

No part of the candidate's evidence in this exemplar material may be presented in an external assessment for the purpose of gaining an NZQA qualification or award.

SUPERVISOR'S USE ONLY

S

93105A



931051

Draw a cross through the box (X) if you have NOT written in this booklet

☐

+

OUTSTANDING SCHOLARSHIP EXEMPLAR



Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Scholarship 2025 Agricultural and Horticultural Science

Time allowed: Three hours
Total score: 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.

Write your answers 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 2–23 in the correct order and that none of these pages is blank.

Do not write in the margins (///). This area will be cut off when the booklet is marked.

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

Page 1

QUESTION ONE: The impact of the internet and social media

With reference to ONE primary production system, discuss the impact that the internet and social media has had on the production, marketing, and consumption of your primary product.

In your discussion consider:

- what groups, organisations, companies, or individuals have an online presence relevant to your primary production system
- the benefits the internet and social media have on the primary production system
- the threats the internet and social media pose to the primary production system.

Primary production system:

PLANNING

Todd McClay - the us faces an average tariff of 0.8% in new zealand, which is far less than what we face in their export market

Glen Hurel - A small milk company should work...but we need to be efficient with our processing and with our current equipment its hard to be efficient

Stan Robbs "very, very little has been sold"

Vice article - the average farm size increased twofold from 65 to 147ha

Jason Te Blake - If we do not preserve NZ's identity we become apart of someone else's story

"worst since 2000" "chinese consumers are already complaning about fruit quality on social media"

Begin your answer to Question One here:

B *I* U

The internet and social media have fundamentally transformed New Zealand's dairy landscape. Many groups on the production and consumption ends of the dairy industry have begun to connect as new communication channels have emerged. While there have been many advantages, including increased branding, transparency, sales and education, at the same time, many producers have also faced protests and backlash. However, on net, the dairy industry has massively benefited from the internet and social media.

The most direct and obvious positive impact in the marketing and consumption space is that the internet and social media have had on the dairy industry is increased sales. New Zealand, which exports 95% of its dairy products to over 130 countries around the world, historically relied on trade deals to sell dairy products. However, the development of the Global Dairy Trade by Fonterra in 2008 has allowed dairy sales to increase both in scale and efficiency. 30-40% of New Zealand's dairy now runs through the GDT, and it has allowed New Zealand's dairy exports to reach \$23.7 billion in the 2024/2025 season. Additionally, there have also been more B2C (business-to-consumer) sales through advertising. Nowadays, with licenses and certifications like the Ministry of Primary Industries Grass Fed Dairy Standard, dairy companies like Fonterra now have the "100% grass-fed" title by ensuring three criteria over a year: 1) for at least 340 days, cows are grazing on pasture, 2) cows spend a minimum average of 8 hours a day on pasture and 3) that 90% of its diet is grass/ryegrass/clover. As such, Fonterra's "Your Child Deserves 10 Marks" advertisement campaign garnered over 63 million views in its first month in 2015. Subsequently, in the 2016 Singles Day in China, customers became allured by the branding of New Zealand's dairy industry as "premium" and "100% grass-fed." As such, Fonterra was able to amass 12.5 million NZD in 24 hours, selling 12 tonnes of product. Furthermore, through Synlait's partnership with Octonauts, a Chinese cartoon company, they were able to amass over 830 thousand views for their flagship a2 milk products and infant formula, helping bring in sales of over 2 million NZD. These two examples demonstrate how, through strategic advertisement, companies can bring increased sales and revenue by targeting consumer areas where there is high demand.

