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## Level 2 Agricultural and Horticultural Science, 2018

### 91297 Demonstrate understanding of land use for primary production in New Zealand

9.30 a.m. Wednesday 28 November 2018

Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of land use for primary production in New Zealand.	Demonstrate in-depth understanding of land use for primary production in New Zealand.	Demonstrate comprehensive understanding of land use for primary production in New Zealand.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

**You should attempt ALL the questions in this booklet.**

If you need more room for any answer, use the extra space provided at the back of this booklet.

Check that this booklet has pages 2–8 in the correct order and that none of these pages is blank.

**YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.**

Excellence

TOTAL

24

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## QUESTION ONE: CHANGES IN LAND USE ON THE CENTRAL PLATEAU

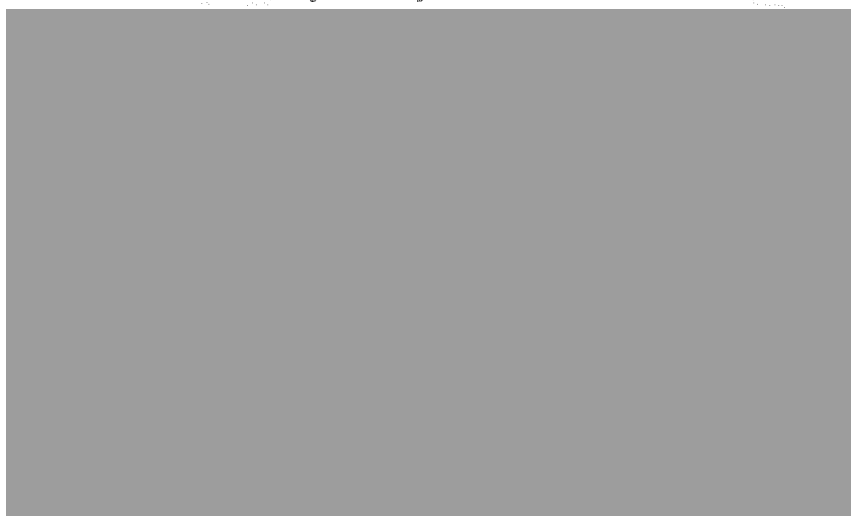
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Environmental and financial pressures have forced Landcorp and Wairakei Estate owners to abandon contentious forest-to-dairy land conversions. Freshwater ecologist Dr Mike Joy welcomed the move as a significant win for the environment.

Wairakei Estate, near Taupo, currently comprises 13 dairy farms with 17,000 cows over 6,400 hectares. It had been planned to run 43,000 cows on 39 farms by 2021, but Landcorp chief executive Steven Carden said in a statement that this would be scaled back, without saying exactly how many cows the property would carry.

Text (adapted) and image source: <http://www.stuff.co.nz/business/farming/dairy/77608461/Landcorp-bows-to-pressure-to-halt-dairy-conversions>.

### Forestry-to-dairy land conversion



Source: <https://resources.stuff.co.nz/content/dam/images/1/5/g/r/v/j/image.related.StuffLandscapeSixteenByNine.620x349.1a7f2l.png/1457314857545.jpg>.

- (a) Explain why land in the Taupo/Central Plateau region has traditionally been used for forestry.

Because this area is considerably cold, it isn't ideal for practises such as certain fruit (ie citrus, grapes, avocados) as these require warm or subtropical temperatures. However, the climate is ideal for much hardier plants such as forestry. The topography of the land also makes it difficult for machinery etc to accomodate for fruit/vegetables as it wouldn't do well on the sloping/hilly land when time for harvest came around. It wouldn't be economically viable. In contrast, forestry only needs to be 'harvested' every few decades when it has matured. This makes it a lot more viable to farm in rough areas. The Taupo/Central Plateau

- (b) Justify the decision to scale back the conversion of forestry land to dairy farms by comparing and contrasting the two land uses.

In your answer, consider:

- the local economy
- the environment
- social aspects.

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While dairy does bring in large sums of money compared to forestry, the cost to irrigate / apply effluent to land, bring in the technology needed to successfully dairy farm in these areas is not viable. In order to gain peak performance and maximum yield from the dairy industry, expensive technology is needed. Dairy farms also need a lot more hands on work all year round, and in isolated areas this would be difficult to come by. It would also require housing for potential workers, adding to the cost. The environment plays a big role in this also, as one of NZ's major selling points for tourism is Lake Taupo. Recent developments mean stock over a certain age cannot be farmed close to this lake, which cuts out significant dairying land. NZ has a 'clean green' image which must be upheld. The land topography again would be difficult to navigate for stock and machinery alike on a regular basis. Recent social movements such as the sudden rise in veganism <sup>(ie nut milk)</sup> or alternative 'healthier' options to traditional cows milk may also call for the decrease in milk sales, meaning fewer dairy farms may be needed. In contrast, products deriving from wood (paper, houses, furniture) will always be needed. \* In contrast forestry needs little year round maintenance, and thus workforce.

