

93105A



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SCHOLARSHIP EXEMPLAR



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

QUALIFY FOR THE FUTURE WORLD
KIA NOHO TAKATŪ KI TŌ ĀMUA AO!

Scholarship 2016 Agricultural and Horticultural Science

9.30 a.m. Wednesday 23 November 2016

Time allowed: Three hours

Total marks: 24

ANSWER BOOKLET

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

Answer ALL questions from Question Booklet 93105Q.

Write your answers in this booklet.

Start your planning and answers to Questions One, Two, and Three from pages 2, 8, and 14 respectively.

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 2–24 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.

QUESTION ONE: CONTEMPORARY ISSUES (8 marks)

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PLANNING

Use this space to plan your answer to Question One:

Food Safety

Kiwi fruit

1992 shipment - Italy

Consumer perspective = unsafe food etc

Response = Zespri System / kiwifruit

↓
GAP, ergonomics, phosphates, MRLs,
orchard checks, traceability

Consumers now view products as safe

MRL = 0.1 mg/fruit

Impact, perspectives, responses

Intro

FSANZ, food act,
MALS, Categorisation?
recalling

Dairy

Animal products act (PA81) →

Salmonella, Staphylococcal, botulism
absent

PMSCC below 400,000 cells/ml

Stored under 8° → breakage
will result in times such as
Melamine score 2010

Botulism ex → perspective = further
is not safe, do not buy those
products

Response = 4 year food safety

programme → warehouses

comply, global GAP, Right first
time quality metric → incentives

Begin your answer to Question One here:

Food safety refers to the production, preparation, transportation, and storage of food products to avoid contamination and the health risks that come with contamination. The demand for high quality, safe food is increasing in NZ and worldwide as consumers become more aware of the dangers of unsustainable management practices. In NZ the Ministry for Primary Industries and the Global Food Safety Initiative (GFSI), along with Food Safety Australia New Zealand (FSANZ) regulate the food safety standards regularly in order to keep up with the high demand for safe food.

~~THEIR~~ Zespri has upheld very high quality standards since an incident in 1992 when a whole shipment of fruit was sent back from Italy for having very high spray residue levels. The growers usually calendar-sprayed their fruit, so every 12 days they would spray the orchard for pests even though they may not be a problem, in order to prevent their crop from becoming contaminated. After the complaint from Italy, Zespri's reputation was hindered because consumers in Europe held the perspective that Zespri had low food safety standards, so the kiwifruit were unsafe to consume.

Zespri had to respond quickly to this food safety incident, so they quickly responded by reducing Maximum Residue Levels^(mRLs) to 0.1 mg/kg in order to make their fruit safe again. Zespri growers also developed ~~the~~ ~~their~~ Kiwigreen, which used Integrated Pest Management (IPM) instead of using harsh chemical sprays, and therefore reducing the

chances of having highly contaminated fruit. Zespri has now developed Kiwigreen further to form the 'Zespri System' which integrates IPM, orchard checks, Global GHP certification, and traceability. The Global GHP certificate signifies that the growers have been sustainable in their management practices, so have used less harmful sprays, and so the fruit can be trusted to be safe. This has meant that growers have had to change some of their growing methods, such as having an open canopy to increase the airflow around the fruit to reduce fungi growth, and therefore the amount of fungicides used.

Zespri traceability has seen the reputation of the company improve greatly. For fruit that is sent to Japan, our main Kiwifruit export market, each fruit has a sticker with a QR code. The consumer can buy this fruit and scan it, and it provides information as to where the fruit was grown - it even gives the exact orchard. This provides trust for the consumer that their product is safe, and if there were any safety issues then the problem could be easily fixed and the fruit recalled, without having to recall whole shipments of fruit which would be time consuming and costly. Food safety is now not an issue for Zespri as they constantly check and review their safety standards. This has shifted the consumer perspective to trusting Zespri Kiwifruit, so people will opt to buy our well-known safe products.

