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RURAL LEADERSHIP
PROGRAMME

Balancing Profit and Environment:

Insights from New Zealand's Leading Dairy Farms

Kellogg Rural Leadership Programme | Course 53 2025
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Executive Summary

This research project explores the balance between profitability and environmental sustainability in New Zealand's top-performing dairy farms. By analysing DairyBase data and conducting qualitative interviews with leading farmers, this report identifies key management practices, values, and philosophies that contribute to both economic and environmental success. The study highlights that profitability and sustainability are not mutually exclusive. The top-performing farms don't have to choose between making a profit and looking after the environment. The best farmers show that smart choices and caring for the land can go hand-in-hand. But it's not all straightforward. Farmers still face plenty of hurdles like changing rules, unpredictable weather, and tight budgets.

The findings reveal that efficient pasture management, attention to animal health and welfare, detailed monitoring, and data-driven decision-making are common practices among high-performing farms. These farms also prioritise financial prudence, keeping farm working expenses low and focusing on profitability. Core values such as integrity, honesty, hard work, and family involvement play a significant role in their success. Community and knowledge sharing through participation in discussion groups and industry organisations foster continuous improvement.

Environmental sustainability practices, such as reducing nitrogen use, maintaining soil health, and minimising environmental impact, are crucial for the long-term viability of dairy farms. The study emphasises the importance of a balanced approach that integrates profitability with sustainability. The research highlights the need for ongoing education and support for farmers to adopt best practices, highlighting the role of community and social interactions in shaping farmers' decisions.

The interviews provide practical examples of how farmers implement these practices, such as adopting organic farming methods or low input systems, which align with the literature's emphasis on environmental sustainability. Farmers use tools like DairyBase and Overseer to track performance and make informed decisions, ensuring that their practices are both economically viable and environmentally responsible. The focus on reducing nitrogen use and maintaining soil health is evident in the interviews, aligning with the literature's emphasis on sustainability indicators.

By adopting best practices and leveraging shared knowledge, farmers can achieve a balance between profitability and sustainability, ensuring the long-term success of their farming operations. This holistic approach not only benefits the environment but also enhances the resilience and economic viability of dairy farms. The collective effort of farmers, industry leaders, and policymakers will be essential in achieving a resilient and prosperous dairy sector in New Zealand.

Acknowledgements

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CoPilot AI has been utilised in this report to refine language and enhance clarity.

1. Introduction

Historical Context

Dairy farming in New Zealand traces its origins to the early 1800s, when it was largely a modest, family-run enterprise. Farmers typically hand-milked their cows and produced butter and cheese for local use. A pivotal moment arrived in 1882 with the advent of refrigerated shipping, which opened the door to international trade. For the first time, dairy products like butter and cheese could be exported to markets around the world. This development laid the groundwork for New Zealand's emergence as a key player in the global dairy trade.

The establishment of the New Zealand Dairy Board in 1923 further accelerated the sector's expansion, offering a coordinated approach to marketing and export. Another turning point came in 1952 with the introduction of the herringbone milking shed, a design that enabled farmers to handle larger herds more effectively. Since then, a steady stream of innovations—such as rotary milking platforms and automated systems—has continued to improve efficiency and output.

Over time, farm management methods have also evolved. The transition from traditional pasture-based setups to more intensive operations has boosted milk yields, but not without consequences. Environmental concerns have become more pressing, prompting a shift in recent years toward more sustainable farming approaches. These changes have been driven in part by regulatory reforms and growing consumer awareness around ecological issues. For example, more shoppers are seeking products with lower carbon footprints, animal welfare certifications, or regenerative farming claims. Brands like Allbirds have responded by publishing the carbon footprint of each product and promoting the use of natural, renewable materials. Globally, the rise of eco-labels and sustainability marketing reflects a broader shift: consumers increasingly want transparency, accountability, and proof that their purchases align with their values.

Global Perspective

New Zealand's dairy sector differs markedly from those of many other major dairy-producing nations. A key distinction is its reliance on pasture-based systems, with cows typically grazing outdoors for most of the year. This approach supports low-cost production and reinforces the country's "clean, green" brand. However, it also introduces its own set of challenges, particularly in managing pasture health during times of drought or heavy rainfall.

In contrast, nations such as the United States and the Netherlands tend to rely more heavily on intensive systems, where cows are kept indoors and fed controlled rations. While these systems can deliver higher per-cow yields, they often come with increased operational costs and significant environmental impacts—including higher greenhouse gas emissions and nutrient leaching.

Geographic isolation adds another layer of complexity to New Zealand's dairy landscape. While it helps protect livestock from many global diseases, it also demands robust biosecurity protocols. Moreover, with the industry heavily dependent on exports, it is highly sensitive to global economic shifts and international trade dynamics.

Nonetheless, New Zealand remains a recognised leader in dairy production, renowned for the quality of its products and forward-thinking practices. Its strong emphasis on environmental responsibility and sustainability continues to offer valuable insights for the international dairy community.

2. Purpose

The author (and partner) purchased their first dairy farm in 2022. Their vision for their farming business is;

'Proud dairy farmers who positively impact our environment and our community'

To positively impact their environment, they recognise the necessity of being a profitable business. As Bruce Wills aptly stated in the Waikato News, "*One thing all these farmers will tell you is to be green, you must be in the black. Fencing waterways, planting trees, protecting biodiversity, and implementing effective effluent systems all require financial investment*" (Wills, 2012)

The questions they wanted answered were;

1. Are there farmers out there who are both profitable and who are positively impacting their environment?
2. What values drive their behaviour?
3. What does the research say both about profitable and environmentally sustainable farms and how farmer behaviour is influenced?

This research project aims to answer these questions.

3. Literature Review

3.1 Introduction

The balance between profitability and environmental sustainability in dairy farming is a critical issue facing the agricultural sector. This literature review explores existing research on the impact of farming practices on environmental outcomes. However, it does not address the connection between environmental and economic sustainability due to a lack of available studies.

The review covers studies on farming intensification, environmentally friendly grazing practices, sustainability indicators, the balance between conventional and organic agriculture, and farmers' decision-making processes.

New Zealand's dairy sector faces environmental challenges particular in the areas of nitrate pollution in waterways and biogenic methane into the atmosphere. The dairy sector is a major source of enteric methane emissions and while debate continues on how to account for these emissions, industry and government are clear; emissions need to decrease.

Since the early 1800s, New Zealand's dairy industry has undergone significant transformation — from hand milking to mechanisation, the advent of refrigerated shipping

in 1882, the establishment of the Dairy Board in 1923, and the introduction of the herringbone shed in 1952, which enabled farmers to milk far greater numbers of cows more efficiently.

3.2 The Impact of Farming Intensification on Milk Production

How can farming intensification affect the environmental impact of milk production? This study (Bava, Sandrucci, Zucali, Guerci, & Tamburini, 2014) examined the relationship between farming intensification and the environmental impact of milk production in northern Italy. The evolution of dairy farming in Italy has seen a decrease in the number of dairy cows (from 2.6 million in 1980 to 1.6 million in 2012) and an increase in the number of cows per farm (7.9 up to 31.8 in the same period).

The authors found that intensification can lead to increased environmental pressures due to higher inputs and outputs. However, they also noted that efficient management practices can mitigate these effects. Key strategies include optimising feed efficiency, improving effluent management, and adopting precision farming technologies. The study highlights the importance of balancing intensification with sustainable practices to minimise environmental impact.

It must be noted that the study showed high variability among the farmers and that the way to produce the most environmentally friendly milk was not clearly identified.

The implications for New Zealand dairy farmers are getting the balance right between herd efficiency and farming intensity to reduce environmental impacts. This study assessed the environmental impact per milk unit but concluded that it was difficult to identify the relationship between farming intensity and environmental performance. However, the principal component analysis "showed that some characteristics related to farming intensification, particularly milk production per cow, dairy efficiency, and stocking density, were negatively related to the impact per kilogram of product; this suggests a role of these factors in the mitigation strategy of the environmental impact of milk production on a global scale" (Brava et al., 2014, p. 4591-4592).

3.3 Transitioning to Environmentally Friendly Grazing Practices

(Brasileiro-Assing, Kades, de Almeida Sinisgalli, Farley, & Schmitt-Filho, 2022) analysed the performance of dairy farms in Santa Catarina, Brazil, that have transitioned to environmentally friendly grazing practices. The findings indicate that such transitions can improve both sustainability and profitability. The study emphasises the need for careful planning and management during the transition period. Key practices include rotational grazing, maintaining soil fertility, and reducing reliance on synthetic inputs. The study provides valuable insights into the benefits and challenges of adopting environmentally friendly practices in dairy farming.

There are limited implications for New Zealand dairy farming as on the whole NZ already implements rotational grazing, known as the Voisin Rotational Grazing System in this study.

3.4 Sustainability levels in Irish Dairy Farming (Micha et al., 2017)

Irish milk production was restricted due to a milk quote system introduced by the European Union in 1984. The removal of quota regime in April 2015 presented an opportunity for Irish dairy farmers to increase production with the Irish Government introducing a Food Harvest 2014 Strategy aiming to increase milk production by 50% in the first five years following milk quote removal (against a base period; 2007-2009).

The research categorises Irish dairy farms based on their sustainability performance indicators (Micha et al., 2017). The study identifies different farm types, each exhibiting varying levels of sustainability. Key indicators include greenhouse gas emissions, nitrogen surplus, and biodiversity. The findings suggest that tailored management practices are essential for improving sustainability across different farm types. The study highlights the importance of using sustainability indicators to guide decision-making and policy development in the dairy sector.

The findings from this study align with existing literature on the importance of efficient resource management and environmental sustainability. The study also highlighted the need for a balanced approach that integrates profitability and sustainability. Challenges include the need for ongoing education and support for famers to adopt best practices.

Implications for New Zealand Dairy farmers are;

1. **Use of Sustainability Indicators:** The importance of using sustainability indicators to guide decision-making and policy development is highlighted in the study. New Zealand dairy farmers can implement indicators such as nitrogen surplus, greenhouse gas emissions, and biodiversity to monitor and improve their farm's sustainability performance. These indicators can help farmers make informed decisions that balance economic goals with environmental responsibility.
2. **Policy Development:** The findings suggest that effective policy development should be based on sustainability indicators. Policymakers in New Zealand can use these indicators to design policies that incentivise sustainable farming practices and support farmers in their transition to more environmentally friendly methods. This can include providing resources, education, and financial incentives to encourage the adoption of sustainable practices.
3. **Improving Sustainability:** The study highlights the varying levels of sustainability among different farm types. New Zealand dairy farmers can focus on improving sustainability by adopting best practices from the most sustainable farms. This can include measures to reduce nitrogen surplus, enhance soil health, and promote biodiversity. By learning from the experiences of other farms, New Zealand dairy farmers can enhance their own sustainability performance.

3.5 Conventional vs. Organic Agriculture

This study challenges the binary view of organic vs. conventional farming and advocates for a hybrid approach to sustainability (Tal, 2018). The study concluded that while the demand for organic products has increased around the world that the data suggests that where responsibly run conventional agricultural operations may actually cause less environmental damage than large scale, organic farming operations. That rather than clinging to a given ideology, sustainable practices that improve environmental performance should be integrated into all farming operations.

It suggests that conventional farms can adopt key organic principles—such as reduced chemical input and enhanced soil health—while maintaining high production levels. Key recommendations include integrating organic practices into conventional systems, such as using cover crops, reducing chemical inputs, and promoting biodiversity. Rather than sticking strictly to 'organic' or 'conventional' labels, the article encourages mixing the best of both to find what really works on the ground

Research indicates that organic dairy farms often have lower stocking rates, leading to reduced methane emissions per hectare but higher emissions per unit of milk produced. The adoption of hybrid models that incorporate the best of both systems could provide an optimal balance of productivity and sustainability.

The implications for New Zealand dairy farmers include;

1. **Adopting Hybrid Models:** New Zealand dairy farmers can benefit from adopting hybrid models that integrate the best practices from both conventional and organic farming. This approach can help achieve a balance between high productivity and environmental sustainability.
2. **Reducing Chemical Inputs:** By reducing chemical inputs, New Zealand dairy farmers can improve soil health and reduce environmental impact. Practices such as using cover crops and organic amendments can enhance soil fertility and reduce the need for synthetic fertilisers.
3. **Promoting Biodiversity:** Integrating practices that promote biodiversity can lead to healthier ecosystems and improved farm sustainability. New Zealand dairy farmers can implement measures such as planting diverse forage species, maintaining hedgerows, and creating wildlife habitats on their farms.
4. **Optimising Stocking Rates:** The research indicates that organic dairy farms often have lower stocking rates, which can lead to reduced methane emissions per hectare. New Zealand dairy farmers can explore optimal stocking rates that balance productivity with environmental impact.
5. **Pragmatic Approach:** The study emphasises the need for a pragmatic approach that moves beyond the binary view of conventional versus organic agriculture. New Zealand dairy farmers can adopt a flexible and adaptive approach to farming practices, integrating the best of both systems to achieve sustainability and profitability.

3.6 Farmers' Decision-Making and Behaviour

The Edinburgh Study of Decision Making on Farms (Joyce Willock, 1999) examines how farmer attitudes, behaviours, and personality traits influence farm outcomes. The findings indicate that farmers' decisions are influenced by a complex interplay of factors, including economic goals, environmental values, and personal characteristics. The study highlights the importance of understanding farmers' perspectives to develop effective policies and support programs. Key insights include the role of education, peer influence, and access to information in shaping farmers' decisions. It highlights the role of proactive decision-making, adaptability to change, and a strong commitment to environmental stewardship in achieving both profitability and sustainability.

The insights from the Edinburgh Study are highly relevant for New Zealand dairy farmers because understanding the complex interplay of factors that influence farmers' decisions can help in developing effective policies and support programs tailored to their needs. Some of the key implications include;

1. **Education and Training:** Providing ongoing education and training programs can help farmers stay informed about best practices and new technologies. This can enhance their decision-making processes and improve farm outcomes.
2. **Peer Influence and Community Support:** Encouraging participation in farmer groups, discussion forums, and industry organisations can foster knowledge sharing and peer support. This can positively influence farmers' attitudes and behaviours, leading to better farm management practices.
3. **Access to Information:** Ensuring farmers have access to accurate and timely information is crucial. This can include data on environmental impacts, market trends, and technological advancements. Access to information can empower farmers to make informed decisions that balance economic goals with environmental sustainability.
4. **Proactive Decision-Making:** Promoting proactive decision-making and adaptability to change can help farmers navigate challenges and seize opportunities. This includes planning for long-term sustainability and being open to adopting innovative practices.
5. **Environmental Stewardship:** Emphasising the importance of environmental stewardship can encourage farmers to adopt practices that reduce their environmental footprint. This can include measures to improve soil health, reduce nitrogen use, and minimize greenhouse gas emissions.

