Assessment Schedule – 2020

Agricultural and Horticultural Science: Analyse a New Zealand primary production environmental issue (91532)

Assessment Criteria

Achievement	Achievement with Merit	Achievement with Excellence
Analyse environmental issue involves: • explaining the environmental issue arising from primary production management practices • explaining potential courses of action to mitigate the negative impacts of the management practices • recommending course(s) of action to support sustainable management practices.	*Critically analyse environmental issue* involves: • explaining, in detail, the environmental issue arising from primary production management practices • evaluating potential courses of action to mitigate the negative impacts of the production management practices. This may include comparing and contrasting alternative courses of action. • recommending course(s) of action to support sustainable production management practices that best address the issue.	*Comprehensively analyse an environmental issue* involves: • justifying course(s) of action to support sustainable production management practice(s) that best address the issue; this includes environmental, economic, political, and / or social considerations.

Evidence

PART A	Evidence
Demonstrates understanding of how two management practices carried out in the production of a product have changed over time to allow for more intensive production.	**Management practices** **Explains** in general terms OR **Explains in detail** how two management practices carried out in the production of a product have changed over time to allow for more intensive production. Note: *It is not sufficient to simply state a management practice carried out in the production of the primary product. There has to be some effort to explain how it has changed over time to allow for more intensive production.* *Management practices (example)* • Irrigation – Types of irrigation structures used such as centre pivots, volumes of water applied per Ha, storage of water on farm, water monitoring equipment and scheduling. • Feed types used – Using highly digestible feeds, feeds with faster growth rate results, feeds to persist under tough conditions. • Fertiliser – Types of fertiliser used to add soil nutrients, volumes of fertiliser applied per Ha, frequency of fertiliser applications, application methods / equipment. • Planting / stocking density – Animals farmed per hectare, herd homes, barn raised, row width, spacings, supporting structures. • Genetics / breeding – Plant or animal breeding programmes, selective breeding, purchasing semen / eggs. • Pest / disease control – Use of chemicals to control pests and diseases, use of chemicals / pharmaceuticals to keep animals / plants healthy.

	• More inputs from outside of the production system – More feed brought in to allow for higher stocking rates, higher productivity, higher carrying capacity.

PART B	Evidence
Demonstrates understanding of specific negative environmental impacts of management practices from Part A, and a social or economic impact.	**Environmental, social and economic impacts** **Explains** in general terms OR **Explains in detail** specific negative environmental and social or economic impacts of carrying out chosen management practices. There must be a link between the management practice and the impact it causes. This may not be written explicitly by the candidate, but the impacts caused must be due to the management practices carried out in Part A. The impact on the environment will be negative, while the economic and social impacts may be positive or negative. *Environmental impacts* • Decreased water quality in streams / rivers / lakes. This may be lower dissolved O_2, warmer temperatures, lower MCI score, higher levels of nutrients in water. • Decreased quantities / flows in waterways. • Declining levels of biodiversity in waterways. Lower MCI scores, decreased quantities of native fish species, less 'life' in the water to support a healthy ecosystem. • Greenhouse gases emitted contributing to climate change. • Decreased diversity in ecosystems. This may be due to unproductive areas being 'improved' for pasture production or trees being planted. Monoculture from decreased diversity of production species / types on farm. Drainage of wetlands. *Economic impacts* • Increased profitability on farm due to increased productivity from increased inputs. • Increased revenue for local central government from tax and rates. • Increased spending in New Zealand by producers in local regions on inputs, services, vehicles, and support. • Increased costs to clean up the negative environmental impacts caused by primary production. • Decreased revenue due to a lower quality product being produced. • Decreased profitability due to diminishing marginal utility (past optimum production). *Social impacts* • Increased employment on farm. • Increased employment off farm in support and service businesses. • Decreased environmental quality resulting in lower satisfaction in water activities involving waterways. • Decreased support for farmers from the urban areas in New Zealand.