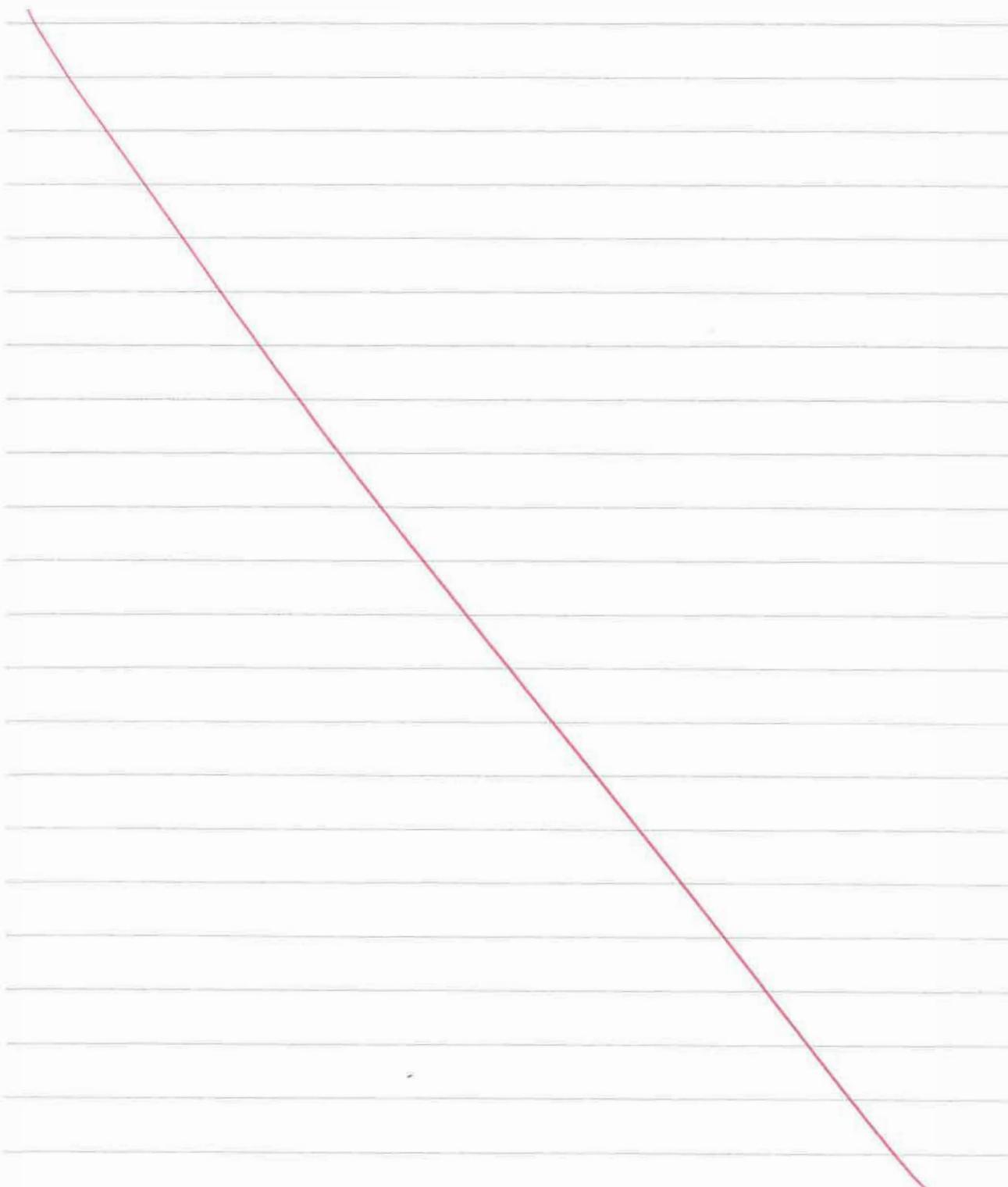
Fonterra claims that food safety is one of the company's most important features, however, the many recent food safety issues prove otherwise. Fonterra follows standards by the GFSI and International Standards Organisation (ISO), and has breached standards many times. Each lot of milk collected is checked at the farmgate. The milk must not contain salmonella, staphylococcal enterotoxins, or clostridium botulinum in five 25g samples, or else the milk will cause significant health issues if consumed. The simplest way to check this is by measuring the bulk milk somatic cell count (BMSCC) which must be below 400,000 cells/ml or else it will contain bacteria that could be harmful. The milk also must be stored under 8°C or else the milk may deteriorate and become unsafe. Farmers should respond to food safety guidelines by checking their cows at every milking for signs of mastitis, and to then take those infected cows out of the milking shed to milk them separately so that the contaminated milk does not go to the factory for processing. However, because some farmers have failed to do so, contaminated milk has been exported overseas, and damaged the reputation of the country.)