By integrating these insights into policy development and support programs, New Zealand can enhance the sustainability and profitability of its dairy farming sector.

3.7 Finding the balance between economic performance and environmental responsibility

The paper investigates the environmental impacts of dairy farming in New Zealand, focusing on the economic valuation of these impacts(Baskaran, Cullen, & Colombo, 2009). The authors aim to provide a comprehensive understanding of how dairy farming affects the environment and to estimate the monetary values associated with these impacts. The study covers various environmental issues, including nitrogen leaching, water contamination, and greenhouse gas emissions. By using a combination of economic valuation techniques and environmental data, the authors estimate the costs associated with these impacts and discuss potential policy implications for the dairy industry in New Zealand. The findings highlight the need for sustainable farming practices and the importance of balancing economic performance with environmental responsibility.

The authors summarised that the design of efficient policies to incentivise farmers to adopt more sustainable practices, decision makers need information on the relative values attached by the public to these detrimental environmental impacts. The paper used survey-based methods (using Choice Modelling) to elicit households' willingness to pay for improvements in ecosystem service quality. The surveys included multiple choice questions about alternative policies for improving the environmental outcome of dairy farming. The report concluded that New Zealand residents derive greater satisfaction when the negative environmental impacts of dairy farming are reduced.

3.8 How farmer group participation impacts the adoption of sustainable farming practices

Using spatial analysis of New Zealand dairy farms this paper analysed the impacts of participation in farmer groups on dairy farmers' adoption of sustainable farming practices (Yang & Wang, 2023). The study showed that farmers decisions are affected by their neighbour's choices and that participation in farmer groups has a positive effect on the adoption of sustainable farming practices. The findings highlighted learning and knowledge spillover among farmers. The report concluded that water quality degradation calls for the design and implantation of policies to reduce nutrient pollution however for countries, like NZ, the effectiveness of these policies is highly reliant on the voluntary actions of farmers. The authors recommended policymakers consider providing support for farmer group activities where farmers can share information and experiences with other farmers. They recommended central and regional government integrate their support on good management practices into farmer group activities.

3.9 Behavioural factors affecting the adoption of sustainable farming practices.

The study (Dessart, Barreiro-Hurlé, & van Bavel, 2019) investigates the behavioural factors that influence the adoption of sustainable farming practices. It provides a policy-oriented review that highlights the importance of understanding farmers' attitudes, motivations, and decision-making processes to develop effective policies and support programs. The findings suggest that behavioural factors such as risk perception, social norms, and personal values play a significant role in shaping farmers' decisions. The study emphasises the need for tailored approaches that consider these behavioural factors to encourage the adoption of sustainable practices.

The review focuses on farmers' decisions to adopt more environmentally sustainable practices. The main remit was the voluntary adoption of these practices, regardless of whether it is government-supported or not. The reason being farmers decisions to comply with mandatory environmental regulations are likely to be different to those leading to voluntary adoption.

Figure 1 illustrates three behavioural factors; dispositional, social and cognitive and where they are positioned in relation to decision-making and the mechanisms and biases that explain how and why these behavioural factors affect the adoption of sustainable practices.

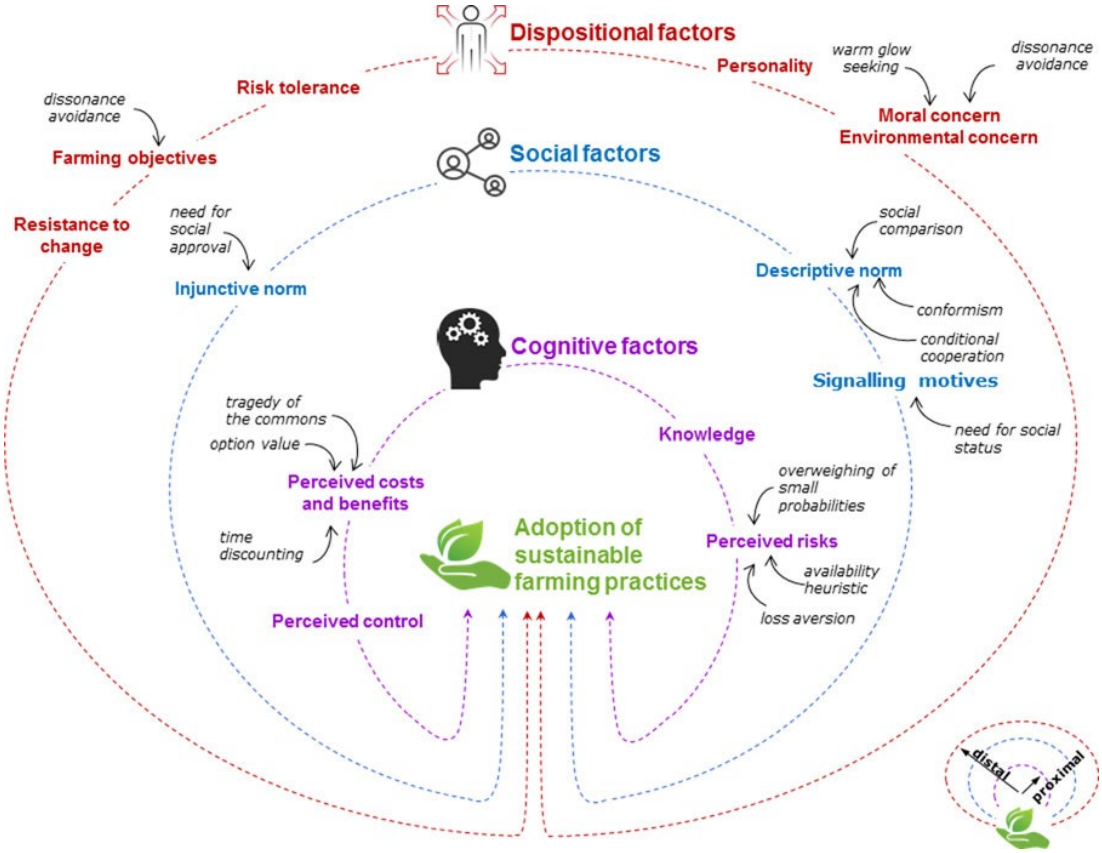

Figure 1 *An integrated framework of behavioural factors affecting farmers' adoption of environmentally sustainable practices. (Dessart et al., 2019)*

Dispositional factors are those that relate to an individual's propensity to behave in a certain way and the study found a significant relationship between dispositional factors and farmers adoption of more sustainable practices.

Social factors include social norms representing acceptable behaviours as well as individuals perceptions of conduct of others. This links very closely with Section 3.8 above (Yang & Wang, 2023) which showed that farmers decisions are affected by their neighbour's choices and that participation in farmer groups has a positive effect on the adoption of sustainable farming practices.

Cognitive factors are very specific and are associated with the difficulties, costs, benefits and risks that a practice is perceived. Having access to relevant and reliable information is crucial if farmers are to adopt sustainable practices. There also needs to be a perceived level of control, benefits and lower risks.

The implications for New Zealand dairy farmers are;

1. **Understanding Farmers' Attitudes and Motivations:** The study highlights the importance of understanding farmers' attitudes and motivations to develop effective policies. New Zealand dairy farmers can benefit from policies that consider their unique perspectives and motivations, encouraging them to adopt sustainable practices that align with their values.
2. **Risk Perception:** Farmers' risk perception influences their willingness to adopt new practices. Policymakers can design programs that mitigate perceived risks and provide support during the transition to sustainable practices. This can include financial incentives, education, and access to resources that reduce uncertainty.
3. **Social Norms:** Social norms play a crucial role in shaping farmers' decisions. Encouraging participation in farmer groups and fostering a sense of community can positively influence farmers' attitudes towards sustainable practices. New Zealand dairy farmers can benefit from peer support and knowledge sharing within their communities.
4. **Personal Values:** Personal values, such as environmental stewardship and commitment to sustainability, drive farmers' decisions. Policies that align with these values and promote environmental responsibility can encourage farmers to adopt sustainable practices. New Zealand dairy farmers can integrate practices that reflect their commitment to environmental sustainability.

3.10 Linking Environmental Outcomes with Economic

This study (Arvidsson Segerkvist, Hansson, Sonesson, & Gunnarsson, 2020) aimed to map scientific literature on environmental, economic and social sustainability in dairy farming. It looked at studies from Europe, North America, Australia and New Zealand published between January 2000 and March 2020. It started with 169 papers and narrowed it down to 35 relevant papers. It found the major focus on environmental sustainability included greenhouse gas emissions, nutrients and explores impacts on different feed strategies on GHG emissions. The economic factors included production costs, policy impacts and income and social sustainability looked at labour conditions, food safety and societal attitudes towards farming.

The conclusion was that few studies included all 3 and as can be seen in the Figure 2 below none included both environmental and economic factors. Figure 2 illustrates the keywords from each of the papers and shows minimal overlaps.

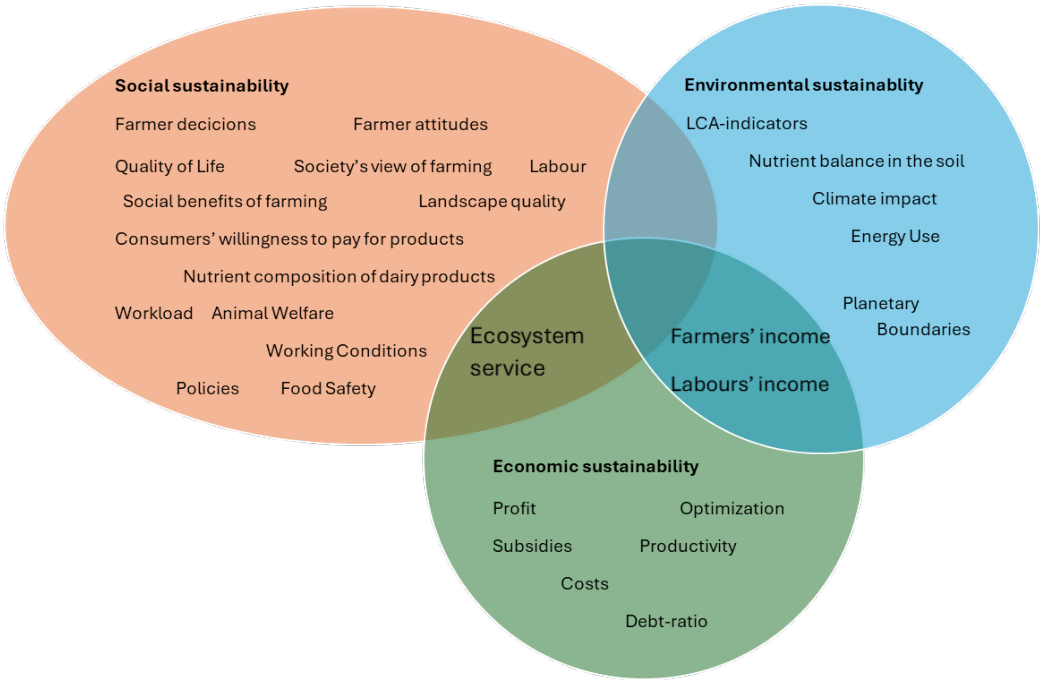

Figure 2; *from (Arvidsson Segerkvist et al., 2020) categorising keywords based on data extracted from papers*

3.11 Conclusion

The literature reviewed provides an understanding of the factors influencing environmental sustainability in dairy farming. Key themes include the impact of farming intensification, the benefits of transitioning to environmentally friendly practices, the use of sustainability indicators, the integration of conventional and organic practices, and the complexity of farmers' decision-making processes.

The review highlights that farming intensification can lead to increased environmental pressures due to higher inputs and outputs, but efficient management practices can mitigate these effects. Transitioning to environmentally friendly grazing practices can improve both sustainability and profitability, although New Zealand already implements rotational grazing. The use of sustainability indicators is essential for guiding decision-making and policy development, and tailored management practices are necessary for improving sustainability across different farm types. The integration of organic practices into conventional systems can enhance sustainability, moving beyond the binary view of conventional versus organic agriculture. Understanding farmers' attitudes, motivations, and decision-making processes is crucial for developing effective policies and support programs.

It is also worth noting that, as highlighted by Arvidsson Segerkvist (2020), finding research papers that address both environmental and economic sustainability proved challenging.

In conclusion, the literature reviewed underscores the importance of efficient resource management, informed decision-making, and a balanced approach to farming practices to achieve environmental sustainability. It outlines the importance of farmers learning from farmers and some great points around how incentivisation can drive positive change in agricultural practices, fostering a more sustainable and resilient farming community.

4. Methodology

4.1 Data Collection

Quantitative Analysis: Data was sourced from DairyBase.

DairyBase is a comprehensive data collection tool provided by DairyNZ, designed to gather financial, physical, and environmental information from dairy farms across New Zealand. This tool plays a crucial role in helping farmers understand their farm systems and performance. By comparing key performance indicators (KPIs) with other farms, DairyBase enables farmers to identify what is working well and pinpoint areas for improvement. The data collected through DairyBase is robust, with over 20% of New Zealand's farms contributing to the database. This extensive dataset is also used by DairyNZ to respond to policy issues, contribute to industry statistics, and build industry-wide information.

Selection Criteria

Farms were selected based on their ranking for operating profit, nitrogen surplus and methane emissions per hectare. Using these KPI's top farmers in each region were selected to ensure all regions were represented. The reason to not choose the top 10 farms in New Zealand (for example) was to ensure a diverse representation of farming practices and conditions across different regions, rather than focusing solely on the highest-performing farms. This approach allows for a more comprehensive analysis of the factors contributing to success and areas needing improvement, providing valuable insights for the entire industry.

- Operating Profit/ha is a key indicator for profit as it provides a clear measure of profitability relative to land.
- Nitrogen surplus is a measure of how efficiently a farm system is using nitrogen. It is calculated as the difference between nitrogen inputs (fertiliser and feed) and outputs (milk and meat). A high nitrogen surplus indicates that more nitrogen is entering the farm than is being removed in product, suggesting potential losses to the environment through leaching, runoff and volatilisation.
- Enteric methane emissions are a key indicator of a farm's greenhouse gas footprint. This metric assesses the impact of livestock production by quantifying methane emissions from the digestive processes of dairy cows on a land area basis. Enteric methane is calculated based on feed intake. For the purposes of this project a per hectare figure has been used (instead of per kgMS) as it provides a broader farm-level emissions perspective. While emissions per kgMS indicates the intensity of emissions in relation to milk production, emissions per hectare reflects the total enteric methane emissions released from the land, which is important for overall environmental impact.