- Issues like effluent and nutrient leaching from fertilisers may cause eutrophication and algal blooms, leading to the death of water life in the lake, and mean people can't use the water. Forestry produces no effluent etc so

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## QUESTION TWO: AVOCADOS

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Dairy farms are being converted to avocado orchards in the Auckland and Northland regions as the industry gears up for major expansion. Avocados achieved new records for volume and value in the 2016–17 season, and investors keen to capitalise on the increasing demand for avocados are planning large-scale plantings.

It is an exciting time to be growing avocados, New Zealand Avocado chairman Ashby Whitehead said.

Source (adapted): <https://www.stuff.co.nz/business/farming/94626504/Dairy-farms-make-way-for-avocados-in-north>.

- (a) Identify a traditional land use in Northland, and explain reasons for this land use.

Traditionally, Northland was used for citrus, ~~avocados~~ among other things. This was due to the rich volcanic soil in this area (and particularly in Auckland), which was perfect for citrus. It was also used for dairying, ~~avocados~~ as Auckland has great accessibility to all over NZ and the world, due to the harbour and airport, and State Highways, and can export <sup>and distribute</sup> dairy products we produce. //

- (b) Explain why Northland's environmental and economic conditions are suitable for subtropical fruit such as avocados.

### Environmental factors

The environment in Northland is perfect for subtropical fruit as the climate is very warm. There are very few frosts, which is ideal as avocados have very low chill hours and need warm weather and higher sunshine hours. The soil is rich and ideal for plant growth. (Northland/Auckland area has some of NZ's best soil, as it's volcanic soil) //

### Economic factors

Geographically, Northland is very close to Auckland. This means the workforce demand can be met, ~~as~~ Auckland ~~is~~ is one of the most populated areas in NZ. It has excellent accessibility for export (in terms of the airport and harbour) and local distribution (ie State highway which runs the length of NZ goes through Auckland). //

- (c) Evaluate the impact of conversion from a traditional land use to avocado orchards in Northland.

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USE ONLY

In your answer, consider:

- the economy
- workforce supply
- the environment.

The change from dairy to Avocado could greatly benefit the economy, as social trends ~~are~~ call for less intake of animal products (i.e. veganism) and unhealthy fats, to move organic and healthy lifestyles. Avocado is a very trendy food due to its health benefits and being a 'healthy fat'. This means that the market for ~~avocado~~ avocado is likely to flourish, and meeting the demand will bring in a lot of money. NZ is known for its top quality products and clean image; ~~our~~ ~~our~~ products are wanted by exportees and can bring in millions <sup>(sold for a premium)</sup>. Although the initial change from dairy to avocado will be of a cost, the social drive of the economy would quickly ~~bring~~ show the benefits. This change would put many dairy farm owners and workers out of the job, however, ~~new~~ new jobs ~~would~~ would be opened as avocado orchards would need their own set of workforce. However, it ~~is~~ likely needs fewer workers at ~~the~~ <sup>certain</sup> ~~times~~ and former dairy farmers may want to apply the skill and passion they have to the dairy industry, not avocados. This has the potential to leave some people without a job. While the land is fit for dairying, it is more than ideal for avocados, while other land ~~across NZ~~ <sup>in the dairy industry</sup> can do dairy but not avocados. The underutilised ~~a~~ sunny, warm climate can be benefited from economically (as it ~~is~~ <sup>is</sup> ideal for avocado growth). It will increase the overall yield of avocados, and the sunshine hours means the fruit spend less time on the ~~to be cont.~~

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### QUESTION THREE: IRRIGATION

ASSESSOR'S  
USE ONLY

The Manuherikia catchment in Central Otago is made up of two principal valleys and a number of dividing hills, and has a total area of approximately 3,000 square kilometres, of which 60,000 hectares are suitable for irrigation. Of this area, currently 15,000 hectares are fully irrigated and 10,000 hectares are partially irrigated.

Source (adapted): <http://www.centralotagonz.com/economic-development/key-sectors/irrigation>.

Farmland around Lake Dunstan, near Cromwell, Central Otago



Source: <https://www.google.co.nz/maps/@-44.977413,169.2110126,6025m/data=!3m1!1e3>.