In 2013, it was thought that a lot of milk had been contaminated with a bacterium causing mastitis. This saw that 38 tonnes of whey powder were recalled from China, although it was later found to be a false alarm. This breached the 1981 Food Act, so Fonterra was fined \$300,000 for having potentially contaminated food products.

This saw that consumers, particularly in China, found Funtown milk products unsafe and untrustworthy, because of the potential risk to the public the contaminated milk had. This meant that many opted to buy products from Europe or the USA, with some companies, such as Nutreco, terminating their supply from Funtown. This resulted in a \$500 million loss, and took two years for the demand for Funtown products to recover. Many people do not want to risk buying Funtown products in case it leads to health complications, or even death, which occurred during the Melamine contamination of milk in 2010, where six children died after a significant breach in food safety.)

Funtown has tried to maintain higher food safety standards since 2013, as they established a four year food safety programme in order to improve their farm management practices, to win back consumer trust. This food safety programme mainly focuses on having farmers comply with Global G.A.P regulations, having full accountability of the sustainability of all Funtown farmers, and to establish the 'Right First Time' quality metric. This quality metric includes having short term incentives for farmers who consistently have a low BMSCE, and who produce the highest quality milk. This aims to get all farmers to change their farming practices to enable high quality milk to be produced. Eventually these incentives will be phased out, in hope that high quality standards become the norm. This will mean that people will be able to see that

Fertiliser products are safe, and so the demand for those products should increase. //



5

QUESTION TWO: PRICE VOLATILITY AND PRIMARY PRODUCTION SYSTEMS (8 marks)

PLANNING

Use this space to plan your answer to Question Two:

Dairy products

Became volatile after 2008 China FTA (2.5% tariff reduction each year) ✓

2011/12 = \$7.90

2012/13 = \$6.40

2013/14 = \$8.40 → high due to high Chinese demand, low volume from EU due to profitability being low there ✓

2014/15 = \$4.65 → forecast was \$7 ✓

- China stockpiling, producing their own milk ✓
- Russia trade sanctions & Europe (flooded market) ✓
- No UK quotas = increased volume ✓

2015 = \$3.90 → \$210,000 loss for average farmer at the end of the 2015/16 season ✓

~~How will it continue in the future~~

- ~~Impact on sustainability~~ = lower stock rates = soil not as compacted, allows maximum pasture growth for future production ✓
- less money to be spent on improving farm practices e.g. riparian strips etc. ✓
 - low cow numbers = less milk when prices are high ✓

Responses: Reduce amount of milk supplied by 4% ✓

Cull cows - 209,000 cows culled in 2014/15 ✓

Reduce stock feed ✓

Some turned to organics - \$1.75 added to premium

Begin your answer to Question Two here:

The prices of NZ dairy products have been highly volatile over the past few years. This occurred after the China Free Trade Agreement (FTA) was set up in 2008, meaning that tariffs reduced by 2.5% each year, allowing for more milk to be sent to our biggest market of China for cheaper. The FGMP (farmgate milk price) ranged from \$6 to \$7 between 2008 and 2013, but in 2013 there was a rapid increase to \$8.40 /kg MS. This increase was due to the Chinese demand becoming significantly stronger for NZ dairy products, and there was a low volume supplied by Europe because they were only receiving low prices for their milk, so reduced their supply to save money. Farmers responded to this high price by increasing cow numbers and stock feed to boost the supply 11% in the previous season.

In 2014/15 the FGMP was forecast to decrease to \$7, but instead dramatically forecast decreased to \$4.65 /kgMS, which is significantly lower than the break-even of \$5.25 needed to make a profit. This saw that the supply of milk decreased by 4%, and is set to decrease another 2-3% by the end of 2016, as the farmers cannot make a profit from producing milk, so must save money. They did this by reducing the amount of stock feed to reduce the amount of milk production, and also by culling cows. During 2014/15 200,000 cows were culled in order to reduce the herd size and therefore, the amount of milk produced. This allowed them to save money, as they were not making an income but still had to keep producing milk regardless.