Data Validation

To ensure the accuracy and reliability of the data from DairyBase, several validation steps were undertaken. This included cross-referencing data entries with farm records and conducting consistency checks to identify and correct any anomalies. Potential limitations, such as data entry errors or incomplete records, were addressed by verifying information with the participating farmers.

Qualitative Analysis:

Interview Process

Semi-structured interviews were conducted with eight dairy farmers from different regions: Northland, Waikato, Bay of Plenty, Taranaki, Lower North Island, West Coast/Top of the South, Canterbury, and Otago/Southland. These interviews were conducted either online via Teams or over the phone, with each session lasting approximately one hour. The semi-structured format allowed for flexibility, enabling farmers to share their experiences and insights in detail while ensuring that key topics were covered.

The interview questions are attached in Appendix 1.

The interview process was designed to uncover farmers' motivations and attitudes towards sustainable practices. Interviews were transcribed and a thematic analysis was conducted to identify common trends and unique insights from each participant. While the study initially aimed to investigate the behaviours and values

While this project initially aimed to investigate the values that drove sustainable behaviors it became apparent that it would also be important to look at some of the key management practices on farm.

Participant Selection

The selection criteria for participants focused on identifying farmers who consistently ranked in the top 30% for operating profit and the bottom 30% for nitrogen surplus and enteric methane emissions over four years. This approach ensured that the study included high-performing farms with sustainable practices. The diversity of regions represented in the study provided a comprehensive view of different farming practices and environmental conditions across New Zealand.

The consistently top farmer in each region was chosen to be interviewed. Some regions were more challenging than others to select these farmers as can be seen in Figure 3.

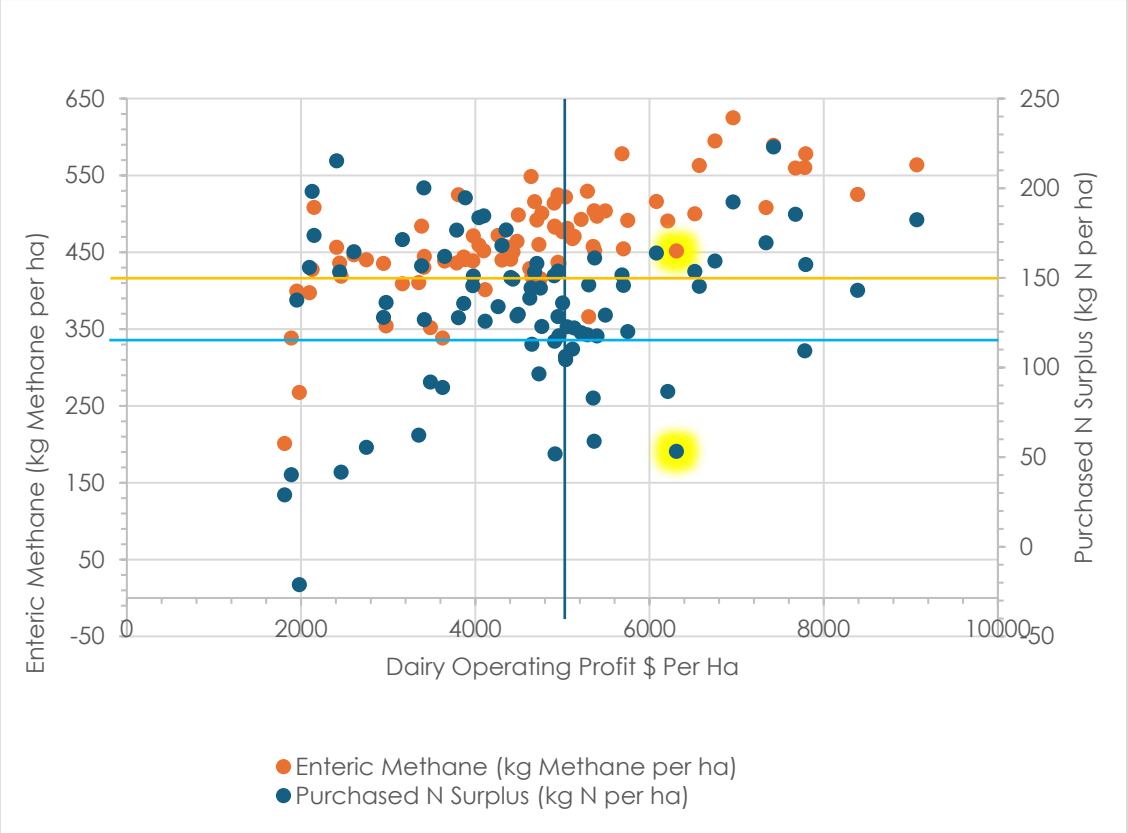

***Figure 3**. DairyBase, DairyNZ. Owner Operators and Owners with Contract Milkers. Average over 4 years. Canterbury.*

The yellow highlighted dot indicates the farmer that was interviewed. The Canterbury farmer interviewed was consistently in the top 30% for operating profit. In Figure 3 this is illustrated by the highlighted dot (average of the last 4 years) being above the vertical line in the graph. The dark blue vertical line indicates top 30% of farmers for Operating Profit on the right and bottom 70% on the left of the line.

Their Enteric Methane Emissions for this farm was just above the bottom 30% (shown by the horizontal orange line) on average over 4 years. And their Purchased Nitrogen Surplus was however well below the 30% line (light blue horizontal line).

Ethical Considerations

Ethical considerations were paramount throughout the interview process. Informed consent was obtained from all participants, ensuring they were fully aware of the study's purpose and how their information would be used. Confidentiality was maintained by anonymising data and ensuring that individual farms could not be identified in the report.

4.2 Data Analysis

Quantitative Analysis: Key Performance Indicators (KPIs): KPIs; operating profit per hectare, nitrogen surplus per hectare, and enteric methane emissions per hectare were used to evaluate farm performance. These indicators provided a clear and quantifiable measure of each farm's economic and environmental outcomes. By comparing KPIs across different farms, the study identified best practices and key factors contributing to high performance.

Qualitative Analysis: Thematic analysis was conducted on the interview transcripts to identify common themes and unique insights. This process involved coding the data to categorise different aspects of farm management, decision-making, and sustainability practices. Themes were developed iteratively and grouped into broader categories through multiple rounds of analysis.

Coding Process: The coding process involved reading through the interview transcripts and assigning codes to specific segments of text that related to the research questions. These codes were then grouped into themes, such as efficient pasture management, financial prudence, and community engagement.

4.3 Limitations and Challenges

Data Limitations: One limitation of the data used in this study is the potential for biases or gaps in the DairyBase dataset. While DairyBase provides a robust and comprehensive source of information, it relies on self-reported data from farmers, which may be subject to inaccuracies. To mitigate this, data validation steps were taken, and any anomalies were addressed through cross-referencing and verification with participants.

Methodological Challenges: Several challenges were encountered during the data collection and analysis process. These included difficulties in scheduling interviews with busy farmers, variations in data quality across different farms, and the complexity of integrating quantitative and qualitative data. These challenges were addressed through careful planning and flexible scheduling.

5. Findings

The key findings from the analysis are as follows.

5.1 Profitability and Sustainability Are Not Mutually Exclusive

DairyBase data analysis clearly shows that profitability and sustainability are not mutually exclusive. Recent analysis of DairyBase data shows the 2 highest correlations to Operating Profit $/ha are Pasture and Crop Harvested (tDM/ha) illustrated in Figure 4 below and Operating Expenses ($/kgMS) – Figure 5. More grass and fewer costs = more profit. The dots in Figure 5 are colour coded to represent farm system. Green dots for system 1 and 2 (0-10% of total feed is imported), blue for system 3 (11-20% of total feed imported) and yellow for system 4 & 5 farms (21%+ total feed imported).

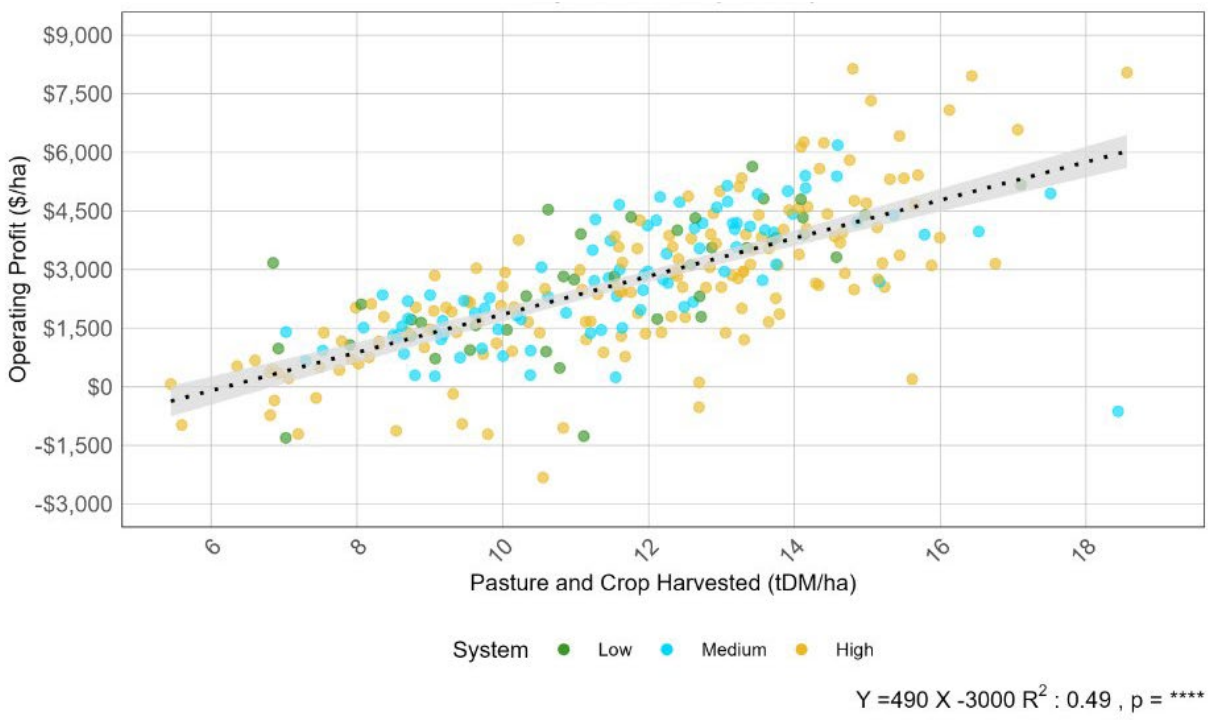

Figure 4; *DairyBase, DairyNZ - NZ Owner Operators 2023/24. Operating Profit ($/ha) vs Pasture and Crop Harvested (tDM/ha)*

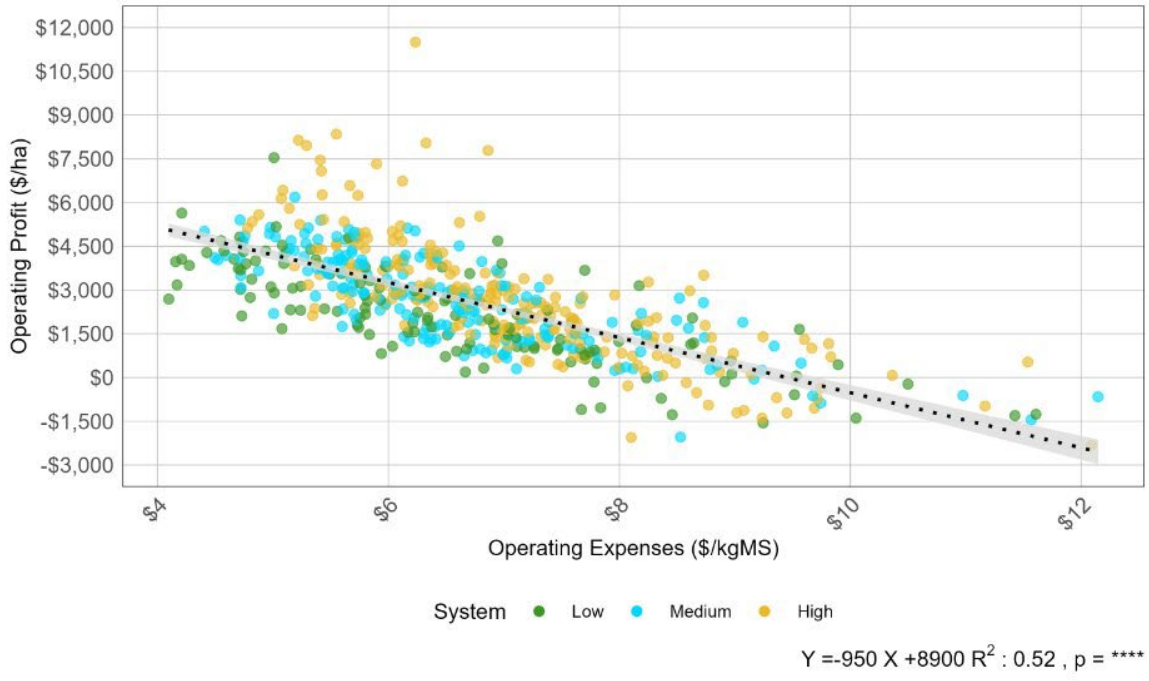

Figure 5; *DairyBase, DairyNZ. NZ Owner Operators 2023/24. Operating Profit ($/ha) versus Operating Expenses ($/kgMS)*

Figure 6 shows how there isn't a strong correlation between Operating Profit ($/ha) and Purchased N Surplus (kg N/ha), illustrating that a profitable farm can maintain high profitability without necessarily increasing nitrogen surplus. This suggests that efficient

management practices and strategic decision-making can lead to both economic success and environmental sustainability.

