	0	1	2	3	Average
%	50	20	19	11	0.91

One mark for each correct part of the answer, up to 3 for answering the most likely soil degradation problem, the cause and how the problem could be monitored.

If the problem recognition is wrong then a mark can still be given for the monitoring if it is appropriate to the problem the student has nominated.

Soil acidification can be the result of too much nitrogen-based fertilisers (in excess of plant requirements) being added to the soil. The environmental indicator pH is monitored. Excess rainfall washes the nitrogen down into the soil where it is converted into nitrate by the action of soil microorganisms. If plant roots do not take up the nitrate ions, it leaches down below the root zone, contributing to acidification. Saline builds up in soil (not salinity).

eii

Marks	0	1	2	3	Average
%	53	22	16	9	0.79

One mark for each correct part of the answer, up to 3 for providing the most likely water degradation problem, the macro-nutrient causing the problem and how it can be monitored.

If the problem recognition is wrong then a mark can still be given for the monitoring if it is appropriate to the problem the student has nominated.

Phosphorus from 'Super' is responsible. Super phosphate runoff into streams can cause algal blooms. Also the nitrogen can leach into these areas and contribute to unnaturally high levels. Both contribute to the increased growth of algae and water weeds and grasses thus unbalancing the stream ecosystem.

fi

Marks	0	1	2	3	Average
%	37	43	17	3	0.86

One mark for each point raised that explains why it is important to maintain areas of remnant vegetation.

- remnant vegetation
 - diversity of plant species supports a diversity of pest predators, and is more reliable protection against drought effects, pest/disease attacks, erosion and soil ecosystem degradation
- riparian zone: as above and:
 - helps filter runoff, keeping water clear
 - reduce erosion of river banks.

An increased diversity of plants will lead to an increase in the species and number of birds that will find food and habitats in the riparian zone. Studies have shown (DNRE) that many birds are insectivorous. The birds will also visit the wheat fields and will eat insects. The incidence and severity of insect problems is greatly reduced. The good part about it is that the control is happening naturally. Fewer insecticides are required. The crop is more valuable.

fii

Marks	0	1	2	3	Average
%	26	44	25	5	1.09

One mark for each aspect listed of what needs to be done to preserve the areas.

The area should be fenced off. This will keep stock out and prevent them eating the indigenous vegetation, and compacting the soil or damaging riverbanks. Plant with more indigenous plants when needed.

Control rabbits – rip burrows and/or use bait. Rabbits eat vegetation, especially newly planted or succulent young plants and contribute to erosion problems. Monitor and control exotic species that could dominate the indigenous plants

g

Marks	0	1	2	3	4	5	6	Average
%	28	17	17	19	13	5	1	1.91

One mark for each aspect described of how to develop a whole farm plan:

- aerial photograph and mapping of land use types over it
- identification of sensitive/degradation areas that need protecting or fixing
- identifying suitable land use matched to classification type and
- placement of roads/lanes etc., and fences to help manage the diversity of land types
- planning these into farm enterprises. setting objectives, time frames for achieving the plan
- defining methods of monitoring achievement of aims.

Fifty-three per cent of students did not understand the benefits of legume crops to a cereal crop rotation. The important natural process of nitrogen fixation by legumes was understood by less than 25 per cent of the students. Parts 3b, 3c and 3d tested understanding of some common broad acre cropping/soil management practices. About 25 per cent of students could not answer part b and close to 60 per cent could not answer c and d.

Part d tested basic knowledge of aspects related to fertilisers. About 40 per cent of students could answer these questions.

Knowledge of soil and water degradation causes and monitoring was tested in part 3e (25–30 per cent provided a satisfactory response). Most students could not use the information provided to arrive at the **most likely** degradation problem, and performed poorly in this question.

Student understanding of the benefits and management of ‘remnant vegetation’ and stream banks was mostly limited to filtering runoff, reducing erosion and fencing the area off. Only 20–30 per cent of students knew enough about this to achieve a satisfactory mark in part 3f.