The major decrease of price in 2014/15 was caused by multiple factors. China had stockpiled milk powder in

the previous season, so the demand from China was very low, meaning that the price decreased because of the surplus supply on the market with no potential buyers. China also started to produce more of their own milk, although this is expected to phase out as it is not economical for China to produce their own milk compared to buying ours. This should see a rise in the FGMP in 2016/17, so farmers may be able to make a profit again.)

European farmers quickly flooded the dairy products market during 2014/15 due to having trade sanctions with Russia that mean that they cannot supply their milk there. This has seen them turn to other markets, such as China, to earn an income, which has seen the NZ price reduce due to there being an over supply of milk on the market. Farmers in the UK have also increased their supply of milk because quotas on milk production have been lifted. Before 2015 UK farmers were restricted as to how much milk they could produce before they had to start paying large taxes on it. When these quotas were lifted, the supply of milk from the UK also increased, which also contributed to the low FGMP in NZ as there was so much extra milk on the market.)

These factors have also reduced the FGMP in 2015/16 to be around \$3.40/kgms. This is even lower than 2014/15, and so farmers are still having to reduce herd sizes and the amount of stock feed may

give to their cows. It is estimated that the average farmer will lose around \$210,000 by the end of 2016 due to such low milk prices.

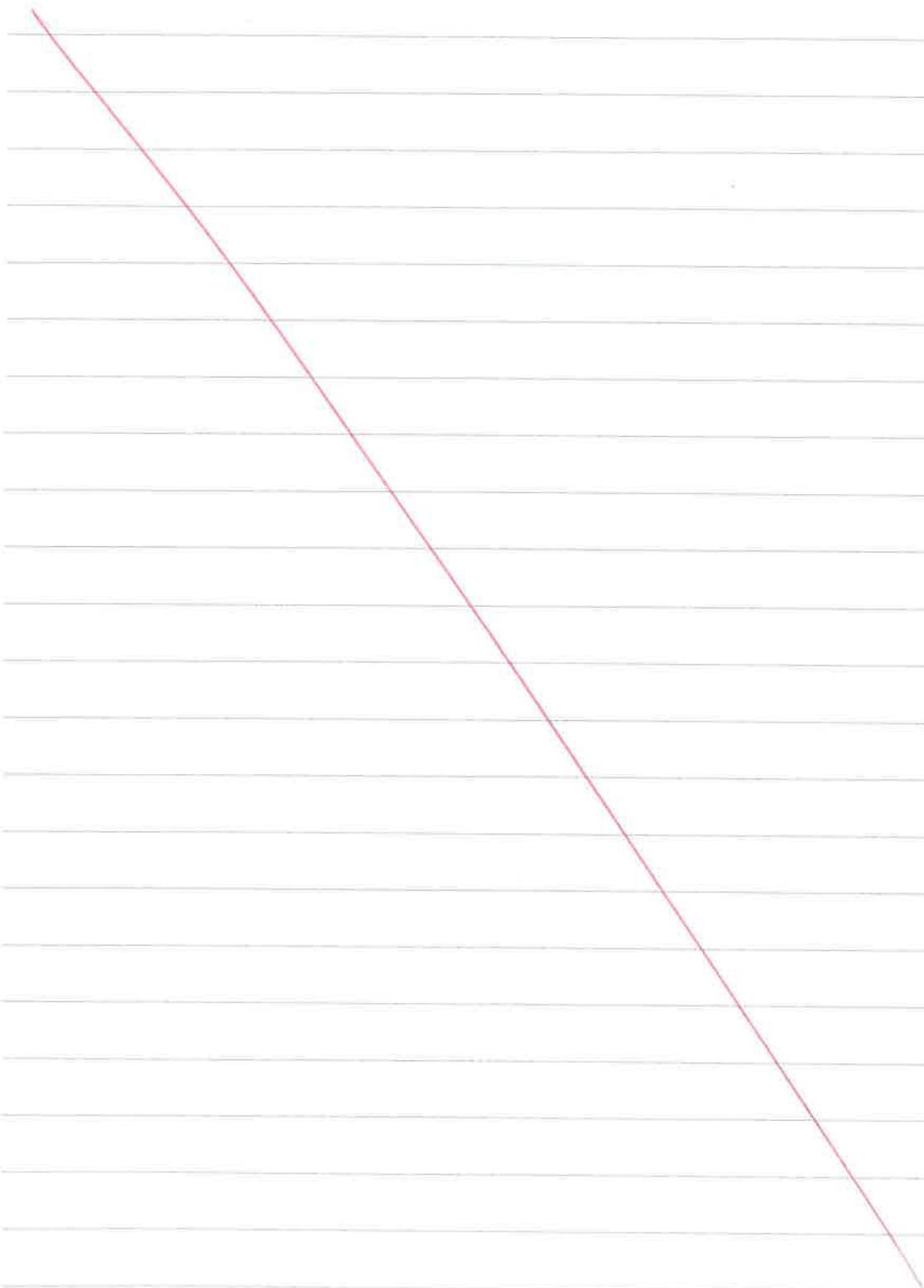
The highly volatile FCMP has had a range of impacts on the sustainability of the dairy industry. For example, culling of cows due to the low FCMP of \$4.65 in 2014/15 ~~sees~~ that the farm land will not get so compacted from having a high stock rate. This allows for greater air pore spaces in the soil to increase pasture growth, allowing for maximum production of milk in the future when the FCMP rises above the break-even. However, the low herd numbers will limit the amount of milk that can be produced, meaning that farmers may have to spend more money to buy cows after the FCMP rises above the break-even again.