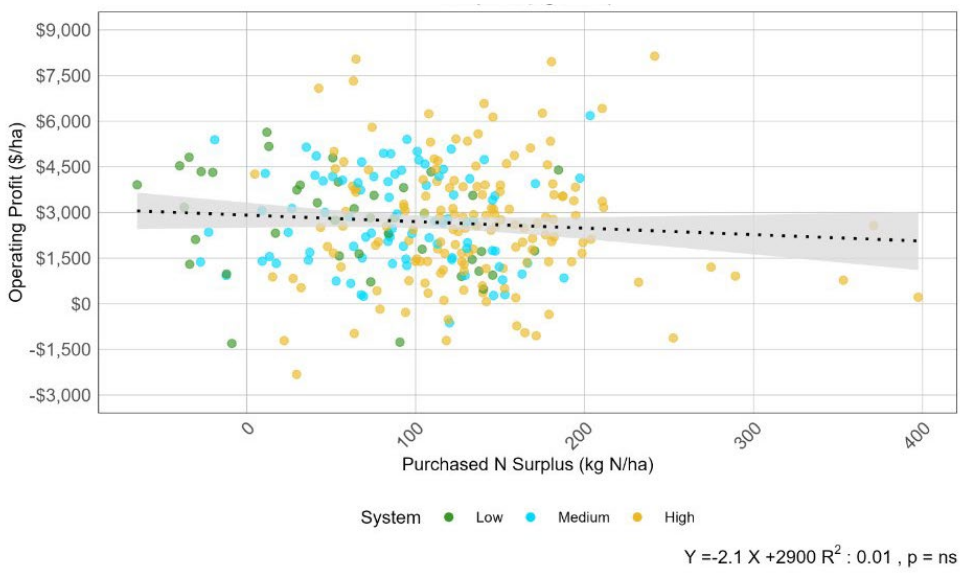

Figure 6 *DairyBase, DairyNZ. NZ Owner Operators 2023/24. Operating Profit ($/ha) versus Purchased N Surplus (kg N/ha)*

While Figure 7 does show a relationship between Operating Profit and Enteric methane emissions, the R^2 value of 0.33 indicates that the correlation is relatively weak. This suggests that other factors may play a more significant role in determining operating profit, and enteric methane emissions alone do not strongly dictate profitability.

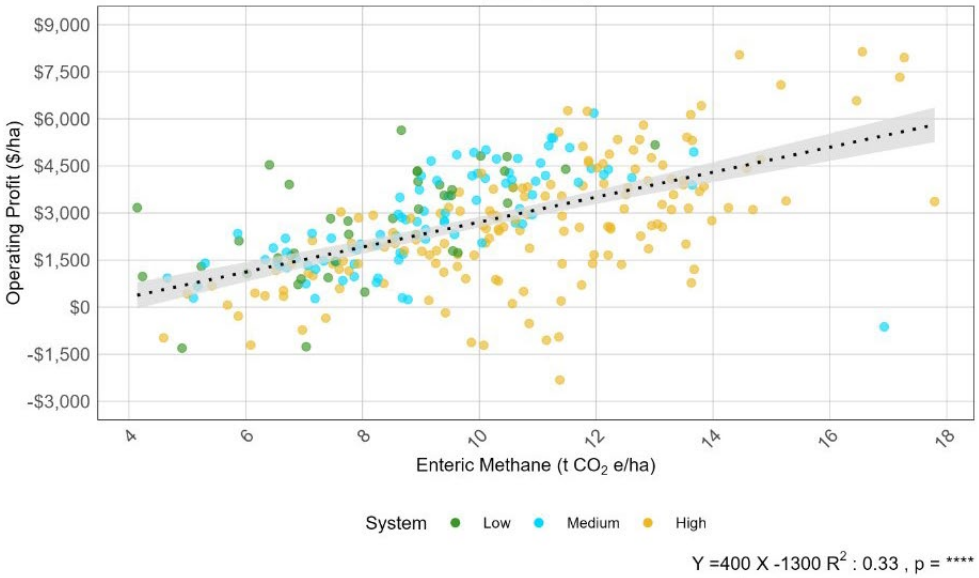

Figure 7 DairyBase, DairyNZ. NZ Owner Operators 2023/24. Operating Profit ($/ha) versus Enteric Methane (t CO2 e/ha)

5.2 Regional Differences

Figure 8 illustrates the significant variation in values for the top performer in each region. The range in operating profit per hectare spans from $995 up to $5446. This indicates that some regions are able to achieve much higher profitability compared to others. However, it's important to note that being a top performer in a specific region does not necessarily

mean being a top performer nationally. The highest values in one region might still be lower than the top values in another region.

In terms of environmental impact, enteric methane emissions range from 187 kg/ha to 483 kg/ha. This wide range suggests that there are substantial differences in how efficiently livestock are managed across the different farms, with some producing significantly more methane than others. Additionally, the purchased nitrogen surplus per hectare varies from -34 kg/ha to 101 kg/ha. A negative surplus indicates a farm using less nitrogen than what is being removed from the system.

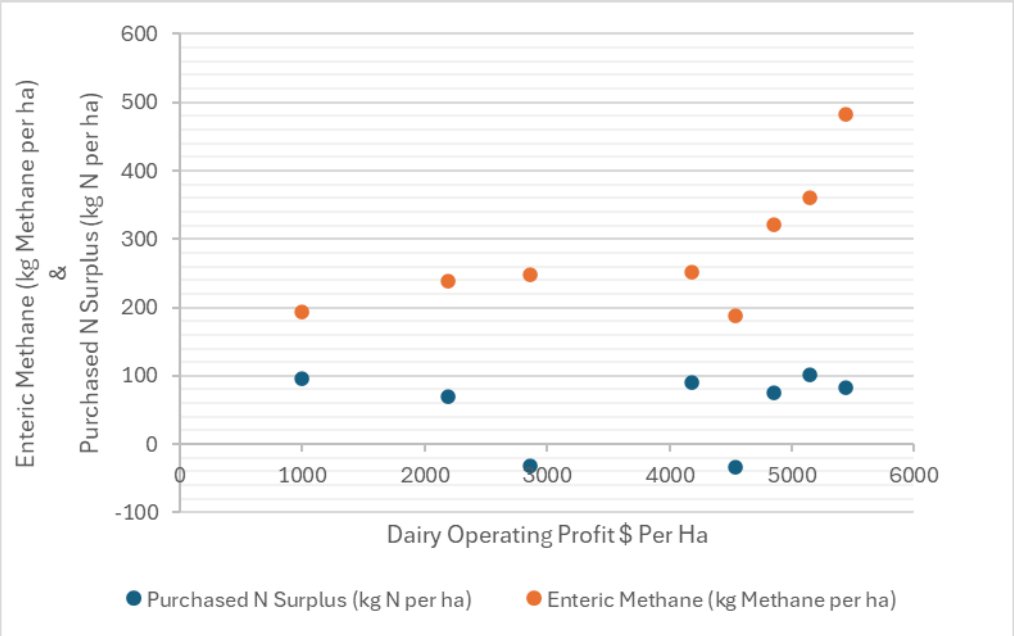

Figure 8 *DairyBase, DairyNZ. Owner Operators and Owners with Contract Milkers 2023/24. Farmers represented in this report.*

5.3 Key Management Practices of High-Performing Farms

The findings from the interviews with high-performing farms reveal that several common practices contribute to their success. These following common practices emerged.

- **Efficient Pasture Management:** Farmers emphasise growing as much pasture as possible and ensuring cows are well-fed primarily on grass. This link to profitability is clearly demonstrated in Figure 4.
    - As one of the interviewed dairy farmers stated "*grow as much grass as practicably possible*"
- **The People:** Having the right people, looking after them and maintaining great relationships.
    - "*And when you say team, people think the farm team – but it is huge. It's your accountant, local farm supply stuff, contractors. They all play a big role*"
- **Focus on Animal Health and Welfare:** Maintaining high-quality herds and regular monitoring of cow health and milk production.

- **Attention to Detail and Data Driven decision making:** Detailed monitoring of farm performance leads to informed decision-making to help optimise operations.
    - *"You've got to make a decision that stands up to scrutiny. We'll research the hell out of it"*
- **Environmental Sustainability:** Practices to reduce nitrogen use, maintain soil health, and minimise environmental impact.
    - *"Our profitability comes from thinking ahead—making sure our land stays healthy so we can keep producing at a high level for years to come."*
- **Financial Prudence:** Keeping farm working expenses low and prioritising profitability. Demonstrated in figure 5.
    - *"Look at the numbers to back everything up. I was an early adopter of DairyBase because I wanted the numbers behind everything."*
    - *"Keep it simple and sustainable. If you are not sustainable in a business sense, well, doesn't really matter what else you're doing. You're not going to be there tomorrow."*
- **Core Values:** Importance of integrity, honesty, hard work, and family involvement.
    - *"Plus, normal values of honesty and hard work"*
- **Community and Knowledge Sharing:** Participation in discussion groups and industry organisations fosters continuous improvement.

5.4 Analyse of DairyBase Physical Data

The physical data from DairyBase was analysed to identify any consistencies among the top-performing farms in comparison to their regional counterparts. However, the analysis revealed minimal correlation.

Pasture and crop harvested, which Figure 4 indicates has the highest correlation to operating profit, did not show consistency among the interviewed farms. In fact, three out of eight farms were in the bottom 30% for pasture and crop harvested. There were some consistencies in cropping practices, with only three farms planting summer crops, two planting winter crops, and just one farm planted a harvest crop.

Reproduction metrics were also examined. Five of the farms were in the top 30% for low empty rates, while the six-week-in-calf rate varied widely, ranging from the bottom 30% to the top 30%.

5.5 Discussion

While financial performance is a crucial indicator of success, the interviews highlight that other areas are equally important for achieving long-term sustainability and profitability. Efficient resource management and environmental sustainability are essential components that contribute to the overall success of dairy farms. The study emphasises the need for a balanced approach that integrates profitability with sustainability, as challenges such as ongoing education and support for farmers to adopt best practices are critical.

Identifying 'top operators' based solely on financial performance provides a limited view of what makes a farm successful. The interviews reveal that factors such as environmental

sustainability, animal health and welfare, and community involvement play significant roles in achieving long-term success. These areas are important because:

1. **Environmental Sustainability:** Practices that reduce nitrogen use, maintain soil health, and minimise environmental impact are crucial for the long-term viability of dairy farms. Sustainable farming practices ensure that the land remains productive and healthy for future generations.
2. **Animal Health and Welfare:** Maintaining high-quality herds and regularly monitoring cow health and milk production are essential for maximising productivity and profitability. Healthy animals produce higher-quality milk and have lower maintenance costs.
3. **Community and Knowledge Sharing:** Participation in discussion groups and industry organisations fosters continuous improvement and knowledge sharing. Farmers benefit from peer support and access to the latest best practices and technologies.
4. **Core Values and Integrity:** Strong core values, including honesty, hard work, and family involvement, contribute to a sustainable and fulfilling farming operation. These values create a positive farm culture and enhance overall farm performance.

By taking into account these areas alongside financial performance, policymakers and industry organisations can create more comprehensive support programs that cater to the diverse needs of dairy farmers. This holistic approach ensures that farms achieve both profitability and sustainability, making them resilient to environmental and economic challenges. The findings align with existing literature, emphasising the importance of efficient resource management and environmental sustainability. The study underscores the necessity of a balanced approach that integrates profitability with sustainability, highlighting the ongoing need for education and support to help farmers adopt best practices.

The farmer identified in Figure 9 shows the Bay of Plenty Owner Operators and Owners with Contract Milkers with the interviewed farmer highlighted in yellow. Again, this farmers average over 4 years is well above the 30% (vertical line) for Operating Profit by nearly $800 per hectare and below both N Surplus and Enteric Methane Emissions.

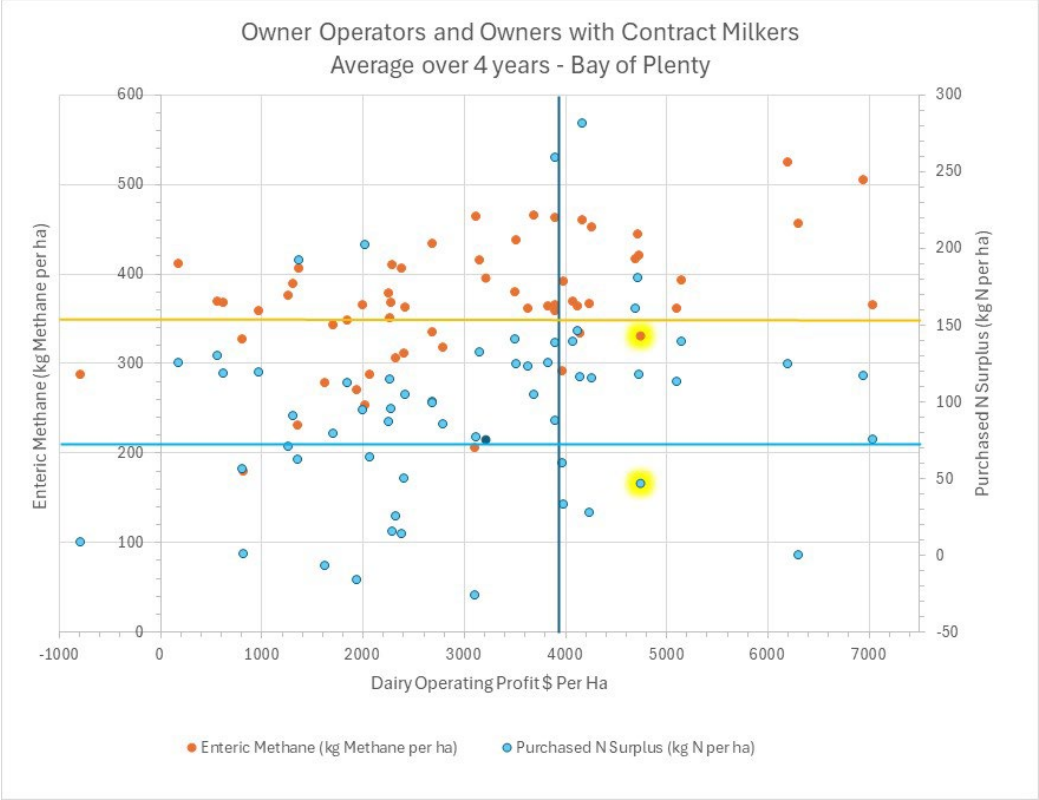

Figure 9 *DairyBase, DairyNZ. Owner Operators and Owner with Contract Milkers. Average over 4 years. Bay of Plenty*

6. Key Themes from Literature and Interviews

6.1 Impact of Farming Intensification

Literature:

- Intensification can lead to increased environmental pressures due to higher inputs and outputs.
- Efficient management practices can mitigate these effects. The key strategies in the report focused on optimising feed efficiency, improving effluent management, and adopting precision farming technologies.

Interviews:

- Farmers emphasised efficient pasture management and low input systems, which align with the literature's suggestion of mitigating environmental impacts through efficient practices.
- It is important to remember that increasing production doesn't lead to a higher profit. One farmer stated that "*it's all about the profit. As long as the cows are happy, and I'm enjoying the style of farm I'm doing. It's really about how much money's dropping at the bottom, not how much production you're doing*".
    - And as can be seen in Figure 5 there is no link between farm system and Operating Profit.