Whole-farm planning was included in the 2002 Agricultural and Horticultural examination as well as being part 3g in 2003. It is therefore disappointing that many students were not able to answer this question.

Question 4

a

Marks	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Average
%	3	3	3	9	9	11	14	14	10	9	7	4	3	1	0	6.42

The activities described by students needed to be specific to the enterprise. General business planning headings received a low grade unless supported by enterprise specific examples. Marks for this question were awarded according to the following guide:

- demonstrated a clear understanding of what is involved in the enterprise by describing fully the activities in the correct sequential order
- understood the nature of the enterprise. The mark dependant on the degree of description and the fullness and accuracy of the activity listing
- does not seem to understand what is involved with the enterprise. Has not listed activities in a sequential order, some isolated activities listed but poorly described. The number of activities described and the level of detail will influence the grade.

bi

Marks	0	1	2	3	Average
%	14	15	28	43	2.01

bii

Marks	0	1	2	3	Average
%	20	13	31	36	1.83

bi-ii

For each item of specialist equipment of machinery that was listed, if correct and specialist, 1 mark. A correct detailed description of its use that included why the item was specialist, 2 marks. If the description was lacking in some way, 1 mark only.

c

Marks	0	1	2	3	Average
%	45	39	14	2	0.72

One mark, to a maximum of 3, for each aspect mentioned that explained how economic sustainability of the enterprise would be monitored.

- monitoring of costs compared with income
- cash flow monitoring
- prices paid and received over time
- consideration of demand and supply trends
- actual compared with business plan.

di

Marks	0	1	Average
%	56	44	0.44

One mark for listing degradation relevant to the chosen enterprise.

dii

Marks	0	1	2	3	Average
%	56	26	13	5	0.68

Three marks for a full description of how to monitor the listed degradation. One mark for listing, 2 marks for a partial description.

The following answers, especially to part 4a, are a general guide for each enterprise to the areas students need to describe. Student's answers should be specific to the enterprise.

Answers given to part b. are only an example; other answers were acceptable.

For part 4d, (type of environmental degradation), answers are only a suggestion. Other valid ones exist under particular circumstances. Assessors used their discretion when marking this question.

Table 2:

(Example answers to Questions 4 a, b, c, d).

Growing a wheat crop

a. Carry out maintenance and preparation of machinery. Seed bed preparation, in autumn when the moisture level in the soil is high enough sow the seed. Weed control. Pest and disease monitoring, prevention and control. Harvest considerations. Stubble management. Grain storage, protection and transport.
b. Combine harvester, seeding equipment.
c. Check to see that the enterprise is up to date with the production plan and the financial plan. Check that all production tasks are being completed on time and that expenses are as planned. If everything is fine the enterprise should be economically viable and sustainable
d. Soil nutrient depletion. Monitor with regular soil tests for nutrients and/or visual inspection of plants for quality. Soil biological and structural decline. Monitor the worm population. Monitor soil structure, soil acidification and perform pH tests. Remove remnant vegetation. Use photographic monitoring

Rearing cattle for the beef market

a. Select appropriate stock. Ensure the health of the cattle before buying. Ensure pasture care and consider hygiene and safety considerations of living quarters. Check fencing, appropriate feed and nutrition considerations, mating and calving and access to water. Monitor pests and disease prevention and control.
b. Drench gun, feed troughs.
c. Check to see that the enterprise is up to date with the production plan and the financial plan. Check that all production tasks are being completed on time and that expenses are what were planned. If everything is satisfactory the enterprise should be economically viable and sustainable.
d. Soil nutrient depletion. Monitor with regular soil tests for nutrients and/or visual inspection of plants for quality. Soil biological and structural decline. Monitor the worm population and soil structure. Check nutrients and pesticide run-off into wetlands and streams. Measure. Check contamination of groundwater with nutrients, and pesticides. Soil acidification. (From artificial fertilisers for pastures). Remove remnant vegetation.