Because of the currently low FCMP of \$3.90/kgMS, farmers have to restrict the amount of money they spend on other aspects of the farm, such as riparian planting, wetland maintenance and construction, and effluent management. This may impact on the future sustainability of the farm because of high nutrient concentration in the soil, making it toxic and hard to grow pasture in, so cows will be limited in their milk production and therefore the farmer will be limited in the income he can receive. The farmer may also face fines for high nutrient run-off into waterways if wetlands or riparian strips are not in place to filter much the run-off, meaning that he will lose

out on more money, and may face certain restrictions such as not Furtensor not collecting the milk until he complies with the high safety standards).

In the future the FCMP is forecast to increase to \$6.70 in 2019, however, Furtensor usually mis-calculates their forecasts by around \$1-2. If the price were to remain below the break-even of \$5.25 / kgms then many farmers would have to sell their cows and land as they are losing too much money and cannot make an income.* If the price were to rise above the break-even then the supply of milk should also start to increase with an increase in cow numbers to be able to make the highest profit possible. If the NZD continues to gradually decrease against the USD then the profitability of milk should also increase, and hence the supply from NZ farmers will also increase.

* This means that if the number of farms decreases, then so will the total GDP of NZ because we rely heavily on dairy farming for an income, so when the FCMP rises above the break-even then there may not be as much money coming into NZ. The future of dairy farming will then be quite small compared to what it is now. //



QUESTION THREE: GLOBAL FOOD TRENDS (8 marks)

PLANNING

2 threats

2 opportunities

Use this space to plan your answer to Question Three:

Kiwifruit

Organic green = \$7.37 / tray ✓

Conventional = \$6.01 / tray

wealthy market
will pay high price

Dairy

Organic premium of \$1.75

added to FCLMP

↳ 63% increase in ~~2015/16~~^{2016/17} to
\$9.20 / kgms

O

All growers are global CHP centred = premium markets and people trust it is safe

~~Buy locally trend?~~

- moving into own economy
- eg Europe, Australia

H

Both = NZ has the clean green image, seen as less sprays, environmentally friendly → China + US & cannot offer the same advantage
→ focus outside

F

High food miles while exporting = people think we are far away so expend lots of CO₂

D = 25,000 mj / tonne

UK = 48,000 mj / tonne

↳ needs to be promoted

Begin your answer to Question Three here:

The 'Natural, fresh, and organic' movement create plenty of new opportunities and threats to both the horticultural and dairy industries. One major opportunity is that NZ is perceived as a 'clean green' country, where we do our best to protect the environment and aim to produce all of our food products in an environmentally friendly way. This means that consumers often assume that both dairy farmers and horticulturists in NZ use minimal chemical fertilisers and sprays, and so will be healthier to consume because they are natural and fresh. This provides us a great marketing opportunity to sell our 'natural, fresh' products to the rest of the world, so we will be able to receive high prices, as consumers are willing to pay extra money for safe products. Countries such as China and the USA will not be able to offer the same advantage because of their polluted environment and high use of harsh chemicals, so they are not perceived as natural or fresh, so consumers will not opt to buy those products. This also allows for a higher income to NZ.