That being said, even though sales have a magnified increase when advertised, this mechanism also works in the opposite manner. When there are certain crises or concerns within the dairy industry, many of our exporting nations may quickly retract imports, harming dairy farmers. For example, in 2013, there were myths of Botulism, a devastating disease that would contaminate cows and hence their dairy products, spreading in bovines across New Zealand. This immediately led to China and Russia, amongst other countries, temporarily banning New Zealand dairy exports. While this was only misinformation and the Ministry of Primary Industries swiftly recovered, this case demonstrates how misinformation and conspiracies can gravely affect dairy producers. Another example of where misinformation can take place was through the Bovaer claims. Organisations like Greenpeace New Zealand claimed that Bovaer, an additive which can be used to reduce methane emissions in dairy cows by up to 90%, was being used in cows across the nation. Even though Fonterra quickly came out with a public statement stating that "Bovaer has not been allowed to be used on farms in New Zealand," countries like China reacted negatively. As such, while there is a trend of increasing sales due to strategic advertising, there are also many dangers and potential harms due to misinformation that could decrease sales.

A secondary effect in regards to marketing and consumption is also increased transparency and efficiency in the dairy industry. Before the Global Dairy Trade was established, deals were often administered behind closed doors, and trade deals took a long time to come into effect. However, now, all deals and financial reports are published on the Global Dairy Trade websites as well as Fonterra's website, with FY earnings published every year. This has increased confidence in consumers and producers that make up the Fonterra Co-operative. However, while there may be increased transparency and efficiency, this also leads to heightened volatility. Since May 2025, prices on the Global Dairy Trade have dropped by over 15%, resulting in a decline in sales in Q3 this year relative to other years. Whereas trade deals are able to provide more stability for organisations like Fonterra as they have a clear forecast of the future, the Global Dairy Trade has meant that the 30-40% of product that runs through it is subject to supply and demand, which affects producer confidence and thus reduces investment.

In terms of production, one of the largest benefits for dairy farmers is increased education and increased collective bargaining power. By establishing groups like the New Zealand Dairy Facebook Group Chat, over 200 thousand farmers can come together and support each other. Often, issues that farmers face are quite niche, meaning that local farmers may not have the expertise. However, by banding farmers together, they are not only able to help educate each other but are also able to support each other in times of crises, eg, Cyclone Gabrielle. When I visited the page, I saw very specific tools and suggestions that were made, including tyre-rollers and innovative ways to reduce pugging. Additionally, there is also collective bargaining power. One farmer alone would struggle to effect change at the regional and national levels. However, through the internet and effective coordination, dairy farmers have been able to protest governmental policies. For example, after the Viral Muddying photos - where cows were knee deep into wet mud during the winter forst - became viral in 2019 and 2020, producers quickly protested. This led to the Ministry of Primary Industries responding with a Winter Grazing Taskforce, and a pan-sector action group has recently been established to implement the taskforce's 11 key recommendations. Another instance of this is the Groundswell protests in 2020, where, through the internet, over 14,000 farmers rode their tractors into city centers across the nation to protest against policies that would impact farmers, eg, the Ute tax.

However, this mechanism also oppositionally, just like with marketing and consumption. Protests from groups like Greenpeace, through posts shared online about how "Fonterra's Cows Cook the Climate" and other messages, have allowed these climate action groups to file lawsuits against Fonterra's claims of being "100% grass-fed" and degrade their reputation. This puts downward pressure on farmers. Importantly, smaller producers, which are not a part of organisations like Fonterra and protest groups, are most gravely affected. Because Fonterra exports the majority of New Zealand's dairy, it naturally has the most funds and marketing capital to establish a great presence online to market its products. This means that many other producers are locked out of the marketing space. For example, Glen Hudel, the owner of the Happy Milk Company, had to close down his factory in 2018 due to being outcompeted. He originally wanted to create a small farm where he would be able to sell products in recycled bottles and embrace sustainability and kaitiakitanga. However, he stated that "a small milk company should work...but we need to be efficient with our processing, and with our current equipment, it's hard to be efficient." With a lack of marketing and presence online, their products weren't being sold, and he lacked funds to invest in better equipment. Only through local advertisement and support were they able to restart their brand. As such, while social media is able to benefit the large monopolies and oligopolies of the New Zealand dairy industry, many are also excluded from such benefits. However, with the development of social media, it is clear that cases like these have been brought to the forefront of our attention. Before the rise of social media, many cases like these would remain unseen by the public. Thus, support for local producers is steadily increasing and will improve in the future.

