Assessment Schedule – 2024

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

Assessment Criteria

Achievement	Achievement with Merit	Achievement with Excellence
Analyse involves: • explaining the environmental issue arising from the 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* 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* 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

TASK	Evidence	Achievement	Achievement with Merit	Achievement with Excellence
(a)	For your chosen production system, explain how TWO management practices, used to intensify production, can have a negative environmental impact on the natural ecosystem. *Management practices* Irrigation – Increased demand for water, as traditionally dry areas of New Zealand are converted into land uses that require large volumes of water to grow crops / pasture. Additional water supply will increase crop / pasture yields. Fertiliser – Nitrogen (N) fertiliser is added to the soil to increase pasture growth and the volume of feed available for the cows to eat. This increased use of N fertiliser has resulted in increased production per hectare. Supplementary feed – For livestock systems, importing supplementary feed will allow for increased stocking rates and increased production per stock unit. Imported supplementary feed will bring nutrients onto a farm that then need to be managed. Insecticides – The use of insecticides to control insect pests in fruit and vegetable crops will allow for more saleable crop per hectare.	**Explains** how practices have a negative environmental impact on the natural ecosystem.	**Explains in detail** how practices have a negative environmental impact on the natural ecosystem. Uses data and evidence.	

	Environmental impacts • 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. • Insecticides can result in a decrease in biological services by insects, e.g. pollination from bees. • Declining levels of biodiversity in waterways. Lower macroinvertebrate community index (MCI) scores, decreased quantities of native fish species, less 'life' in the water to support a healthy ecosystem. • Drainage of wetlands, removal of filtration, which results in degradation of surrounding waterways. • Soil erosion from overcultivation – loss of habitat for soil organisms. • 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.			
(b)	Explain how TWO courses of action could mitigate the negative environmental impacts of intensification. • Animals, such as cows, are kept off pasture at certain times of the year to reduce loss of nitrates from urine. • On-farm water storage utilised to reduce water takes from surface water or ground water. • Production system chosen to match the natural features, such as rainfall, sunshine, soil type, etc. • Lower inputs to optimal levels to maximise profitability, not productivity per hectare. • Use of precision farming procedures, such as mapping of the production system to understand soil type and nutrient levels. • Use of the best genetics, so that livestock are bred to reduce nitrates lost through urine. • Use of direct drilling to reduce the soil disturbance between each crop. • Pest monitoring on an orchard to understand which insect pests are present and the use of targeted insecticides to kill only those insect pests.	**Explains** a realistic course of action the producer could take to mitigate the negative environmental impacts of intensification.	**Explains in detail** realistic courses of action the producer could take to mitigate the negative environmental impacts of intensification.	

(c)	Discuss which course of action from part (b) best allows producers to sustainably produce their products. Dairy **Animals such as cows kept off pasture for times of the year to reduce loss of nitrates from urine.** Use herd homes or concrete stand pads to collect effluent from animals for either part of, or all of the year, depending on the area of New Zealand where the farming occurs. Keeping animals off pasture reduces N leaching into groundwater or surface water. Urine patches are the biggest loss of N from dairy farm systems. Studies have found that up to 95% of the N ingested by cows ends up being urinated back onto the ground. • Reduction in N reaching groundwater: - Less eutrophication – increased oxygen levels, improved habitat for New Zealand native aquatic fish and invertebrate species. • Reduced damage to soil: - Increased soil productivity and pasture growth. • Increased feed utilisation: - Increased feed efficiency and productivity. • Increasing the recreational use of waterways: - Swimming. - Fishing. - Boating. • Maintaining environmental image: - Increase in tourism. - Market access to environmentally discerning markets. • Improving social license to operate: - Improved sales / economic outcomes.	Explains but does not include impacts.	Explains in detail using data, and covers some of the impacts.	**Discusses why** a course of action best allows producers to sustainably produce their products, considering social, economic, and environmental sustainability. Answers are well prepared and laid out in a logical order.

N1	N2	A3	A4	M5	M6	E7	E8
Does not explain how a chosen production system has a negative environmental impact on the natural ecosystem. OR Does not explain a realistic course of action the producer could take to mitigate environmental impacts of intensification.	Partially explains how a chosen production system has a negative environmental impact on the natural ecosystem. OR Partially explains a realistic course of action the producer could take to mitigate environmental impacts of intensification.	**Explains** how a choosen system has a negative environmental impact on the natural ecosystem. AND **Explains** ONE realistic course of action the producer could take to mitigate environmental impacts of intensification.	Explains how TWO practices have a negative environmental impact on the natural ecosystem. AND Explains TWO realistic courses of action the producer could take to mitigate environmental impacts of intensification.	**Explains in detail** how ONE practice has a negative environmental impact on the natural ecosystem. AND **Explains in detail** how a SECOND practice has a negative environmental impact on the natural ecosystem. AND **Explains in detail** ONE realistic course of action the producer could take to mitigate environmental impacts of intensification. OR **Explains in detail** a SECOND realistic course of action the producer could take to mitigate environmental impacts of intensification.	Explains in detail how TWO practices have a negative environmental impact on the natural ecosystem. AND Explains in detail TWO realistic courses of action the producer could take to mitigate environmental impacts of intensification.	Explains in detail how TWO practices have a negative environmental impact on the natural ecosystem. AND Explains in detail TWO realistic courses of action the producer could take to mitigate environmental impacts of intensification. AND **Discusses** which course of action best allows producers to sustainably produce their products. Considers social, economic, and environmental sustainability in some detail.	Explains in detail how TWO practices have a negative environmental impact on the natural ecosystem. AND Explains in detail TWO realistic courses of action the producer could take to mitigate environmental impacts of intensification. AND **Discusses** which course of action best allows producers to sustainably produce their products. Considers social economic, and environmental sustainability in detail.

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

x