Our high animal welfare standards in NZ also create great opportunities in the 'natural, fresh, and organic' movement. In NZ we keep our cows outside in open pasture, so consumers often see marketing of our products featuring cows frolicking in the fields, and in a natural environment. However, in European countries they often keep their cows in barns due to the snow in the winter. This portrays cramped conditions that some people would class as 'cruel', meaning that those dairy products do not sell as well as our fresh and natural dairy products, so

consumers will want to buy our high quality, safe products.

The 'natural, fresh, and organic' movement poses a potential threat to NZ due to ~~the~~ country being geographically isolated and far away from other countries. This means that people expect our products to have high food miles. Food miles are basically a measure of the carbon dioxide emissions that are involved with the production and transportation of food products. This is a very big thing in Europe at the moment, so they tend to buy products that are produced locally as it is seen better for the environment due to having less food miles. Because NZ products are exported long distances, they may not be perceived as fresh or natural, so consumers may not buy them, resulting in an economic loss for NZ. However, recent studies by Lincoln University in Christchurch have found that NZ dairy products actually produce less food miles than that of other countries. The NZ dairy industry emitted 25,000 MJ/tonne of CO₂, whereas the UK dairy industry emitted 48,000 MJ/tonne of CO₂, so our products actually are more environmentally friendly than what people think. This therefore provides a marketing opportunity to NZ to promote our natural, fresh products.

The organic markets of both horticultural and dairy are becoming increasingly popular. MAFESZ experts around 3.5 million trays of organic green fruit, which receives a price of \$7.37 / tray. This is a significant amount

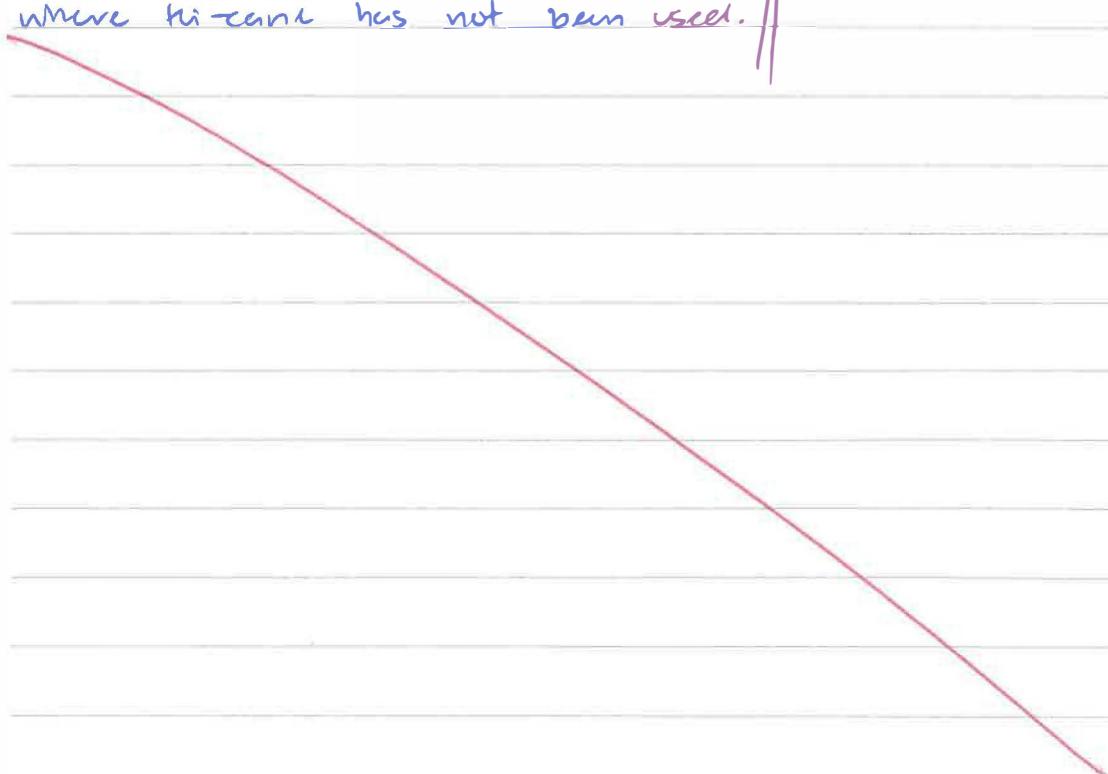
more than conventional green kiwifruit, which only receive a price of \$6.01 / tray (2014/15). Consumers who want to buy our natural, fresh, and organic products are willing to pay the high price because they know that the products are safe to consume. This sees that the kiwifruit industry can make a higher income from high returns from the increasing demand of organic fruit, resulting in a high income for NZ.)