- Figure 10 shows the farm systems of the interviewed farmers. While 1 farmer sits at System 4 (21-30% imported feed) the other 7 are all System 3 (11-20% imported feed) or below. The interviewed farmers tended toward lower input farms compared to the population (as represented by DairyBase data).

Farm System	Interviewees		NZ Farms
System 1	1	13%	2%
System 2	2	25%	23%
System 3	4	50%	37%
System 4	1	13%	29%
System 5	0	0%	10%

***Figure 10**; Farm System of interviewed farmers vs DairyBase analysis 23/24*

- Several farmers focused on low input costs and sustainable practices, supporting the idea that intensification can be balanced with sustainability.

Alignment:

- Both the literature and interviews highlight the importance of efficient management practices to balance intensification and environmental sustainability.

6.2 Transitioning to Environmentally Friendly Practices

Literature:

- Transitioning to advanced grazing practices can improve sustainability and profitability. This study did focus primarily on practices such as holistic planned grazing and adaptive multi-paddock grazing, which offer enhanced benefits over traditional rotational grazing.
- Key practices also included reducing synthetic inputs while maintaining soil fertility.

Interviews:

- 2 of the farmers interviewed are fully certified organic farmers so they currently don't use any synthetic fertiliser
- Figure 11 shows the expected high correlation between the amount of nitrogen applied and the nitrogen surplus. 7 out of the 8 farmers applied Nitrogen below 100kg/ha – with the 2 organic farmers applying no synthetic nitrogen fertiliser.

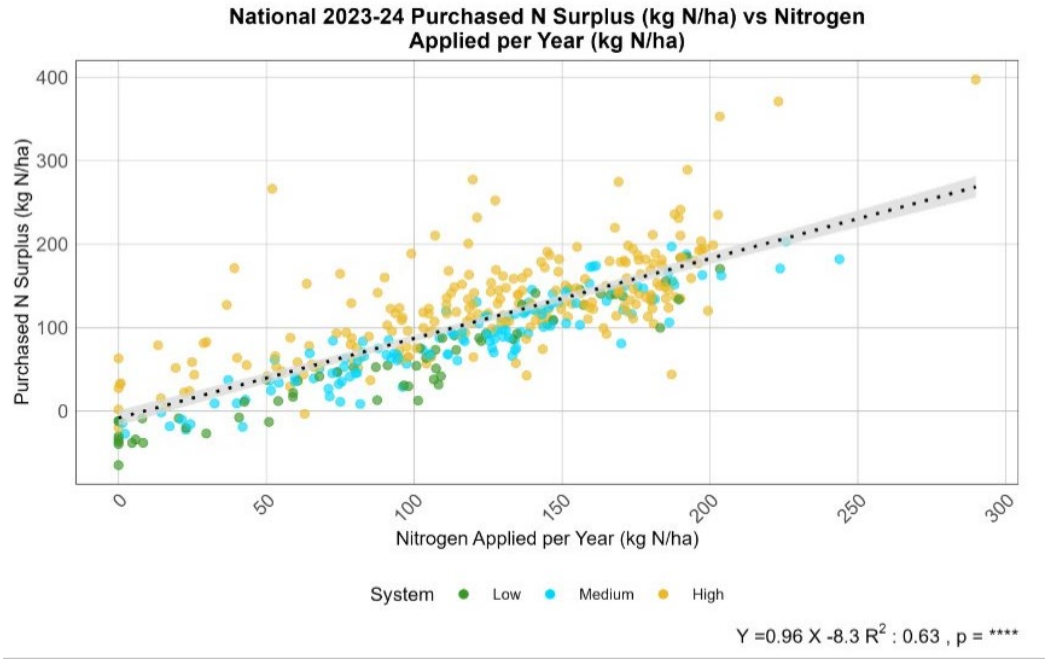

Figure 11; *DairyBase, DairyNZ. NZ Owner Operators 2023/24. Purchased N Surplus (kgN/ha) versus Nitrogen Applied per year (kg N/ha)*

- Practices such as maintaining clover-rich pastures and reducing nitrogen use are common among the interviewed farmers.
    - One farmer commented *"I'm in a way green but not overly so. Looking after clover and limiting pasture damage is important"*

Alignment:

- The interviews align with the literature in showing that transitioning to environmentally friendly practices can enhance both sustainability and profitability.

6.3 Sustainability Indicators

Literature:

- Different farm types exhibit varying levels of sustainability based on indicators like greenhouse gas emissions and nitrogen surplus – measured per ha.
- Tailored management practices are essential for improving sustainability and the literature suggested that farmers focus on improving sustainability by adopting best practices from the most sustainable farms.

Interviews:

- Farmers use tools like DairyBase and Overseer to track performance and make informed decisions, aligning with the literature's emphasis on sustainability indicators.
- The focus on reducing nitrogen use and maintaining soil health is evident in the interviews.

Alignment:

- Both the literature and interviews emphasise the importance of using sustainability indicators and tailored management practices to improve farm sustainability.

6.4 Blending Conventional and Organic Agriculture

Literature:

- A hybrid approach that integrates organic practices into conventional systems can enhance sustainability.
- Moving beyond the binary view of conventional versus organic agriculture.

Interviews:

- Some of the farmers have integrated organic practices into their farming systems, balancing conventional and organic methods.
    - One of the interviewed farmers (who is not organic) commented that they were *"Green at heart. Environmental stuff is quite important to me, but I don't think I'm an out and out greenie. I use nitrogen fertiliser when I have to."*
    - And as mentioned above 7 out of the 8 farmers applied Nitrogen below 100kg/ha. 2023/24 DairyBase data showed an average nitrogen application of 125 kg N/ha.
    - Another (non-organic farmer) commented when asked about some of the core values that guided their farming practices; "*we're in a sensitive catchment, but I've moved from being a climate change sceptic to a climate change believer*"
- The emphasis on efficiency and sustainability aligns with the literature's recommendation for a balanced approach.

Alignment:

- The interviews support the literature's suggestion of integrating organic practices into conventional systems to enhance sustainability.

6.5 Farmers' Decision-Making Processes

Literature:

- Farmers' decisions are influenced by economic goals, environmental values, and personal characteristics.
- Education, peer influence, and access to information are significant factors.

Interviews:

- Decision-making processes among the interviewed farmers involved thorough research, scientific data, and long-term planning.

- Trust in the science was mentioned buy a lot of the interviewees with one commenting; "*trust science but only from people who don't have a vested interest*"

- Farmers prioritise financial prudence by keeping expenses low and focusing on profitability, as seen in most of the interviews
    - A lot of comments that came around "*running the numbers*". From running it through a balance sheet, ensuring the numbers "*stack up*", understand pros and con's and looking at "*profit per production rather than cost per production*."
- Family involvement and community support play crucial roles in decision-making, as seen in all of the interviews.
    - All of those interviewed talked about either "*bounce(ing) ideas off people*" or involving family in decision making.
    - One also mentioned discussions groups and neighbours playing a key role in their decision making.
- Decisions aligning with key values also came through clearly.
    - About "*finding a system that we enjoy*" and "*do they align with what we are trying to achieve*" came through strongly.
    - Another commented on understanding the effect it will have on the whole system and getting the balance right. The example they used was putting in a feed pad -which would mean more hours, more machinery and more feed when they were opting for a "simple and sustainable" system.

Alignment:

- The interviews align with the literature in highlighting the complexity of farmers' decision-making processes and the influence of various factors.

6.6 Financial Performance and Environmental Sustainability

Literature:

- Practices that reduce nitrogen use and maintain soil health are crucial for environmental sustainability.
- Adoption of organic farming practices or low input systems helps achieve a balance between profitability and sustainability.

Interviews:

- Farmers implement practices to reduce nitrogen use, maintain soil health, and minimise environmental impact
- The adoption of organic farming practices supports the literature's emphasis on environmental sustainability.

- Figure 12 illustrates a positive correlation, indicating that as the Purchased N Surplus rises, Enteric Methane emissions also tend to increase. This suggests that farmers who opt to apply less nitrogen may experience lower methane emissions.

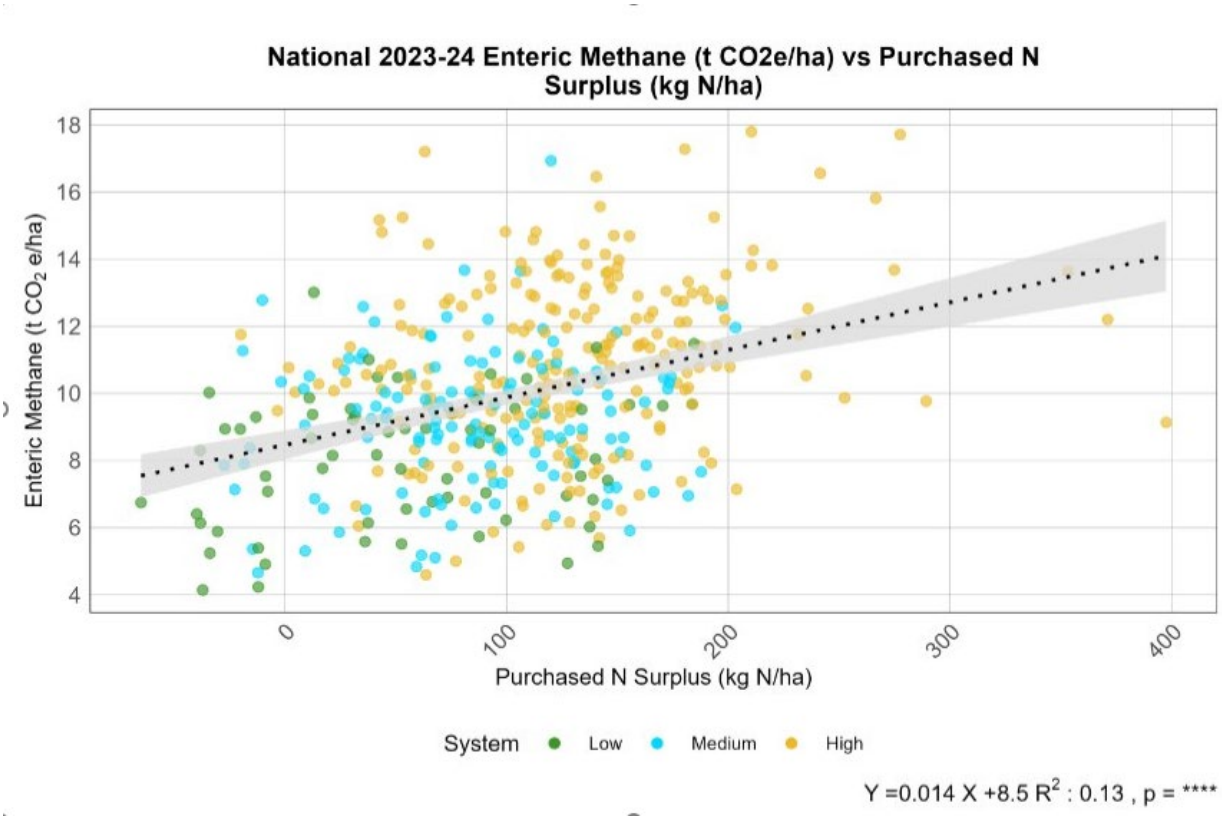

Figure 12: *DairyBase, DairyNZ. NZ Owner Operators 2023/24. Enteric Methane (t CO2 e/Ha) versus Purchased N Surplus (kgN/ha)*

Alignment:

- Both the literature and interviews emphasise the importance of practices that reduce environmental impact and promote sustainability.

6.7 Peer Influence

Literature:

- Farmers decisions are affected by their neighbours' choices.
- Highlighted learning and knowledge spillover among farmers

Interviews:

- Like Section 6.5 above, farmers utilise peers, neighbours and discussions groups in their decision making.
- There were also a number of comments around DairyBase and benchmarking. Being able to see how their decisions "*stacked*" up against others while remaining one of the top in profitability.

- Strong relationships with suppliers, contractors, and advisors was also mentioned several times. These key relationships provide valuable support and insights.

Alignment:

- Both the literature and interviews emphasise the importance of community and social interactions and benchmarking in farmers' decision-making processes. Farmers are influenced by their neighbours' choices and benefit from shared knowledge, which helps them improve their practices and maintain profitability.
- The use of tools like DairyBase further supports this alignment by providing a platform for comparison and learning.

6.8 Values and Social Norms

Literature:

- Behavioural factors such as risk perception, social norms, and personal values play a significant role in shaping farmers' decisions.
- Social norms play a crucial role in farmers' decisions
- Personal values drive farmers' decisions

Interviews:

- As in Section 6.5 above, decisions aligning with key values came through clearly.
- One farmer commented on the ability to have "*choice. If I want to be doing something, I can do it. If I don't want to be doing it, I don't have to be.*" A key part of his decision making involved including family and thinking about succession and long-term planning.
- And as in Section 6.7 above, farmers are affected by what their neighbour does which over time creates social norms.
- The interviewed farmers wanted to be "*attractive to staff*" and "*employer of choice*" indicating perception playing a key role in farmer's decisions.

Alignment:

- Both the literature and interviews emphasise the importance of behavioural factors, social norms, and personal values in shaping farmers' decisions.
- Farmers are influenced by their perception of risks, the practices of their neighbours, and their own values.
- The interviews provide specific examples of how these factors manifest in farmers' decision-making processes, such as the emphasis on family involvement, succession planning, and being attractive to staff.

6.9 Conclusion

The research findings from the literature largely align with the insights from the interviews with New Zealand dairy farmers. Both sources highlight the importance of efficient resource management, informed decision-making, and a balanced approach to farming practices to achieve both profitability and environmental sustainability. The interviews provide practical examples and reinforce the key themes identified in the literature, offering valuable insights for the wider dairy farming community.

However, there are a few areas where the literature and interviews don't fully align. For instance, while the literature emphasises optimising feed efficiency and adopting precision farming technologies, the interviews highlight low input systems and efficient pasture management more strongly. Additionally, the interviews reveal varying degrees of adoption and personal attitudes towards organic farming, which may not be as prominently mentioned in the literature.

The alignment between the literature and interviews underscores the significance of integrating organic practices into conventional systems and the role of community and social interactions in shaping farmers' decisions. The emphasis on sustainability indicators and tailored management practices further highlights the need for continuous monitoring and adaptation to improve farm sustainability.