Producing milk for the whole milk market

a. Stock selection. Ensure the health of the cows before buying. Check pasture care and hygiene and safety considerations of dairy and living quarters, eg. fencing. Ensure appropriate feed considering nutrition considerations. Ensure water availability. Monitor pest and diseases prevention and control. Mating and calving. During daily harvesting routines. Monitor quality and health.
b. Dairy-herringbone, rotary, refrigerated tank for the milk.
c. Check to see that the enterprise is up to date with the production plan and the financial plan. Check that all production tasks are being completed on time and that expenses are as planned. If everything is satisfactory the enterprise should be economically viable and sustainable.
d. There may be erosion. Monitor area and extent of erosion. Check for effluent contamination. Nutrient, pesticide run-off into wetlands and streams. Contamination of groundwater with nutrients, and pesticides.

Yabby breeding

a. Given the prolific breeding characteristics of yabbies, hatcheries are not necessary to produce juveniles. Juvenile stocking in grow-out ponds can be achieved in a number of different ways: Stocking the pond with a parent population and allowing natural population dynamics to occur; Stocking the pond with brood stock at a rate of one male to three females; Stocking the pond with berried females; Breeding the yabbies in smaller pond or tank and re-stocking them into grow-out ponds. Monitor for pests and diseases. Maintain/check that a suitable environment is provided for the yabbies – especially in tanks. Maintain/check filters and temperature. Devise harvesting schedules. Packaging, storage and distribution.
b. Tanks, ponds, filter.
c. Check to see that the enterprise is up to date with the production plan and the financial plan. Check that all production tasks are being completed on time and that expenses are as planned. If everything is satisfactory the enterprise should be economically viable and sustainable.
d. Environmental damage is most likely to be caused by the effluent from the ponds. Check for species invasion. Monitor by measuring the level of effluent in ponds, groundwater streams and wetlands and species escape.

Fish breeding

a. Choose the species to be bred. Choose the starting point and end point of the enterprise. For example, buy a breeding pair of fish. Collect/hatch eggs. Produce and sell juveniles. Buy juveniles and grow on. Choose the growing environment for the species – indoor tanks or outdoor earthen ponds. Breeding pairs are generally placed in individual tanks, with a spawning substrate. Many species spawn year-round. Eggs are laid on spawning substrates and then the eggs and parents are separated (to prevent the parents eating the young) and young fish transferred to grow out units. Monitor for pests and diseases. Maintain/check that a suitable environment is provided for the fish – especially in tanks. Maintain/check filters and temperature. Harvesting, storage and packaging.
b. Tanks, ponds, filter.
c. Check to see that the enterprise is up to date with the production plan and the financial plan. Check that all production tasks are being completed on time and that expenses are what were planned. If everything is satisfactory the enterprise should be economically viable and sustainable.
d. Environmental damage is most likely to be caused by the effluent from the ponds. Check for species invasion. Monitor by measuring the level of effluent in ponds, groundwater streams and wetlands and species escape.

Maintaining a garden

a. Examine soil, plant species and microclimates present. Modify soil if needed. Consider drainage. Prune. Install/maintain watering system. Consider environmental factors. Fertilise as required by plants. Apply/top dress mulch. Construct/maintain edgings, paths, and retaining walls. Control weed. Plant summer annuals in spring. Plant winter annuals in early autumn. Pest and disease monitoring, prevention and control. Pruning schedule. Mowing/lawn maintenance schedule.
b. Secateurs, knapsack sprayer.
c. Check to see that the enterprise is up to date with the production plan and the financial plan. Check that all production tasks are being completed on time and that expenses are as planned. If everything is satisfactory the enterprise should be economically viable and sustainable.
d. Soil nutrient depletion. Monitor with regular soil tests for nutrients and/or visual inspection of plants for quality. Soil biological and structural decline. Monitor with worm population. Monitor soil structure.