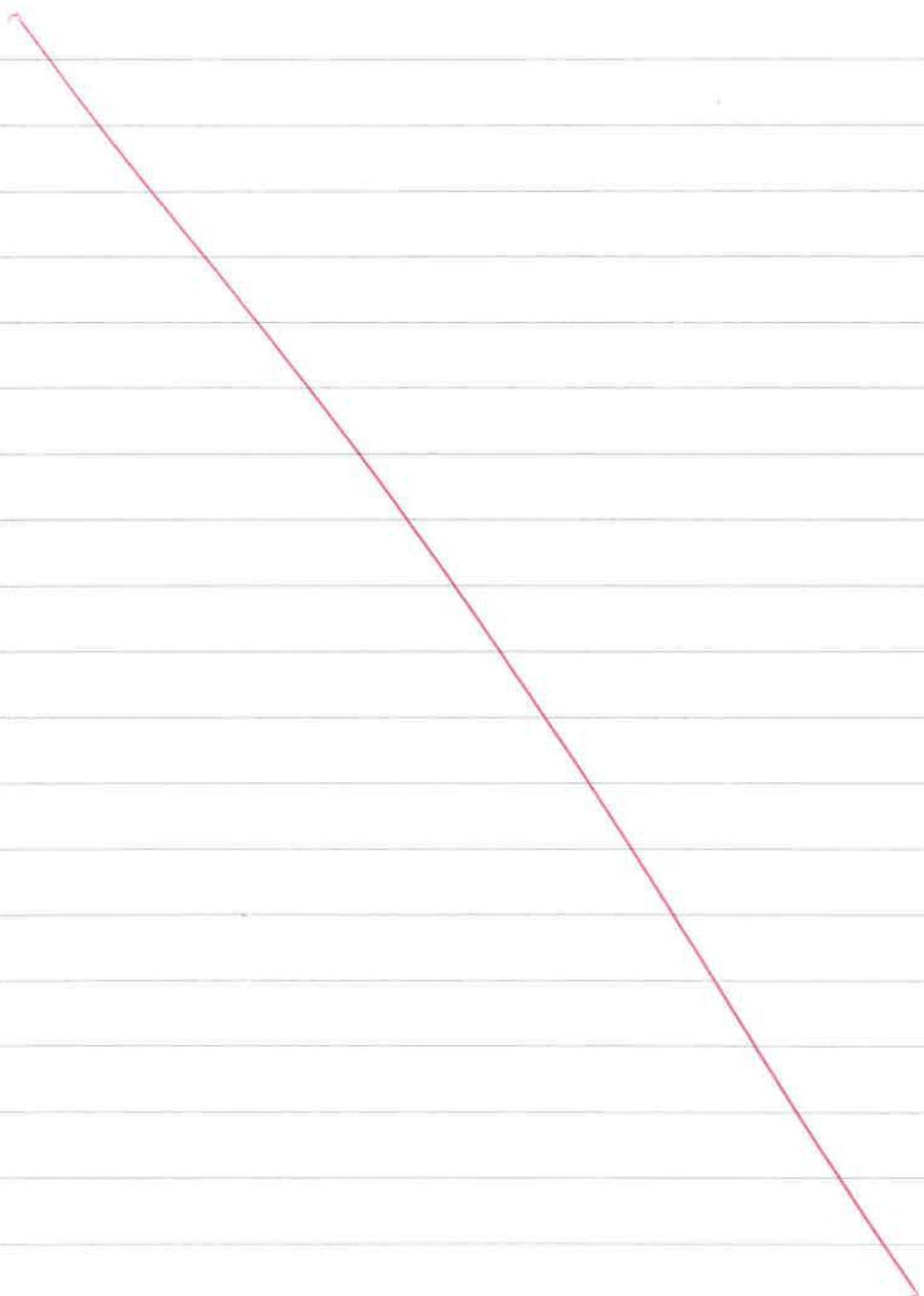
The dairy industry also has the opportunity to expand into the organic market, with 200 farmers already producing organic milk. Organic farmers receive a premium of \$1.75 which is added to the FIMP, and sees that they make a greater income. This is the perfect opportunity for conventional farmers to convert to organics and start to make an income, as conventional milk currently ~~\$4.50~~ is not profitable, however, organic milk is profitable. The pay is forecast to increase 63% for organic farmers to \$9.20 / kgms (includes premium and FIMP) due to the high demand for our ~~for~~ natural, fresh, and organic products, which will continue to increase into the future, as indicated by the organic food sales tripling over the past decade.)