PART C	Evidence
Demonstrates understanding of a realistic course of action that a grower could carry out to allow them to farm sustainably into the future.	**Course of action to gain sustainable production** **Justifies** how a realistic course of action will allow for sustainable production. The course of action will reduce negative environmental impacts, ideally without reducing economic and social outcomes. The course of action justified should be carried out by the producer and have benefits for the wider New Zealand community. The course of action needs to be able to be carried out into the future, so there can be expected interruptions in the short term in the production system to move to sustainable production. *Courses of action* • Having diversification of production systems on a farm rather than monoculture. A single type of production system exposes a producer to price volatility, market failure, insect / pest issues, and extreme weather events. Diversification spreads the income of the property across various systems. • Lower inputs to optimal levels to maximise profitability not productivity per hectare. Natural systems do not increase production in a linear way with increased inputs. Instead they have a diminishing marginal utility, until finally the additional unit of inputs results in a lower level of output. Producers need to find the optimal level of inputs to ensure they maximise their profitability, not just increase productivity. • Monitor soil moisture levels to ensure optimal water levels are applied for plant growth without excess. Electronic moisture monitoring or consultants will ensure that the correct quantity of water is applied to maximise production, without losses. They will use rainfall data, evapotranspiration and transpiration data to ensure soil moisture levels are optimised. Sensors in soil can also be utilised to give accurate figures of what the soil moisture levels actually are. • Ensure the production system is suitable for the natural capital of the property. Understanding the soil type, natural rainfall and sunshine to select the right system for that environment. Production systems requiring high levels of moisture should be carried out where natural rainfall levels are higher. This will result in the environment needing less modification for primary production. The more the environment is modified, the higher the costs of production, and the more susceptible the producer is to price volatility and unfavourable weather events. • Use of precision farming procedures, such as mapping of the production system to understand soil type and nutrient levels, so an accurate level of water or fertiliser can be applied over the production system rather than a general level being applied over the whole property. This results in lower total quantities being applied, lower costs of inputs and lower losses of inputs. • Use of the best genetics, which are bred to reduce nitrates lost through urine, are drought tolerant and grow to maturity faster. This will reduce the costs of production, lower impacts from unfavourable weather and lessen the losses from the production system. • A closed system approach, such as indoor production, where there is lower level of losses from the production system. Effluent can be captured and stored and used at an appropriate time for plant growth. The producer has more control over the inputs and outputs from the system. Note: *The answer will be reasoned and supporting data included. Answers should be well prepared and laid out in logical order.*

N1	N2	A3	A4	M5	M6	E7	E8
Partially explains how ONE management practice causes environmental OR social or economic impact.	**Partially explains** how TWO management practices cause environmental AND social or economic impacts.	**Explains** how ONE management practice cause environmental, social OR economic impacts. (General explanation of how the management practice has changed over time to allow for intensive production) *AND* **Explains** a course of action the producer could take to allow for sustainable production. (The reduction of negative environmental impacts.)	**Explains** how TWO management practices cause environmental AND social or economic impacts. (General explanation of how the management practice has changed over time to allow for intensive production) *AND* **Explains** a realistic course of action the producer could take to allow for sustainable production. (The reduction of negative environmental impacts.)	**Explains in detail** how ONE management practice cause environmental AND social or economic impacts. (Specific reference of how the management practice has changed over time to allow for intensive production) *AND* **Explains in detail** a realistic course of action the producer could take to allow for sustainable production. (The reduction of negative environmental impacts, with some coverage of social or economic impacts.)	**Explains in detail** how TWO management practices cause environmental AND social or economic impacts. (Specific reference of how the management practice has changed over time to allow for intensive production) *AND* **Explains in detail** a realistic course of action the producer could take to allow for sustainable production. (The reduction of negative environmental impacts, with some coverage of social or economic impacts.)	**Explains in detail** how TWO management practices cause environmental AND social or economic impacts. (Specific reference of how the management practice has changed over time to allow for intensive production) *AND* **Justifies** a realistic course of action the producer could take to allow for sustainable production. (Detail on the reduction of negative environmental impacts as well as discussion on social or economic impacts.)	**Explains in detail** how TWO management practices cause environmental AND social or economic impacts. (Specific reference of how the management practice has changed over time to allow for intensive production) *AND* **Comprehensively justifies** a realistic course of action the producer could take to allow for sustainable production. (Detail on the reduction of negative environmental impacts as well as discussion on social and economic impacts.)

N0 = No response; no relevant evidence.

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 2	3 – 4	5 – 6	7 – 8