By adopting best practices and leveraging shared knowledge, farmers can achieve a balance between profitability and sustainability, ensuring the long-term success of their farming operations. This holistic approach not only benefits the environment but also enhances the resilience and economic viability of dairy farms.

7. Key Implications & Recommendations for the New Zealand Dairy Industry

The implications of these findings are significant for the dairy farming industry in New Zealand and potentially for dairy farming globally. While this project has identified the top 30% of farmers for profitability (per hectare), the next 30-50% can adopt practices to lift their profitability performance while lowering their environmental footprint.

While providing ideas and recommendations plays a key part in decision-making, the research shows that driving changes in behaviour is much more complicated. Farmers learn from other farmers, are influenced by their neighbours' practices, and are driven by personal values and social norms.

7.1 Efficient Pasture Management

- **Implication**: Emphasising efficient pasture management can lead to both increased profitability and environmental sustainability.
- **Individual Action**: Dairy farmers should focus on growing as much pasture as possible and ensuring cows are primarily grass-fed. This reduces the need for external feed and lowers costs.
- **Industry Action**: The industry needs to continue highlighting farmers with exceptional pasture management and sharing available resources.
    - DairyNZ has numerous resources, including the Spring Rotation Planner, to help farmers balance pasture and cow management to maximise sustainable profit.
    - As shown in Figure 4, there is a strong correlation between Pasture and Crop Harvested and Operating Profit. This information needs to be widely shared.
    - Share case studies of successful pasture management practices from top-performing farms. Discuss the specific techniques used, such as measuring pasture growth, rotational grazing, pasture species selection, and soil fertility management. Highlight the economic and environmental benefits observed.
    - Establish platforms for farmers to share best practice and success stories related to efficient pasture management. Have options for those farmers than can't make it in person include online forums and webinars. A great example is the Pasture Summit however in 2025 only 2 events were held: one in Te Kuiti and one in North Otago.

7.2 Focus on Animal Health and Welfare

- **Implication:** Maintaining high-quality herds and regularly monitoring cow health can enhance productivity and reduce maintenance costs.
- **Individual Action:** Implement regular health checks and monitoring systems to ensure timely interventions and maintain herd health.

- **Industry Action:** Continue to promote best practice and industry targets for things like 6-week in calf rate and 3-week submission rates.
    - Ensure best practice guidelines for animal health and welfare are disseminated. And ensure these guidelines are based on the latest scientific research and tailored to the specific needs of the New Zealand dairy industry
        - LIC has reported that the average 6-week in-calf rate for the 2023/24 season is 69.3%, with an estimated drop to 68% for 2024/25. DairyNZ has set a target of 78% but achieving this would require nearly a 10% increase—an unrealistic expectation for most farmers. While ambitious targets are valuable for driving progress, they must also be practical and achievable
        - Encourage collaboration and knowledge sharing through discussion groups and events. Creating platforms for farmers to share their experiences and knowledge can foster a collaborative environment.
        - Promote the use of health monitoring tools and technologies (like the Body Condition Scoring app) that can help farmers track and manage health of their herds more effectively

7.3 Attention to Detail in Farm Management

- **Implication**: Detailed monitoring and informed decision-making optimise operations and improve efficiency.
- **Individual Action**: Farmers should track performance and use data-driven approaches to make informed decisions about farm management.
- **Industry Action**: Promote the use of tools like DairyBase for farmers to track their performance over time and compare it against their peers and neighbours. DairyBase can help farmers make informed decisions.
    - Discussion groups and events where farmers can share experiences and knowledge also support informed decision-making.
    - Discuss these specific data-driven tools and technologies that can aid in farm management.
    - Highlight the benefits of precision agriculture techniques, such as GPS-guided equipment and direct drilling crops.
    - Include examples of how data analysis has led to improved decision-making on farms as per the farmers interviewed in this project.

7.4 Think Long Term About the Land

- **Implication**: Reducing nitrogen use, maintaining soil health, minimising environmental impact, and increasing biodiversity are crucial for sustainable farming.

- **Individual Action**: Implement practices such as direct drilling, maintaining clover-rich pastures, and reducing synthetic fertiliser use to improve soil health and reduce environmental impact. Increase biodiversity on farm, although challenging to measure, can enhance ecological health and provide a feel-good factor for farmers, knowing their practices support a thriving ecosystem.
- **Industry Action**: Continue to address myths by showing the science. Figure 13 below clearly shows no correlation between nitrogen applied and operating profit. Farmers want science-backed arguments. As one interviewed farmer said, they "*only trust science from people who don't have a vested interest.*"
    - Get respected scientists in front of farmers to share data and science with them. By promoting science-based approaches to environmental sustainability it will encourage collaboration between farmers and scientists.
    - Include more detailed descriptions of sustainable farming practices and their benefits. Provide examples of farms (like the ones interviewed) that have successfully implemented these practices and the positive outcomes they have experienced.

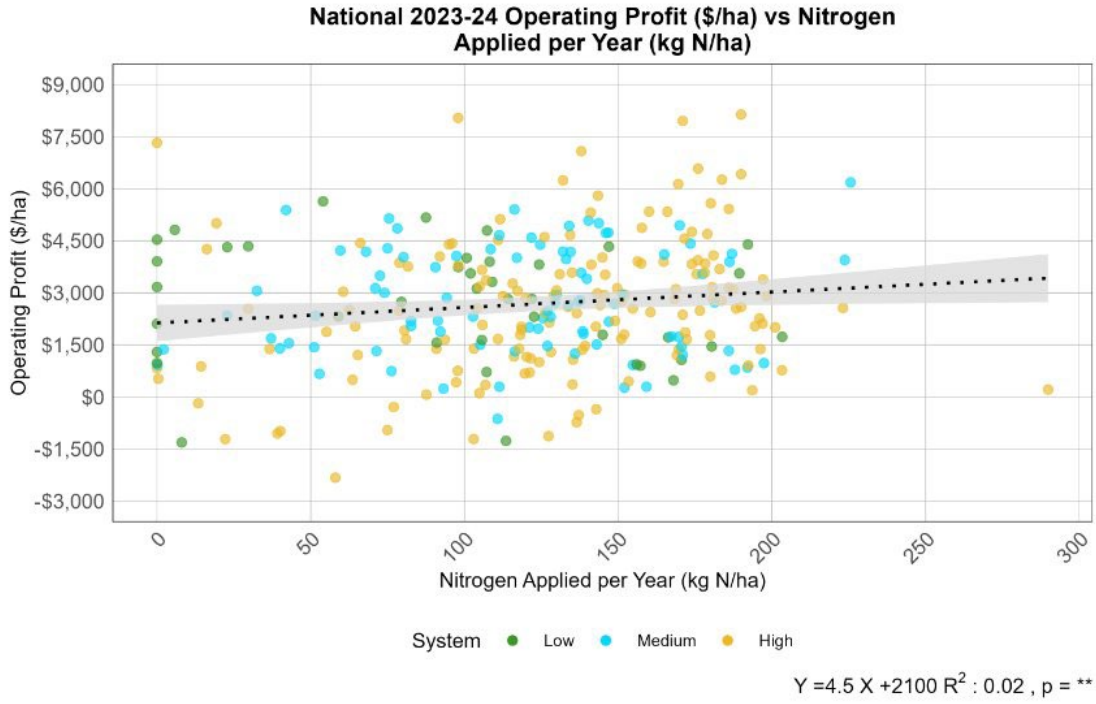

***Figure 13**: DairyBase, DairyNZ. NZ Owner Operators 2023/24. Operating Profit ($/ha) versus Nitrogen Applied per Year (kgN/ha)*

7.5 Be Smart with your Finances

- **Implication**: Keeping farm working expenses low and prioritising profitability over production ensures financial sustainability.
- **Individual Action**: Focus on cost management, minimise the use of bought-in feed, and ensure that every dollar spent maximises return on investment.

- If financial literacy is needed, exploring financial education programs can be beneficial in developing key skills for effective money management. The Rabobank Financial Skills Workshop, which is available to everyone, is one such resource that provides guidance on essential financial topics. These include budgeting, financial planning, and understanding financial statements, helping individuals navigate banking requirements with confidence. By participating in such programs, individuals can strengthen their ability to make informed financial decisions, improve business resilience, and foster long-term financial stability.

- **Industry Action**: Continue to share data, like in Figure 5, showing the high correlation between Operating Profit ($/ha) and Operating Expenses ($/kgMS). The study around behavioural factors (Dessart et al., 2019) highlighted how farmers' risk perceptions influenced their willingness to adopt new practices. Farmers need support to make these decisions through education and access to farmers who have already made changes to their farm businesses.
    - "*Adoption of specific sustainable practices is higher when farmers have sufficient knowledge and competences related to these practices, and when they think these practices bring environmental or financial benefits with limited risks*" (Dessart et al., 2019).
    - Promote the use of benchmarking tools like DairyBase, which allow farmers to compare their performance with peers and identify areas for improvement.
    - Discuss the importance of budgeting, financial planning, and risk management. And continue to dispel myths by providing data as credible evidence.
    - Share case studies of farms that have successfully improved their financial performance through prudent management. Highlight the strategies and practices that contributed to their success.

7.6 Hold on to Your Core Values

- **Implication**: Strong core values, including honesty, hard work, and family involvement, contribute to a sustainable and fulfilling farming operation.
- **Individual Action**: Foster a farm culture that prioritises integrity, family involvement, and work-life balance.
- **Industry Action**: Facilitate community engagement and provide platforms for farmers to engage with local communities, fostering a sense of responsibility and integrity (Dessart et al., 2019).
    - Industry organisations can facilitate community events and collaborative projects (like Catchment Groups) that promote sustainable practices.
    - Discuss the role of core values in long-term farm sustainability. Provide examples of farms that have successfully integrated strong values into their operations.
    - Highlight the benefits of community involvement and support networks.

7.7 Learn from Others in your Community

- **Implication**: Participation in discussion groups, advisory committees, and industry organisations helps farmers stay informed and adopt best practices.
- **Individual Action**: Engage with the farming community, share knowledge, and collaborate with peers to continuously improve farm practices.
- **Industry Action**: Promote knowledge sharing among farmers with case studies that highlight effective practices and innovative solutions.
    - Create online platforms where farmers can share their experiences, challenges, and solutions. These platforms can foster collaboration and encourage best practices.
    - Webinars provide opportunities for farmers to learn from experts, network with peers, and stay updated on the latest advancements.
    - Promote more collaboration between scientists and farmers.
    - Provide more examples of successful knowledge-sharing initiatives and their impact on farm practices.
    - Technology can facilitate knowledge sharing in other ways, including online forums, social media, and virtual conferences.
    - Provide funding and support for farmer groups and discussion forums.

7.8 Informed Decision Making

- **Implication**: Decisions based on thorough research, scientific data, and long-term planning ensure sustainability and profitability.
- **Individual Action**: Use tools like DairyBase and Overseer to make data-driven decisions and plan for the long term.
- **Industry Action**: Promote the use of tools like DairyBase and Overseer so farmers can make informed decisions.
    - Ensure farmers get the opportunity to engage with scientists so that their decisions are based on sound, scientific data.
    - Ensure that farmers have access to accurate and timely data on environmental impacts, market trends, and technological advancements. This can empower farmers to make informed decisions that balance economic goals with environmental sustainability.
    - Ensure that good management practices are integrated into the support given to farmers while highlighting those farmers that have already adopted these best practices.
    - Discuss the importance of continuous learning and staying updated with the latest research and technologies.
    - Provide examples of how informed decision-making has led to improved farm performance.

- Highlight and strengthen the role of extension services and rural professionals in supporting farmers with the latest research and technologies. Rural professionals can offer personalised advice and support to help farmers implement best practices.
- Encourage continuous learning and professional development among farmers. Provide opportunities for farmers to attend training programs, conferences, and other educational events.

7.9 Policy and Support Programs

- **Implication:** Policymakers and industry organisations can support farmers by promoting best practices and providing resources for sustainable farming.
- **Individual Action**: Develop policies and support programs that encourage efficient resource management, environmental sustainability, and financial prudence.
- **Industry Action:** The industry should collaborate closely with policymakers to advocate for regulations and policies that foster sustainable farming practices.
    - Dessart (2019) suggests that a long-term strategy, although uncertain, could have broader effects on farmer adoption by increasing environmental concerns and promoting conservation as a farming objective.
    - Encourage collaboration between farmers and researchers to develop innovative solutions for sustainable farming.
    - Support pilot programs and knowledge-sharing initiatives that benefit the farming community. Dessart (2019) also notes that the adoption of sustainable practices is higher when farmers have sufficient knowledge and competencies related to these practices, and when they perceive environmental or financial benefits with limited risks.

7.10 Make Change Personal

- **Implication:** to change personal beliefs you must make it personal. It is not about adding more rules
- **Individual Action:** Make personal connections and understand individual motivations to foster belief changes.
- **Industry Action:** People resist change because they are scared. They may fear a loss of power, identity, or control. The industry needs to mitigate these fears by identifying what individuals are afraid of and providing solutions. By addressing these concerns and offering support, the industry can help individuals feel more secure and open to change.
    - Discuss the psychological aspects of behaviour change and how personal connections can influence beliefs. Provide examples of successful initiatives that have addressed farmers' fears and facilitated positive change. Highlight the importance of empathy and understanding in driving behaviour change.

7.11 Conclusion

The key implications highlight the significant potential for the New Zealand dairy industry to enhance both profitability and environmental sustainability. By adopting efficient pasture management, focusing on animal health and welfare, paying attention to detailed farm management, and implementing environmental sustainability practices, dairy farmers can achieve substantial improvements in their operations. Financial prudence and profitability, grounded in cost management and strategic investments, are crucial for long-term success.

Core values such as integrity, community engagement, and knowledge sharing play a vital role in fostering a collaborative and supportive farming environment. Informed decision-making, supported by tools like DairyBase and Overseer, ensures that farmers can plan effectively and make data-driven choices. Policymakers and industry organisations must continue to support farmers through policies and programs that promote sustainable practices and provide necessary resources.

Ultimately, the adoption of sustainable practices is driven by personal beliefs and motivations. By addressing individual fears and providing tailored support, the industry can facilitate a smoother transition towards more sustainable farming methods. The collective effort of farmers, industry leaders, and policymakers will be essential in achieving a resilient and prosperous dairy sector in New Zealand.

8. Methane Intensity vs Total Methane

This project wouldn't be complete without adding some commentary around methane intensity. While methane intensity is the buzz word at the moment, it is crucial to understand the broader implications of focusing solely on this metric. Methane intensity — typically measured as the amount of methane emitted per unit of milk produced (e.g., kg CO_2e per kg of milk solids) — has gained traction as a way to gauge environmental efficiency. This focus has been driven not only by policy and research, but also by growing customer and market expectations. International buyers and sustainability-conscious consumers are increasingly demanding transparency around emissions per product unit, often using intensity metrics as a benchmark for environmental performance.