Finally, politicians also use the media to threaten the dairy industry, although it often has little effect. Recently, Fonterra has stated that it would be selling its brands like Anchor and Mainland to the world's largest dairy producer, Lactalis, for more than \$4 billion. Ministers like Winston Peters have made media statements that this is "economic self-sabotage," stating how Lactalis would be able to terminate Fonterra as a supplier within "three years," ruining the dairy industry for farmers. However, as Fonterra is owned by its respective shareholders, there is little that ministers can do, unless it is a bill.

In conclusion, social media has resulted in a myriad of benefits and harms to New Zealand's dairy industry. While it is able to bring increased sales, transparency, education and collective bargaining power for farmers in New Zealand, it has also resulted in volatility, protests and lawsuits, with a particularly large effect on smaller producers who are not a part of cooperatives like Fonterra. However, all in all, the media is what has allowed us to become knowledgeable of such events, and the benefits are able to offset the harms and will likely continue to do in the future as technology improves and governments improve equity.

Page 2

QUESTION TWO: Diversification within primary production systems

A strawberry grower selling high quality fresh fruit, frozen seconds, and strawberry icecream or jam with low quality fruit.

Kiwifruit growers producing Hayward, Sungold, and RubyRed kiwifruit.

A sheep and beef farmer planting pine trees on steep hill country for logs or carbon credits.

A sheep and beef farmer adding agritourism to their production system, including accommodation and activities, such as horse rides and fly fishing.

A producer growing a range of apple varieties to send to different markets.

With reference to TWO primary production systems, discuss how primary producers have diversified their production.

In your discussion consider:

- how the primary producers have diversified their production
- what the drivers for diversification were
- comparing your TWO production systems' ability to diversify from their current production system.

Primary production system (1): Dairy

Primary production system (2): Kiwifruit

PLANNING

Begin your answer to Question Two here:

B I U     

Over the past few decades, both the dairy and kiwifruit industry in New Zealand have rapidly diversified their production. Through pressure from consumers for new and innovative products and technological advancements, diversification has ensued. Importantly, diversification has occurred not only through product diversification but also through the production processes.

In terms of product diversification, both the dairy industry and the kiwifruit industry have seen quantum leaps through stratification of niche markets, although the dairy industry has been able to diversify more due to the capital for investment. In terms of the dairy industry, brands like Fonterra and Synlait have innovated to create new products. The drivers for Fonterra's diversification were the demand for different niches in various markets, resulting in exports for Whole Milk Powder decreasing from 45 to 41% this year, allowing more room for speciality products. For example, certain consumers demanded products like chocolate milk, ice cream and cheeses, hence the creation of Fonterra's Primo, Kapiti and Perfecto Italiano, respectively. Internationally, Fonterra has established brands like Fonterra NZMP (New Zealand Milk Products), which sells products like Lactoferrin, a bacterium that supports the gut, as well as Milk Fat Globular Membrane, a product that aids brain development, to 1000+ consumers in 100 countries. Synlait developed the A2 Milk Company, which was a technological innovation that resulted in milk that only contained beta-casein protein for better digestibility. Additionally, new varieties of milk are also regularly increasing. This includes sheep milk farms (4 in 2014 vs 30 in 2021) like FernGlen, goat milk farms (92 now), and chocolate-milk and organic products like those of Lewis Road Creamery (which owns 50% of the organic milk market).

In terms of the kiwifruit industry, Zespri, the 'single point of entry' for kiwifruit in New Zealand, has diversified its products by creating different varieties of kiwifruit like SunGold3 in 2012, Sweet Green (G14) and its newest addition, Ruby Red. There also exist purely Organic versions of each of these varieties, and smaller varieties like the Kiwiberry. Additionally, kiwifruit producers have embodied the "circular economy." On Oakdale farm, kiwifruit producers can sell products like kiwifruit juice (costing up to \$140 for a bottle of 6), and other producers like Kiwifruit Leather Innovations have created sustainable leathers. Both the kiwifruit industry and the dairy industry have been able to diversify their products.