Growing crop of flowering plants in a glasshouse

a. Design production schedule. Decide on target markets. Select suitable plants/cultivars for selected growing times. Select appropriate media type, i.e. hydroponics/soil or container. Undertake propagation activities as necessary, i.e. Cuttings for carnations or offsets for tulips. Prepare media, check soil pH, enrich with fertiliser prior to planting. Cold treatments such as bulb storage prior to planting to force growth. Control growing environment as necessary, i.e. lighting, cooling, ventilation, irrigation. Provide support structures. Monitor and control pests and diseases. Harvest flowers, i.e. tulips are harvested when the flower bud is 50 per cent coloured to maximise flower life. Apply post harvest treatments/dips to maximise flower life. Grade flowers based on flower size, colour and stem length. Bunch and package, i.e. into bunches of 10 with elastic bands. Store for immediate use in water or dry store in cool room.

Market/sell.
b. Propagation equipment, i.e. secateurs, hormone gel. Glasshouse monitors. Cool stores.
c. Links to production schedule/target markets surveyed. Unit prices for sale realistic to production costs and competition.
d. Soil structure decline. Chemical leaching. Monitor structure. Monitor runoff.

Managing trees to produce a crop of fruit

a. Consider which fruits are suitable for the climate. Examine soil. Modify soil if needed. Consider drainage. Install watering system, usually black poly set above the ground and individually watering each plant. Prune in the winter. Beehives for cross-pollination and fruit set. Fertilise at the beginning of growing season. Fruit set management. Pest and disease monitoring, prevention and control. Weed control. Harvest storage and packing considerations.
b. Spray equipment. Fruit picking bags (open at the bottom also) secateurs, loppers, chain saw, grading machine. Packaging equipment. Trellis.
c. Check to see that the enterprise is up to date with the production plan and the financial plan. Check that all production tasks are being completed on time and that expenses are as planned. If everything is satisfactory the enterprise should be economically viable and sustainable.
d. Soil nutrient depletion. Monitor with regular soil tests for nutrients and/or visual inspection of plants for quality. Soil biological and structural decline. Monitor worm population. Monitor soil structure. Soil acidification. pH tests. Removal of remnant vegetation. Measure area and check diversity.

Managing vines to produce a crop of grapes

a. Consider which vines are suitable for the climate. Examine soil. Modify soil if needed. Consider drainage. Install watering system, usually black poly set above the ground and individually watering each vine. Prune in the winter. Beehives for cross pollination. Fertilise at the beginning of growing season. Pest and disease monitoring, prevention and control. Harvest considerations.
b. Spray equipment, pruning equipment – secateurs, loppers, packaging equipment, picking equipment, trellis.
c. Check to see that the enterprise is up to date with the production plan and the financial plan. Check that all production tasks are being completed on time and that expenses are as planned.
d. Soil nutrient depletion. Monitor with regular soil tests for nutrients and/or visual inspection of plants for quality. Soil biological and structural decline. Monitor worm population and soil structure.

Growing a vegetable, herb or flower crop

a. Examine soil. Modify soil if needed. Consider drainage. Install/maintain watering system. Consider environmental factors. Fertilise at the beginning of growing season. Apply/top dress mulch. Weed control. Plant summer annuals in spring. Plant winter annuals in early autumn. Provide growing support for flowers, i.e. lift wire mesh progressively as the plant grows. Harvest and post harvest requirements.
b. Nursery trolleys, secateurs.
c. Check to see that the enterprise is up to date with the production plan and the financial plan. Check that all production tasks are being completed on time and that expenses are as planned. If everything is satisfactory the enterprise should be economically viable and sustainable.
d. Soil nutrient depletion. Monitor with regular soil tests for nutrients and/or visual inspection of plants for quality. Soil biological and structural decline. Monitor worm population. Monitor soil structure.

Managing poultry for fresh eggs or meat production

a. Choose stock. Ensure the health of the hens before buying. Check hygiene and safety considerations of living quarters, e.g. replace litter in sheds on a regular basis. Provide appropriate feed and water. Nutrition considerations. Ensure pest and disease are monitored and controlled. Harvest storage and packaging. Productivity monitoring.
b. Feeders, drinkers, incubator if grown from eggs.
c. Check to see that the enterprise is up to date with the production plan and the financial plan. Check that all production tasks are being completed on time and that expenses are as planned. If everything is satisfactory the enterprise should be economically viable and sustainable.
d. Air quality, monitor smell. Monitor polluted runoff water. Test runoff for contaminants.