However, an exclusive focus on methane intensity can be misleading and may inadvertently drive-up total methane emissions. This section explores the nuances of methane intensity versus total methane emissions and underscores the importance of a holistic approach to methane management in the dairy industry.

8.1 Understanding Methane Intensity

Methane intensity is a measure of the efficiency with which a farm produces milk relative to its methane emissions. It is calculated by dividing the total methane emissions (as CO2e) by the total milk production. A lower methane intensity indicates that a farm is producing more milk with less methane, which is often seen as a sign of improved environmental performance.

For example, if Farm A emits 1000 kg of methane and produces 10,000 kg of milk solids, its methane intensity is 0.1 kg CO2e per kg of milk solids. If Farm B emits 1500 kg of methane

but produces 20,000 kg of milk solids, its methane intensity is 0.075 kg CO2e per kg of milk solids. Despite Farm B having a higher total methane emission, its methane intensity is lower, suggesting it is more efficient in terms of methane emissions per unit of milk produced.

8.2 The Pitfalls of Focusing Solely on Methane Intensity

While methane intensity provides valuable insights into the efficiency of milk production, it does not capture the full picture of a farm's environmental impact. Here are some key reasons why focusing solely on methane intensity can be problematic:

1. **Total Emissions Matter**: Methane intensity does not account for the total volume of methane emissions. A farm with a low methane intensity but high total milk production can still contribute significantly to overall methane emissions. For instance, if a farm increases its milk production to improve its methane intensity, it may end up emitting more methane in total, thereby exacerbating its environmental footprint.
2. **Incentivising Intensification**: Emphasising methane intensity can incentivise farms to intensify their operations, increasing herd sizes and milk production to achieve lower methane intensity. This intensification can lead to higher total methane emissions, greater resource use, and additional environmental pressures such as increased nitrogen leaching and water contamination.
3. **Overlooking Other Environmental Impacts**: Methane intensity focuses narrowly on methane emissions and milk production, potentially overlooking other critical environmental impacts. For example, practices that reduce methane intensity might increase other greenhouse gas emissions, such as nitrous oxide, or lead to soil degradation and biodiversity loss.
4. **Short-Term Gains vs. Long-Term Sustainability**: Strategies to reduce methane intensity may offer short-term gains but could undermine long-term sustainability. For example, increasing feed efficiency to lower methane intensity might involve using high-energy feeds that are not sustainable in the long run.

8.3 A Holistic Approach to Methane Management

To address the limitations of focusing solely on methane intensity, it is essential to adopt a holistic approach to methane management that considers both methane intensity and total methane emissions. Here are some strategies to achieve this balance:

1. **Integrated Farm Management**: Implement integrated farm management practices that optimise overall farm performance, including methane emissions, milk production, and other environmental impacts. This approach involves balancing herd size, feed efficiency, pasture management, and effluent management to achieve sustainable outcomes.
2. **Diversified Metrics**: Use a diversified set of metrics to evaluate farm performance, including total methane emissions, methane intensity, nitrogen surplus, and biodiversity indicators. This comprehensive assessment can provide a more accurate

picture of a farm's environmental impact and guide more effective management practices.

3. **Sustainable Intensification**: Promote sustainable intensification practices that enhance productivity while minimising environmental impacts. This includes improving feed efficiency, adopting precision farming technologies, and implementing rotational grazing systems that enhance soil health and reduce methane emissions.
4. **Policy and Incentives**: Develop policies and incentives that encourage farms to reduce both methane intensity and total methane emissions. This could include financial incentives for adopting sustainable practices, regulatory frameworks that set limits on total emissions, and support for research and development of new technologies.
5. **Education and Training**: Provide education and training programs for farmers on best practices for methane management. These programs should cover the importance of balancing methane intensity with total emissions, as well as practical strategies for achieving this balance.

8.4 Case Studies and Examples

To illustrate the importance of a holistic approach to methane management, consider the following case studies:

- **Case Study 1: Farm A**: Farm A focuses on reducing methane intensity by increasing milk production through high-energy feeds and larger herd sizes. While the farm achieves a lower methane intensity, its total methane emissions increase significantly, along with other environmental impacts such as nitrogen leaching and water contamination. As shown in Figure 12, there is a positive correlation between Purchased N Surplus and total Enteric Methane emissions. Although the correlation is weak, it suggests that factors in addition to Purchased N Surplus are likely influencing Enteric Methane emissions. This highlights the importance of adopting a more holistic approach, as demonstrated by Farm B below.
- **Case Study 2: Farm B**: Farm B adopts a holistic approach, balancing herd size, feed efficiency, and pasture management. The farm implements rotational grazing, prioritise pasture management and efficiencies, and invests in advanced effluent management systems. As a result, Farm B achieves both a lower methane intensity and reduced total methane emissions, while also improving soil health and biodiversity.

8.5 Methane Intensity vs Total Methane Conclusion

Focusing solely on methane intensity can be misleading and may inadvertently drive-up total methane emissions. To achieve true environmental sustainability, it is essential to adopt a holistic approach to methane management that considers both methane intensity and total emissions. By implementing integrated farm management practices, using diversified metrics, promoting sustainable intensification, adopting innovative technologies, and developing supportive policies and incentives, the dairy industry can reduce its environmental footprint and contribute to a more sustainable future.

9. Conclusion

This project set out to explore how top dairy farms in New Zealand balance making money with caring for the environment. The answer? It's absolutely possible — and many are already doing it. What's more, their success is grounded not in shortcuts or high-tech gimmicks, but in thoughtful, practical, and often simple decisions made every day on-farm. These decisions aren't made in isolation. They're shaped by years of trial and error, by changing seasons, by market pressures, and by a deep understanding of the land. What works in Northland might not work in Southland — but the mindset of continuous improvement is something they all share.

The best-performing farms aren't just focused on producing more milk — they're focused on producing it better. They maximise what their land naturally offers, especially pasture, and avoid overreliance on bought-in feed or synthetic inputs. Their animals are well-cared for, their systems are tidy and efficient, and their finances are under control. It's not flashy — but it works. They're not necessarily chasing growth for its own sake either. For many, success isn't measured in kilograms of milksolids or hectares, but in peace of mind, stability, and knowing they're doing the right thing — both economically and ethically.

They also know they can't do it alone. Every farmer interviewed talked about the importance of community — bouncing ideas off neighbours, benchmarking with others, joining discussion groups, and trusting experienced advisors. The sense of collective learning and shared responsibility was strong. That sense of connection supports innovation and confidence, and it's something the wider industry should continue to nurture.

Just as important are the values behind these decisions. Nearly every farmer mentioned wanting to leave the land in better shape than they found it, run a business they could be proud of, and ensure it would one day be viable for their children. Many were motivated by the well-being of their staff and the health of their communities. These are not just business operators — they are stewards of both land and legacy.

Environmental sustainability isn't a tick-box exercise. It's embedded in how these farmers operate. From reducing nitrogen use and protecting soil health to planting trees and preserving biodiversity, their actions show a clear commitment to farming in harmony with nature. And they're doing it in a way that keeps the books in the black.

What this research shows is that success in dairy farming today means finding a balance — between short-term returns and long-term resilience, between individual action and community support, between productivity and responsibility. The farmers who achieve this balance are leading by example, and their stories deserve to be heard more widely.

There's still work to do. Some farmers will need support to shift their systems. Others may need clearer policy signals or practical tools to make changes confidently. But the path forward is clearer than ever. It starts with knowledge, values, community — and a willingness to keep adapting.

New Zealand has the chance to be a world leader in sustainable, profitable dairy farming — not by following others, but by staying true to what makes our system unique: grass-based farming, deep community roots, and a strong sense of connection. It's a uniquely Kiwi approach — rooted in practical innovation, resilience, and a strong moral compass.

And it speaks to something even bigger: the potential for farming to be not just sustainable, but to give back more than it takes.

The opportunity now is to keep building on that — to lift the next tier of farmers, support bold choices, and ensure the future of our dairy sector is both bright and balanced.

9.1 Key Themes

By combining DairyBase data with insights from interviews with leading farmers, several key themes have come through clearly:

1. **Profitability and Sustainability Go Hand-in-Hand**
   Farms don't need to choose between being profitable and being sustainable — they can absolutely be both. The data shows that focusing on pasture growth and keeping costs down are two of the biggest drivers of profitability, and these also support good environmental outcomes.

2. **What Top Farmers Do Well**
   High-performing farms share a few habits: they manage their pasture smartly, keep their cows healthy, make decisions based on data, and build strong relationships with the people around them — from their teams to their advisors and communities.

3. **Sustainability as a Core Strategy**
   These farms aren't just ticking boxes. They're actively working to reduce nitrogen use, care for their soils, and limit environmental impact. It's part of how they run their business, not something separate.

4. **The Role of Biodiversity**
   Biodiversity came up in the literature and interviews as something that adds resilience to farm systems — even if it's harder to measure. It contributes to healthier ecosystems and brings a sense of pride and satisfaction. One farmer talked about creating an "*adventure playground*" for their kids by planting trees and restoring wetlands. While the interviews didn't dive deeply into biodiversity metrics, its clear many farmers are thinking about it and would benefit from more support to track and improve it.

5. **Methane Intensity vs Total Methane**
   Focusing only on methane per unit of milk can give a skewed picture. Some farms may improve intensity but still increase overall emissions. A more balanced view that includes both total methane and intensity is needed to guide real progress.

6. **How Farmers Make Decisions**
   The choices farmers make are shaped by more than profit margins. Personal values, long-term goals, peer influence, and trust in science all play a role. That means support and policy need to reflect the human side of farming, not just the numbers.

7. **Learning from Each Other**
   Most farmers aren't going it alone. Discussion groups, benchmarking, and sharing ideas with neighbours are common and valued. It's a strength the industry should keep building on — because when one farm lifts, others often do too.

9.2 Long-Term Vision for the New Zealand Dairy Industry

Looking ahead, the long-term vision for the New Zealand dairy industry is about building a sector that is not only resilient and profitable, but deeply sustainable — environmentally, socially, and economically. The goal isn't just to survive future challenges, but to lead and thrive in a fast-changing world.

1. **Sustainable Intensification**
   The focus should be on doing more with less — improving productivity while minimising environmental impact. That means smarter grazing systems, better feed conversion, reducing reliance on synthetic inputs, and integrating biodiversity as part of daily farm management. Healthy soils, resilient ecosystems, and satisfied farmers go hand-in-hand.

2. **Innovation and Technology**
   Ongoing investment in research and innovation is crucial. Whether it's methane inhibitors, feed additives, precision tech, or methane capture from effluent systems, science has a major role to play. But tech must stay grounded in practical outcomes that work on real farms.

3. **Holistic Farm Management**
   Farming needs to be seen as an interconnected system. From herd size and pasture planning to water and nutrient cycling, successful farms will be the ones who integrate all parts of the system thoughtfully, rather than maximising one metric at the expense of others.

4. **Education and Training**
   Farmers need continued access to clear, practical, and timely information. Training should focus not just on compliance, but on building confidence — especially around understanding emissions, balancing intensity with total environmental impact, and adapting to new tools and standards.

5. **Community and Collaboration**
   No farmer succeeds alone. We need more platforms for farmers, scientists, and industry leaders to share knowledge, challenge assumptions, and co-design solutions. Collaboration helps ensure buy-in and strengthens the social licence of the sector.

6. **Resilience to Climate Change**
   With more volatile weather and shifting environmental pressures, farms must be prepared to adapt. Practices that build soil health, manage water wisely, and improve system flexibility will be key. Resilience also means financial stability and mental wellbeing — both need attention.

7. **Consumer Engagement**
   More than ever, consumers care about how their food is produced. New Zealand can lead by showing how high-quality dairy can also be low impact. Telling our story clearly and honestly helps build global trust and secures long-term market access.

By focusing on these priorities, the New Zealand dairy industry can future-proof itself. We can keep our place on the world stage, support thriving rural communities, and ensure that future generations inherit an industry they can be proud to lead.

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12. Appendices

Appendix One: Interview questions

Interview Questions

1. Can you tell me what inspired you to start dairy farming?
    a. Ice breaker but also, I want their motivations, history, personal journey - the why
        i. Prompts.
        ii. How long have you been farming?
        iii. What were you doing before farming?
        iv. Tell me about your farming journey?
        v. May cross over with question 6 which is why they are still farming
2. What core values guide your farming practices?
    a. Principles and ethics that influence their farming methods
        i. Prompts.
        ii. How do you balancing profitability and environmental sustainability?
        iii. What motivates you to maintain a low environmental footprint?
3. How do you approach decision-making on your farm?
    a. Factors and considerations that play a role
        i. Prompts
        ii. Does community/environment/family/profit play a part in your decisions?
4. What do you believe are the key factors contributing to your farm's success?
    a. Those crucial elements
        i. Prompts;
        ii. What does success look like for you?
        iii. How do you measure success?
5. What are the key management practices you use to maintain profitability?
    a. Specific strategies and practices
        i. Prompts
        ii. How do you monitor and manage the environmental impact of farming activities?

