

Assessment Schedule – 2023

Agricultural and Horticultural Science: Demonstrate understanding of land use for primary production in New Zealand (91297)

Assessment Criteria

| Achievement | Achievement with Merit | Achievement with Excellence |
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| <i>Demonstrate understanding</i> involves explaining the facts that determine traditional, current, and future land use for primary production in New Zealand. | <i>Demonstrate in-depth understanding</i> involves a detailed explanation of the factors that determine traditional, current, and future land use for primary production in New Zealand. | <i>Demonstrate comprehensive understanding</i> involves evaluating the factors that determine traditional, current, and future land use for primary production in New Zealand. This may involve justifying, comparing, contrasting, and analysing. |

Question ONE: Land use – North and South

| | Sample evidence |
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| (a) | <p>Describes a land use commonly carried out in the region and explains why it is used this way.</p> <p><i>North Island</i> Region: Bay of Plenty (other regions and land uses can be used) Kiwifruit are grown extensively in the Bay of Plenty.</p> <ul style="list-style-type: none"> • The environmental conditions of the Bay of Plenty make it suitable for kiwifruit, as kiwifruit require flat, well-drained fertile soil with warm sunny summers and winter temperatures that allow for winter chilling. Kiwifruit require over 600 hours below 7°C degrees for bud development. • The Bay of Plenty has a large port at Tauranga, which makes exporting kiwifruit easier. <p>Economically kiwifruit has a very high return with a gross return of around \$126,000/ha for gold and so are a suitable land use for the high value land in the Bay of Plenty.</p> |
| (b) | <p><i>South Island</i> Region: Otago (other regions and land uses can be used) Merino sheep are extensively farmed in the dry Central Otago region.</p> <ul style="list-style-type: none"> • Due to dry conditions, Central Otago is only suitable for low-intensity land uses, such as sheep farming, unless irrigation is provided. Merino sheep can survive in the hostile environments found in Otago. <p>Merino sheep produce a higher valued wool than other sheep breeds with wool prices approaching \$30/kg compared with coarse wool at around \$2/kg.</p> |

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|-----|---|
| (c) | <p>Justifies landowner’s decision to either convert to a new land use or to keep the land in its current use.</p> <p>Evidence given for conversion from dairy to kiwifruit in the Bay of Plenty.</p> <p>The operating profit for a dairy farmer in the Bay of Plenty is \$2853 (2021) per ha while the income for gold kiwifruit minus operating costs are around \$80,000 per ha. This means if the dairy farmland is suitable for kiwifruit, it can offer a better return than dairy. Set up costs for kiwifruit can be very high, up to \$400,000 per hectare and the purchase of Sungold kiwifruit licences from Zespri is high. The time to a mature harvest can be up to 7 years. This means time to break even is on average 12–15 years. Once this is reached, kiwifruit can be a highly profitable land use. Dairy is facing ever-increasing compliance regulations and costs with nitrogen and methane limits to reduce the environmental burden. Dairy can be carried out on a much greater range of land than kiwifruit, whose environmental requirements are much stricter, especially in terms of climate.</p> <p><i>Economic</i></p> <ul style="list-style-type: none"> • Greater return per ha for kiwifruit than dairy. • Set up costs are high. However, upgrading dairy equipment (milking shed / effluent / livestock) is also very expensive. • Developed kiwifruit orchards (\$1,000,000+/ha) are worth a lot more than dairy farms (\$41,000/ha average). <p><i>Political</i></p> <ul style="list-style-type: none"> • Dairy farms are under increasing pressure to comply with nitrogen and methane limits and compliance costs are only going to increase. • Conversion to more intensive land uses require resource consents. <p><i>Environmental</i></p> <ul style="list-style-type: none"> • Land that is suitable for kiwifruit is limited and if the farmer’s dairy farm is suitable for kiwifruit, they can make a better return on investment from kiwifruit. • With climate change, kiwifruit orchards in the Bay of Plenty risk not getting sufficient winter chilling for sufficient bud development. |
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| N1 | N2 | A3 | A4 | M5 | M6 | E7 | E8 |
|--|--|--|---|---|--|---|--|
| Some writing, but does not explain why a specific land use is carried out in a named region. | Partial or insufficient explanation of why a specific land use is carried out in a named region. | Explains why one specific land use is carried out in a named region. | Explains why two specific land uses are carried out in two named regions. | Explains in detail why one specific land use is carried out in a named region | Explains in detail why two specific land uses are carried out in two named regions | Discusses the conversion of a specific land use to another in terms of economic, political, or environmental factors. Comprehensive evidence given for one factor. | Discusses the conversion of a specific land use to another in terms of economic, political, or environmental factors. Comprehensive evidence given for two factors. |