The drivers for such diversification have primarily been similar in both industries, with increasingly niche markets. With better marketing teams, the dairy and kiwifruit industry has been able to segment markets into high and low-income buyers. Products like infant milk formula, Mainland Butter and kiwifruit juice are targeted at those with high income and who are expecting children, while products like regular kiwifruit and Anchor milk are for regular everyday consumers. However, the dairy industry is able to diversify far more than the kiwifruit industry, as it has more capital to pour into research and development. Fonterra regularly invests \$100 million in R&D, while Zespri only invests \$25 million into research and development. Fonterra has recently invested \$75 million in its Clandesboye farm for butter, \$75 million in Studholme for protein, and \$150 million in its Edendale farm for UTH cream. This has allowed Fonterra to extract proteins, create dried powders and other products, whereas Zespri remains singularly focused on kiwifruit. Kiwifruit may also be hard to diversify, especially as cultivating new breeds takes a significant length of time.

In terms of diversification from a perspective of production perspective, the dairy and kiwifruit industries have diversified their production processes very differently. The dairy industry has remained focused on expanding production within New Zealand, and are focused on sustainability and expanding into new industries. Due to climate change and rising temperatures, traditionally dairy-heavy areas like Waikato are becoming increasingly unfit for production. As such, farms have begun to move south. In addition to the aforementioned investments in butter, protein and UTH cream production, there are just more cows in the South Island now. Waikato currently has the greatest share of cows (22.9%), but this is rapidly decreasing: Southland has just increased dairy numbers from 300,000 to over 600,000 over the past decade, and Canterbury has grown from 130,000 to 1.1 million from 1980 to 2024. By also investing in plantains, riparian plants, condensed tannins and legumes, there is also more diverse biodiversity on farms, resulting in methane reductions of over 20%. Furthermore, the dairy industry has traditionally used Friesian cows in its production, as these were typically cows with the greatest milk yields. Now, bobby calves are increasingly being bred with beef bull semen (81% now undergo artificial insemination), meaning not only are there greater milk yields, but also greater beef yields. As such, the dairy industry is now responsible for 70% of beef in New Zealand as well.

Whereas the kiwifruit industry has focused more on diversifying outwards, incorporating new varieties and technology in its production process. Jason Te Blake, CEO of Zespri, recently stated that "consumers want more kiwifruit, and they want it all year long." As such, Zespri has invested in 420 ha of kiwifruit farms in countries like Italy, France, South Korea and Japan, which are now responsible for 12% of Zespri's exports and bring in \$652 million in revenue. Additionally, since the Psa-V outbreak in 2010 harming 40% of farms producing 16HortA over 2 years, Zespri fast-tracked the SunGold3 variety in a short matter of 2 years, and it has since then become the most grown kiwifruit variety, making up 50-65% of exports. Other varieties, like the Hayward Green variety, are deemed to become "marginal by 2050." Finally, regarding technology, Zespri has worked the Plant and Food Research and AJ Scarfe from Massey University to create a) an AI sorter with 96% accuracy and b) an autonomous kiwifruit picker.

Comparing the two industries, it is clear that both industries have diversified their means of production significantly. The drivers for such diversification were vastly different; for the dairy industry, it was to improve sustainability, increase variety for more income, and fight against climate change, whereas for Zespri, it was driven by disease, global demand in new markets, and the need for efficiency to accommodate said demand year-round. Although the factors were different, the overarching goal towards increased profitability and economic sustainability in the long run remains the same. As such, both are continually able to diversify from their current production system, especially with technology becoming exponentially more powerful. Data sharing platforms like MINDA LIC will allow producers to continually optimise and diversify their production processes.