Rearing sheep to produce wool

a. Choose stock. Ensure the health of the sheep before buying. Carry out pasture care. Check hygiene and safety considerations of living quarters, e.g. fencing. Provide appropriate feed and water. Consider nutrition. Monitor pest and disease and carry out prevention and control. Carry out feet management, culling and selection strategies requirements. Shearing and fleece management. Marketing wool.
b. Shearing shed, shears.
c. Check to see that the enterprise is up to date with the production plan and the financial plan. Check that all production tasks are being completed on time and that expenses are as planned. If everything is satisfactory the enterprise should be economically viable and sustainable.
d. Pesticide run-off into wetlands and streams. Contamination of groundwater with nutrients, and pesticides.

Soil compaction.
 Visual assessment of water quality. Algal blooms indicate higher nutrient run off. Sampling and laboratory analysis required for pesticide detection, unless it is very high when aquatic animals would be sick/dying. Reduction in frog populations is an indicator that something is wrong and that further tests should be taken.
 Soil compaction may be measured by a bulk density test. Visual signs would be obvious, hard panning and low water absorption.

Container growing of ornamental plants

a. Timeline specifics depend on the plants being grown. Organise inputs. Buy inputs – seeds, tubestock. Take cuttings – conifers in winter, softwood in mid to late spring, semi-hardwood in late summer. Consider which growing media is suitable for the plants. Install/maintain/monitor watering system. Fertilise at the beginning of growing season. Pest and disease monitoring, prevention and control. Undertake weed control. Harvesting and marketing product.

b. Nursery trolleys, secateurs.
 c. Check to see that the enterprise is up to date with the production plan and the financial plan. Check that all production tasks are being completed on time and that expenses are as planned. If everything is satisfactory the enterprise should be economically viable and sustainable.

d. Nutrient, pesticide run-off into wetlands and streams. Contamination.
 Visual assessment of water quality. Algal blooms indicate higher nutrient run off. Sampling and laboratory analysis required for pesticide detection, unless it is very high when aquatic animals would be sick/dying. Reduction in frog populations is an indicator that something is wrong and that further tests should be taken.

ei

Marks	0	1	2	Average
%	52	30	18	0.65

eii

Marks	0	1	2	Average
%	61	29	10	0.49

eiii

Marks	0	1	2	Average
%	67	25	8	0.40

ei–iii

Two marks for a correct example showing the application of the technological advancement to the enterprise is clearly understood. One mark if the application of the technological advancement is partially understood.
 One mark for each valid and distinct advantage and disadvantage.
 Question 4a allowed students to go into detail about all aspects of their own enterprise, and the better students to talk about full scale commercial operations. More successful answers showed an accurate grasp of the idea of sequencing the activities and went into specific details. Many students answered by addressing the components of a business plan and not providing adequate specific detail about the production activities.

Part 4b focused on specialist equipment and machinery required for the enterprise. It was generally well answered. Many students lost marks by not focusing on ‘specialist’ equipment. Students who discussed commercial operations were better able to provide specialist equipment or machinery examples.

The monitoring of economic sustainability (part 4c) is only understood by about 16 per cent of students. Students need to be aware that this is not ‘making a profit’ but knowing what information to use to ensure profits continue to be made.

Whilst students had a reasonable grasp of how to run their enterprise, only 18 per cent could describe how to monitor the most likely degradation problem it may cause (part 4d). Students should know how to anticipate likely degradation issues.

Part 4e was poorly answered. Only 17 per cent of students could provide an example of recent technological advancement. The outcomes of the course require students to demonstrate knowledge of a range of recent technological advancements. This question showed that schools need to place more emphasis on this outcome and give more thought as to what is recent.

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