- (a) Identify the main agricultural and horticultural uses of land in the Central Otago region, and explain the reasons behind these uses.

Otago has a lot of sheep and beef, as the land is rugged, and these animals are hardy. They also require little use of machinery (ie. dairying needs milking sheds, effluent ponds etc.) Products such as Stonefruit ~~and~~ orchards can survive the harsher colder ~~than~~ climate, and needs significant chill hours in ~~the~~ order to grow fully in summer. //

- (b) Explain how irrigation technology has allowed land use to change.

In areas where there is insufficient rain or ~~poor~~ sandy <sup>(Otago has very free draining soils)</sup> soils which drain quickly, irrigation making it difficult to grow grass for stock or fruit/vege plants, irrigation has provided a way for this to occur. By adding additional water and/or nutrients (ie effluent) grass or plants can

be grown with sufficient water and nutrients. Land that was once too dry to grow anything on could then be used for ~~the~~ growth of plants. //

- (c) The establishment of new irrigation schemes is controversial. Discuss the expansion of irrigation with respect to the environment, the economy, and politics.

In terms of the economy, the cost of ~~water~~ <sup>and irrigation systems</sup> is an issue. Some areas are using dam ~~systems~~ which store water rain before it washes into the ocean. The water is then distributed (at a cost) to farms etc. Although this utilises water well, irrigators use a lot of water, which won't all be taken up by plants. However, despite the cost of irrigation systems and water, the yield brought from it would be largely beneficial. In dairying, ~~tube~~ irrigation is used to grow crops and grass, and animals that are well fed are able to produce more milk. This can be exported at a premium, or sold in NZ. Fruit need sufficient water in order to photosynthesise. Photosynthesis produces glucose, which is <sup>ultimately</sup> what makes fruit sweet. The flavour of the fruit is one of the most important selling points, so this can also bring greater income. Environmentally, installation of irrigation systems has been known to cause on-farm monoculturalism. This means that there ~~is~~ <sup>is</sup> very little variation in plants. Often this occurs because irrigators can't go <sup>or through</sup> over a tree etc. so these are removed, leaving just grass ~~or~~ just one type of plant. While this may encourage certain wanted organisms, it ~~can~~ also leaves it vulnerable to being <sup>early</sup> wiped out by certain pests and diseases. Farmers have found ways to avoid monoculturalism while keeping ~~perpet~~ irrigation, by planting tall grasses that won't damage ~~irrigators~~ <sup>irrigators</sup> or ~~planting~~ <sup>planting</sup> inter-row planting on

Extra space if required.

Write the question number(s) if applicable.

ASSESSOR'S  
USE ONLYQUESTION  
NUMBER

2c. tree, and NZ can get our produce on the market first, to get a premium <sup>price</sup> for it. //

3c. orchards Many political factors come into play, particularly when certain bodies of water are involved.

Farming has been blamed relentlessly for damaging/polluting water bodies (ie lakes and rivers). So, the government and Māori (who often hold spiritual and/or tribal connections to land and some waterways) want to see practices such as fertilisation and effluent distribution come to an end, as if not managed properly they can result in eutrophication (excess nutrients leach into waterways, causing an over enrichment of nutrients). However, this could have negative economic effects, as effluent in particular is worth thousands, but cows produce it for free. Because of their deep connection to the land, ~~often~~ often Māori don't like the commercialisation of the land, or use of water bodies (some of which cannot be used, as they are tapu or sacred). //

91297



## Excellence Exemplar 2018

Subject	Level 2 Agricultural and Horticultural Science		Standard	91297	Total score	24
Q	Grade score	Annotation				
1	E8	This student could to give a comprehensive discussion as to why there is a decision to scale back the conversion of forestry to dairy farms, giving a good discussion about tourism and how dairy farming can potentially impact on Lake Taupo. Although it would be beneficial for the student to have a deeper understanding of the region and what is currently being farmed there, they were still able to give good reasoning with regards to the economics of set up of a dairy farm.				
2	E8	This student could evaluate the impact of conversion of a traditional land use to avocado orchards using topical information such as people's change in diet to discuss an increase in avocado sales and how Northland's environment could bring the harvest of avocados forward, increasing revenue. They also discuss the importance of being close to Auckland for workforce supply and the accessibility to local ports and the airport.				
3	E8	This student could show clear evidence that they have a good understanding of what is grown in Central Otago and how irrigation has influenced the quality, quantity and yield of the products grown there. The student justifies their discussion by discussing the impacts of the expansion of irrigation, including how irrigation impacts both positively and negatively on the environment, economy and politics.				