In conclusion, both the dairy and kiwifruit industries in New Zealand have rapidly diversified in both the products they sell as well as the production processes. The drivers are broadly similar for product diversification - that being increased niche markets, but are widely different for production processes. Whereas the dairy industry is focused on sustainability and variety, the kiwifruit industry has evolved due to disease, global demand, and efficiency. Both will increasingly be able to diversify with advancements in technology, although the dairy market is currently much further ahead due to the differences in investment, as well as differences in the time it takes to innovate. However, both have retained a focus on being New Zealand-based. As Jason Te Blake puts it best, "If we do not preserve NZ's identity, we become a part of someone else's story."

Page 3

QUESTION THREE: Economic sustainability

With reference to ONE primary production system, discuss how primary producers navigate social and environmental expectations to achieve economic sustainability.

In your discussion consider:

- the social factors / expectations influencing the producer
- the environmental factors / expectations influencing the producer
- the positive and / or negative impact the above factors have or may have on the profitability of the primary production system.

Primary production system:

PLANNING

Begin your answer to Question Three here:

B *I* U

The dairy industry has hitherto faced a myriad of social and environmental expectations that, in the short run, harm profitability, but in the long run will have compounding gains as the industry gains more trust and ecosystems are better retained. This allows the dairy industry to achieve better economic sustainability. It is important to note that oftentimes, social factors and environmental factors complement each other and are heavily interlinked, which collectively exacerbate the crisis farmers currently face.

In terms of social factors and expectations, dairy producers have to consider a significant number of variables. Firstly, dairy producers have pressure internationally and nationally to ensure the premium quality of their produce. This primarily comes through branding, and there are often significant compliance costs. In the Dairy Industry, there are primarily three licenses and certifications that producers can rely on: 1) the MPI Grass Fed Dairy Standard, 2) the Fernmark Certification and 3) the Synlait Lead with Pride Certification. Each of these licenses and certifications ensures that dairy producers conduct their farms responsibly. Another way that New Zealand producers have tried to navigate this expectation is through direct connection with the consumer. For example, in Annum, a Fonterra dairy product based primarily in South East Asia, products often have QR codes at the back, which consumers can scan to show them directly where and how the milk was sourced from.

Secondly, dairy producers must also consider their image outside of licenses. New Zealand, unfortunately, slaughters over 2 million bobby calves every single year, an act which has been deemed by organisations like Greenpeace as highly "unethical." Through documentaries like The Dark Side of Dairy, New Zealand's dairy industry has faced backlash for not meeting ethical standards. In response to such claims, New Zealand dairy producers have as such had to continually improve and upgrade facilities, and face compliance like the Farm Environmental Plans (FEP), which require farmers to provide a report in regards to future management.

Thirdly, another factor that dairy producers have to consider is their Corporate Social Responsibility (CSR). If Fonterra is not heavily engaged with its local markets, the company can be seen as purely "profit-oriented" and exploitative of farmers. Hence, at the communal level, producers have tried to navigate this issue by sponsoring many projects. For example, Fonterra funds many breakfast programmes, ensuring that secondary and primary school students are able to have a "warm" meal before they start learning.

Finally, another social factor that is gravely affecting farmers is social tensions around the globe. The Trump Administration has recently imposed a 15% tariff on New Zealand. Minister Todd McClay has complained about this, stating, "The US faces an average tariff of 0.8% in New Zealand, which is far less than what we face in their export market." As such, to navigate these sociopolitical tensions, New Zealand dairy producers have navigated this issue by placing pressure on local governments to continually diversify its export market. It has recently updated and signed Free Trade Agreements with Australia and ASEAN (AFTA), the United Arab Emirates (NZUAE FTA 2025) and is currently in discussion with India for a Free Trade Agreement. Through lobbying and collective bargaining power, producers are now able to export more than 99% of their dairy products tariff-free to those respective markets.

In the short run, obtaining these licenses, ensuring ethical behaviour, funding these projects and lobbying governments creates significant economic costs - keeping a standard like FernMark can cost thousands every year, and lobbying requires massive investment from companies like Fonterra. This would decrease profitability, often significantly. However, in the long run, by strategically complying with and navigating these costs, producers will maintain the reputation of New Zealand's "clean, green" and "premium" image and will improve profitability as consumers trust the dairy industry and are willing to pay higher prices for its higher-quality products.