N0 = No response; no relevant evidence.

Question TWO: Urban sprawl

| Sample evidence | |
|------------------------|---|
| (a) | <p>Explains how environmental and social factors can make land suitable for both intensive production systems (i.e. market gardens) and urban land use.</p> <p><i>Environmental</i></p> <ul style="list-style-type: none"> Intensive plant-production systems need to be grown on flat land with good drainage to ensure access by machinery and avoid damage to soil structure in times of high rainfall. Subdivisions are most economically efficient on flat land and installing drainage is a major cost when subdividing. <p>Intensive plant-production systems tend to require temperate conditions, which are the same type of conditions that people prefer to live in.</p> <p><i>Social</i></p> <ul style="list-style-type: none"> Intensive plant-production systems have large workforce requirements. This means that they need to be near main centres as workers need housing and shops. Land near main centres is also under pressure for development for housing as most main centres are increasing in population and so need more housing. This housing tends to be built around the outer edge of cities and towns as land value is lower. <p>Intensive plant-production systems need to be close to good transport links, such as highways, ports, and airports, to access markets. These transport links also make it easier to subdivide land and give access for the residents to places of employment and travel.</p> |
| (b) | <p>Justifies a council's decision not to allow the re-zoning of rural farmland into urban-zoned land.</p> <p><i>Political</i></p> <ul style="list-style-type: none"> Loss of food security – if we can't produce food in New Zealand, we will have to import it. This can be problematic when supply chains are disrupted as seen in the past few years. This means certain goods will become unavailable or very expensive. Intensive plant production is a significant employer. Loss of land to houses means a loss of those jobs. Not all of those workers will be able to switch to a new profession. |

| N1 | N2 | A3 | A4 | M5 | M6 | E7 | E8 |
|---|---|--|---|--|---|--|---|
| Some writing but does not explain why land suitable for plant production is also suitable for urban land use. | Partial or insufficient description why land suitable for plant production is also suitable for urban land use. | Explains why land suitable for plant production is also suitable for urban land use in terms of environmental or social factors. | Explains why land suitable for plant production is also suitable for urban land use in terms of environmental and social factors. | Explains in detail why land suitable for plant production is also suitable for urban land use in terms of environmental or social factors. | Explains in detail why land suitable for plant production is also suitable for urban land use in terms of environmental and social factors. | Justifies a council's decision not to allow the re-zoning of rural farmland into urban-zoned land in terms of economic or political factors. | Justifies a council's decision not to allow the re-zoning of rural farmland into urban-zoned land in terms of economic and political factors. |

N0 = No response; no relevant evidence.