Another threat by the 'natural, fresh, and organic' movement is that the kiwifruit industry may have to make significant changes to their greening practices, such as the application of thi-cane, due to it not being sustainable. Thi-cane is a chemical spray that promotes bud break of kiwifruit vines,

so that all vines break within ~~one~~^{few} days of each other.

This allows for the maximum crop to be able to be sent to ~~international~~ export markets, such as Japan, so the growers can receive the best income possible. However, because this chemical is very harsh, the use of it is being criticised by the 'natural, fresh, and organic' movement. If growers are not able to use this chemical on their conventional fruit then growers will not be able to maintain the optimum crop yield possible, so not all the fruit will be able to be sent over to Japan, especially in time for Golden Week at the end of April/beginning of May, when ~~normal~~ fruit are in ~~high~~ high demand by the Japanese. However, if they continue to use the spray then people may not buy the product because of the high spray rate, and so Tespi could lose out on an income if consumers opt to buy another product where tricaine has not been used. //





Annotations

Scholarship exemplar 2016

Subject:		Agricultural and Horticultural Science	Standard:	93105	Total score:	16
Q	Grade score	Annotation				
1	5	<p>The candidate has chosen food safety within the dairy and kiwifruit production systems as their contemporary issue and has provided relevant evidence of their understanding of the issue as it pertains to the two selected primary production systems. A number of relevant food safety “events” for both products have been discussed in detail and the impacts, consumer perspectives and responses of the production systems to the issue has allowed it to be awarded a Scholarship level mark.</p> <p>This answer is at the Scholarship level of performance.</p> <p>While it has abundant detail and information, it lacks the necessary perception or insight within the discussion that would make it an “Outstanding” answer.</p>				
2	5	<p>The candidate has chosen dairying (milk production) as the specific primary production system around which this question on price volatility has been discussed.</p> <p>A high level of data and detail has been provided within the answer. This outlines the causes of price volatility within milk payout prices – in terms of local and international factors.</p> <p>However, there is no real element of perception within the answer – thus limiting it to a Scholarship level mark.</p> <p>This answer is at the Scholarship level of performance.</p>				
3	6	<p>This question on global food trends has been answered using kiwifruit and dairy as the primary production systems under discussion. New Zealand’s “clean, green” reputation, along with its animal welfare standards, is relevant to the natural-food movement, and has been appropriately discussed.</p> <p>To balance these opportunities, our geographic isolation has been seen as a risk due to the issues around transporting produce to our overseas markets, and consumer preferences for local foods.</p> <p>Once again, relevant data is used to support the candidate’s statements, and while it is a stronger answer than the previous two questions, it is not an “Outstanding” answer.</p> <p>This answer is at the Scholarship level of performance.</p>				