In terms of environmental factors and expectations, there are also many variables. Firstly, the largest one is climate change. Dairy producers have faced significant amounts of backlash and pressure from environmental activist groups in recent years, with organisations like Greenpeace arguing that dairy producers are unsustainable due to using Palm Kernel (PKE) while feeding their cows. As such, Fonterra had to respond by creating a non-binding limit for producers at 3kg/cow/day to ensure sustainability. This significantly increases costs, as farmers must switch to a) more costly and b) more environmentally friendly alternatives like condensed tannins and legumes like clover. This has placed significant economic pressure on farmers.

Secondly, another environmental factor, perhaps the most important one, that affects farmers is climate change. As temperatures increase in areas around New Zealand, eg, Canterbury, with a Temperature Humidity Index (THI) rising to 68-75, areas are continually pressured to be environmentally sustainable. The agriculture industry is responsible for 44% of New Zealand's greenhouse gas emissions, and 44% of that is methane from dairy. This has resulted in the need for more irrigation as there is less rainfall / more acidic rainfall, meaning it is unsuitable for the plant species on farms.

To navigate such scenarios, dairy farmers have worked bit by bit to respond to these claims and become more environmentally friendly. For example, Fonterra has committed to phase out coal by 2037, and Synlait has the same goal but by 2030. Additionally, Fonterra has recently invested \$1 billion into sustainability, building more agriculturally sustainable farms and ensuring standards are being met. Furthermore, farmers are also now investing in more resilient solutions, like red seaweed, which will reduce methane emissions in cows by up to 90 times, and plantations like plantains and riparian buffers to reduce methane emissions by 20%. Companies like AgResearch are now also in the process of breeding cows that will release 15% less methane, due to be rolled out within the next five years.

Even though this creates far more economic costs in the short run, farmers will ultimately benefit in the long run. Irrigation systems, especially on large farms that can span tens of hectares, significantly harm profitability. However, as we continually invest in smarter systems, technology will improve through data-sharing platforms like MINDA, and as we begin to transition to AI (like recent technology which scans the 66 million bags of milk powder with 90%+ accuracy), we will slowly be able to optimise and navigate tough environmental pressures.

However, it is important to note that oftentimes, social factors and environmental factors complement each other and are heavily interlinked. Naturally, by adhering to social expectations, many environmental benefits will come along as well - increased funding, and more revenue as more products are being sold. Similarly, by complying with environmental factors/expectations, many social expectations will slowly fade away - as gene breeding programmes become optimised, we will no longer need to slaughter as many cows. The inverse is also true, meaning exacerbated and exaggerated negative effects for dairy farmers.

In summary, there have been several social and environmental factors and expectations that farmers in New Zealand are pressured to meet. In terms of social factors, these include maintaining premium branding, ensuring an ethical code of conduct and communal interaction, as well as international trade pressures stemming from social issues. In both instances, producers across the country have sacrificed short-term gains for more promising and profitable futures. There is light at the end of the tunnel, and dairy farmers must push a bit more before they achieve economic sustainability.

Outstanding Scholarship

Subject: Agricultural and Horticultural Science

Standard: 93105

Total score: 21

Q	Score	Marker commentary
1	07	The candidate provided an insightful response how producers and the wider industry have benefitted from the use of the internet and social media. The candidate also provided an insightful response of the threats that the internet and social media pose to the industry
2	06	The candidate has provided a highly developed response on how dairy and kiwifruit producers can diversify their production. They have shown critical thinking into the drivers of diversification and how the producers are able to further diversify.
3	08	The candidate has provided a perceptive response into how primary producers are able to remain economically viable while navigating social and environmental expectations. The candidate has shown insight into the increased costs to meet expectations, but also the increased returns to producers. The candidate made a prediction based on their process with supporting evidence.