Question THREE: Changing land uses

| | Sample evidence |
|-----|---|
| (a) | <p>Explains how economic and technological factors have led to land use change.</p> <ul style="list-style-type: none"> • The biggest changes shown in the graph are a decrease in sheep and beef area and an increase in dairy. Sheep and beef farming are often carried out when no other more intensive land use is suitable for the land. Sheep and beef farming has seen a considerable decline in the total area farmed since 2000. This is mainly due to the conversion of sheep and beef farms in the Canterbury region to dairy farms. <p>Horticulture is a very intensive land use and can yield a lot more per hectare than pasture-based systems. Due to the scale of the graph, small changes in area would not be shown. Due to the environmental constraints of horticulture, they are limited in the area that they can expand. Likewise for grain.</p> <p><i>Economic</i></p> <ul style="list-style-type: none"> • Dairy through the 2000s showed very high demand from countries such as China, which pushed the return up. This meant it become economical to convert land that was previously unsuitable for dairy due to insufficient water, away from beef production. <p>A reduction in dairy pay out in 2016 and an increase in beef returns is shown in the graph by the uptick in the beef production area in 2017.</p> <p><i>Technological</i></p> <ul style="list-style-type: none"> • The use of more efficient irrigation technologies and the development of water schemes allowed the conversion away from sheep and beef farms to dairy land. The continued use and development of synthetic fabrics have continued to push down the return for coarse wool, making the wool sheep uneconomic. |
| (b) | <p>Discusses two factors affecting land use in the future.</p> <p><i>Horticulture</i></p> <p>The graph above does not see much movement in land area used in horticulture. However, horticultural land use is likely to be heavily impacted in both positive and negative ways in terms of political, social, and workforce factors. Horticulture tends to yield a much greater amount of food per hectare than animal-based systems and are not associated with the same environmental and animal welfare concerns that animal-based systems have. With a growing demand for plant-based foods, an increase in vegetarianism, and a demand for providence, horticulture products meet this demand. The increased workforce demand for horticulture land will become even more of an issue than it is currently.</p> <p>TWO factors discussed from political, social, or workforce</p> <p><i>Political</i></p> <ul style="list-style-type: none"> • There will be increasing pressure to reduce the environmental impact of production systems with both nutrients and greenhouse gases targeted. High-value horticulture products such as kiwifruit, apples, and wine are seen in a positive way and can yield a greater amount of food than animal production systems. • Horticulture is a very high intensity land use than can produce more from less land. Moving land from low intensity land uses to higher intensity land uses can make the country more productive, and increase tax take. <p><i>Social</i></p> <ul style="list-style-type: none"> • There is an increase in demand for plant-based foods and an increase in vegetarianism. Expanding the horticultural production will allow New Zealand to meet this demand. • There is demand for foods with providence. This is likely to continue especially with the high-value products in the export market. If we can model what Zespri have done for other horticultural products, this is likely to see an increase in high-value, high-quality export products rather than commodity products. |

Workforce

- We currently do not have enough workers to maintain and harvest our existing horticultural production systems, with Zespri in part blaming the lack of workers for the poor gold kiwifruit harvest in 2022.

Technology will allow horticultural growers to overcome some of the labour issues, reducing the number of people needed for harvest. This will in turn create other work force issues requiring a greater number of skilled workers to maintain and develop this technology.

| N1 | N2 | A3 | A4 | M5 | M6 | E7 | E8 |
|---|---|--|---|--|---|--|--|
| Some writing but does not explain why we have seen land use changes over the past 20 years. | Partial or insufficient description that does not explain why we have seen land use changes over the past 20 years. | Explains why we have seen land use changes over the past 20 years in terms of economic or technological factors. | Explains why we have seen land use changes over the past 20 years in terms of economic and technological factors. | Explains in detail why we have seen land use changes over the past 20 years in terms of economic or technological factors. | Explains in detail why we have seen land use changes over the past 20 years in terms of economic and technological factors. | Analyses how a specific land use might be affected by one of the two factors, with another well supported. | Analyses how a specific land use might be affected by two factors (political, social, or workforce). |

N0 = No response; no relevant evidence.

Cut Scores

| Not Achieved | Achievement | Achievement with Merit | Achievement with Excellence |
|---------------------|--------------------|-------------------------------|------------------------------------|
| 0 – 6 | 7 – 12 | 13 – 18 | 19 – 24 |