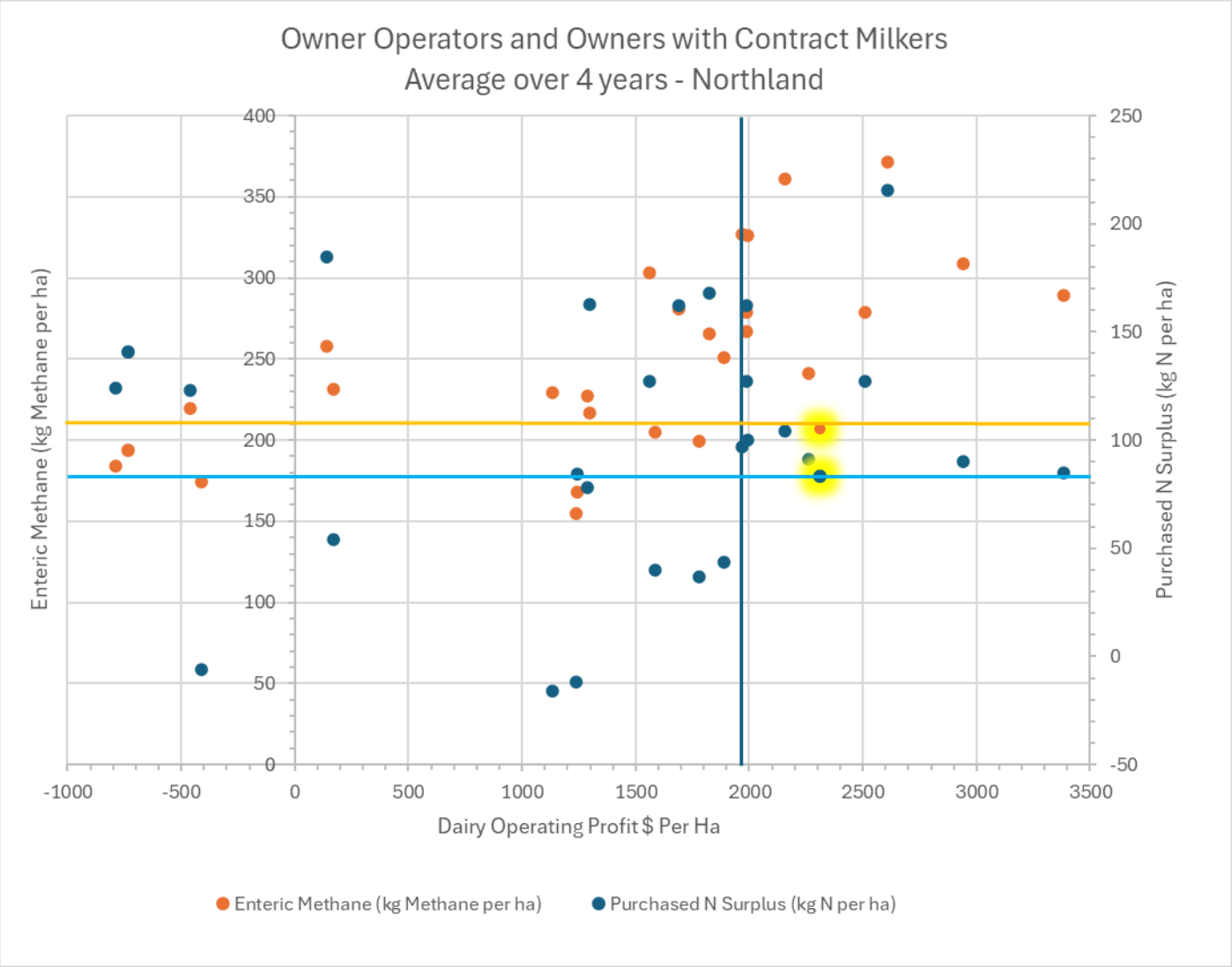
iii. Any innovative techniques or technologies you've adopted on your farm?

6. How do you stay motivated and passionate about your work?
    a. What keeps them driven and enthusiastic
        i. What gets you up each morning?
        ii. Why are you still farming?
7. Is there anything else you would like to add?

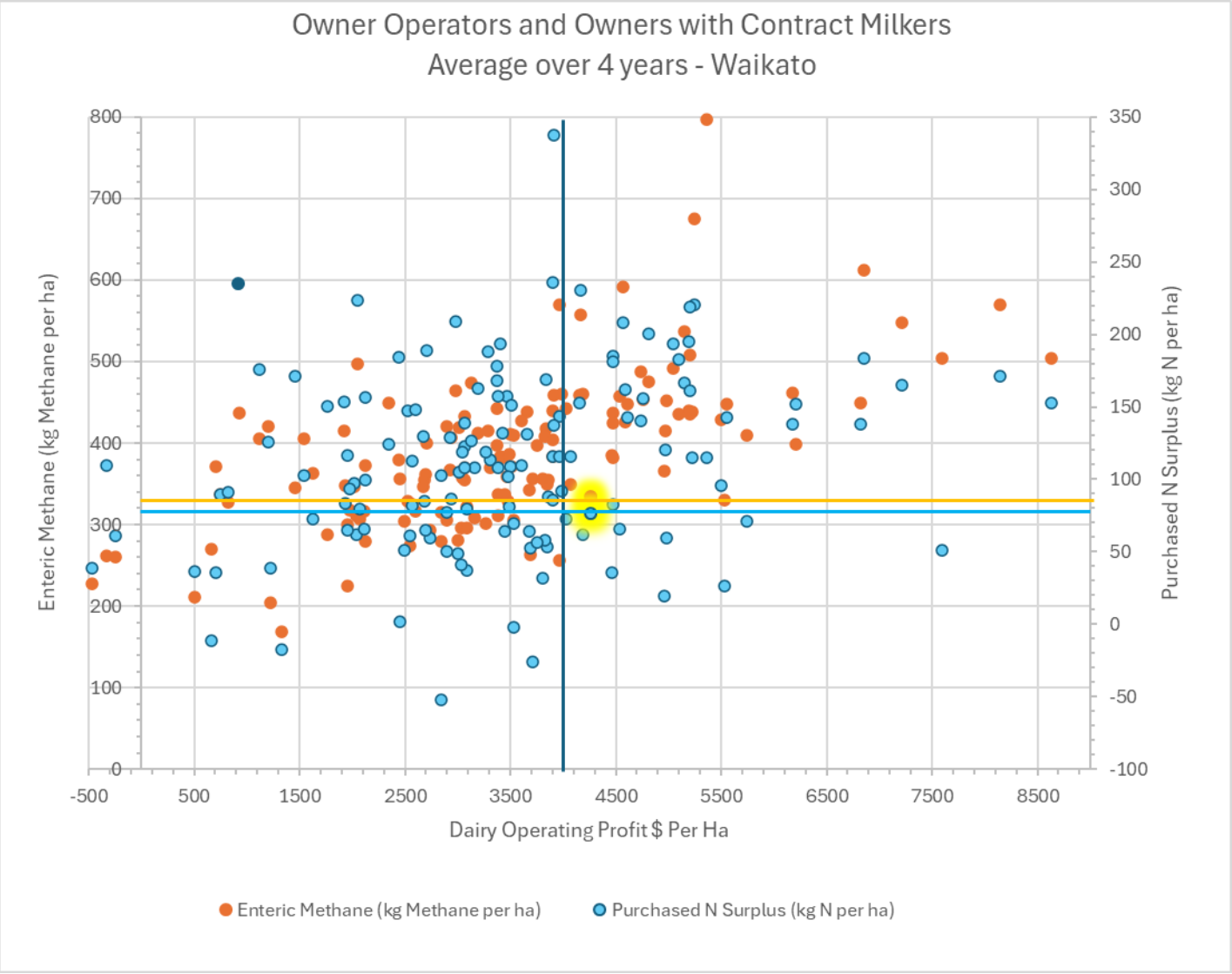
Appendix 2: Graphs

The graphs on the following pages show the interviewed farmer in each region (highlighted in yellow) and where they place in the graph compared to farmers in their region.

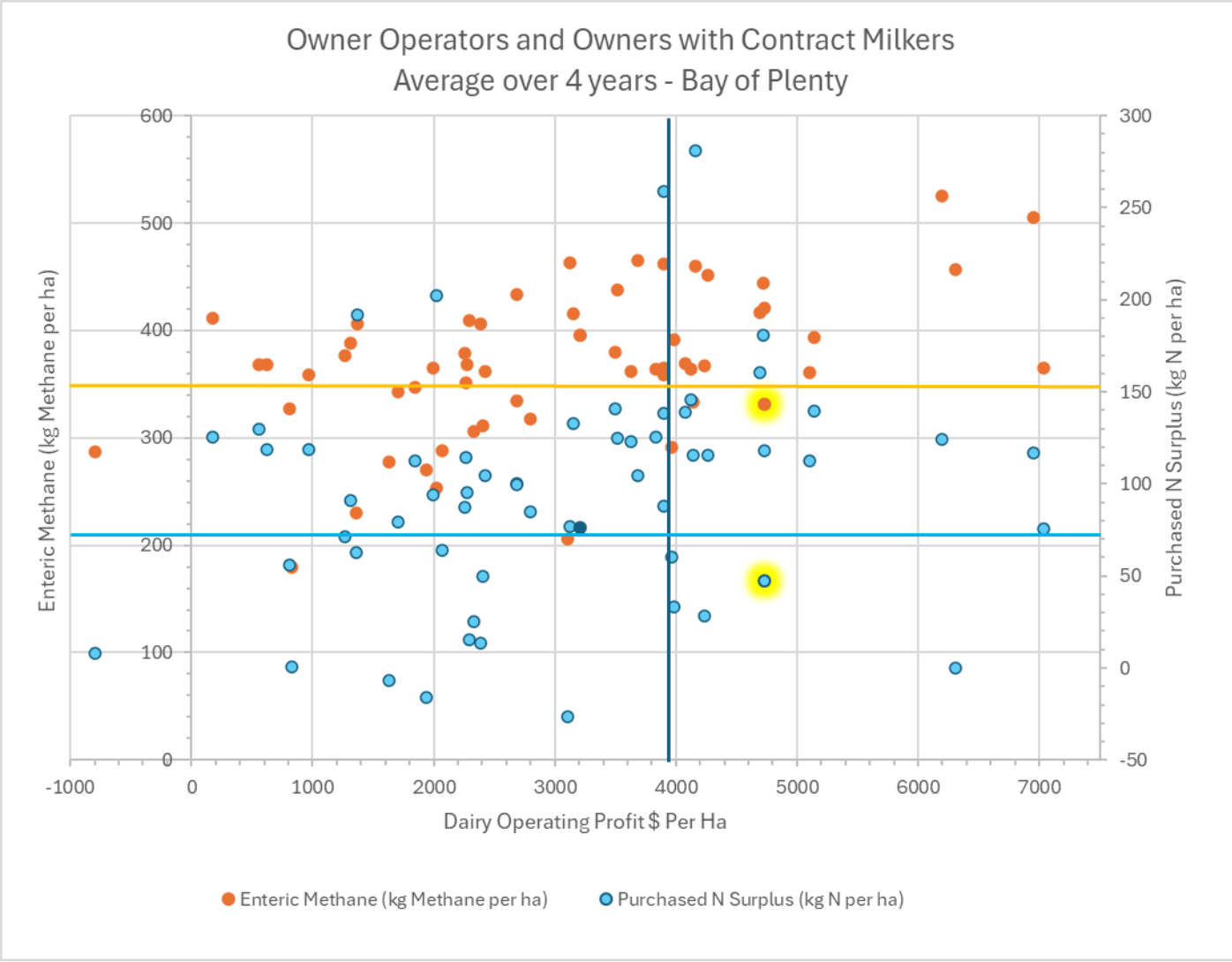
Northland;



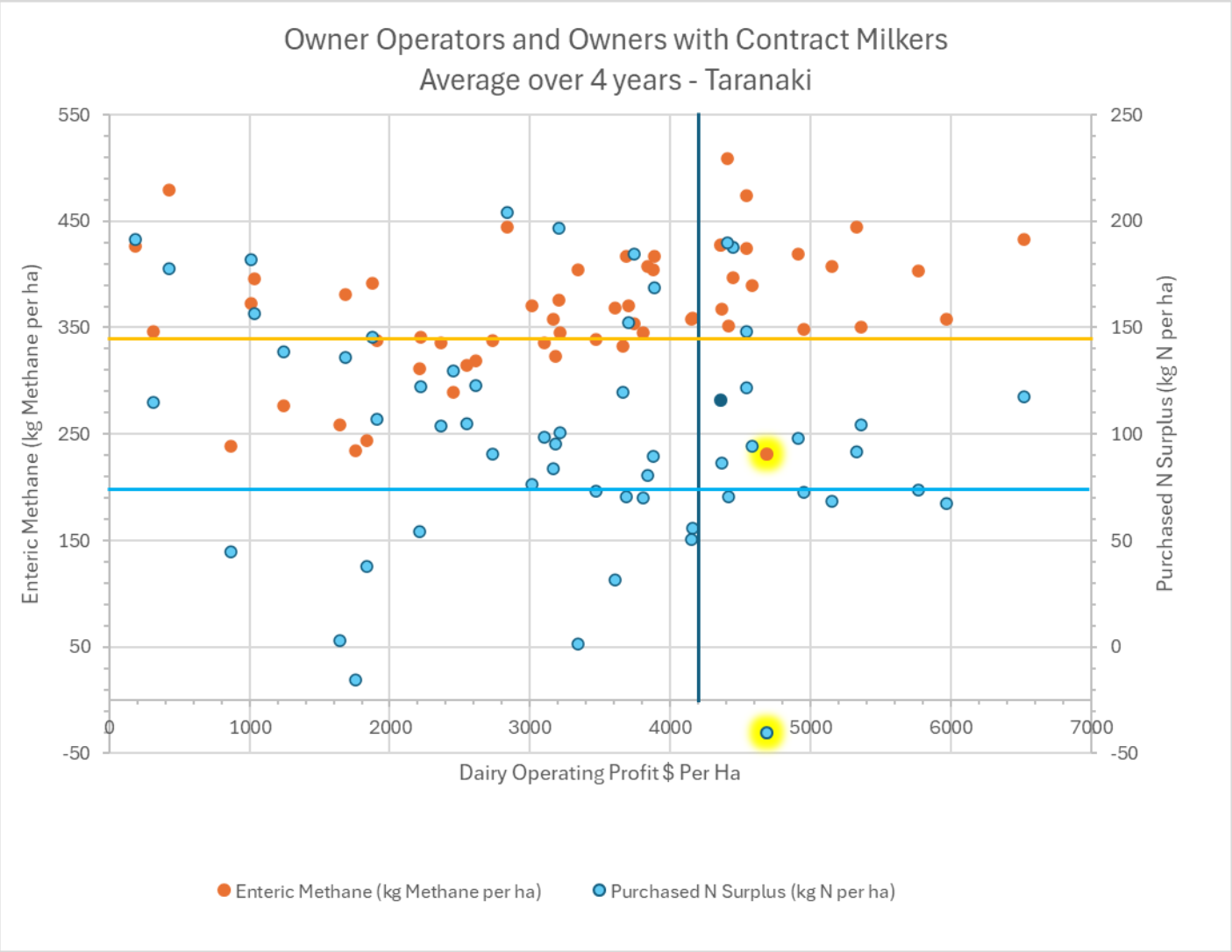
Waikato


Owner Operators and Owners with Contract Milkers
Average over 4 years - Waikato
Enteric Methane (kg Methane per ha)
Purchased N Surplus (kg N per ha)
Dairy Operating Profit $ Per Ha
800
700
600
500
400
300
200
100
0
350
300
250
200
150
100
50
0
-50
-100
-500
500
1500
2500
3500
4500
5500
6500
7500
8500
Enteric Methane (kg Methane per ha)
Purchased N Surplus (kg N per ha)

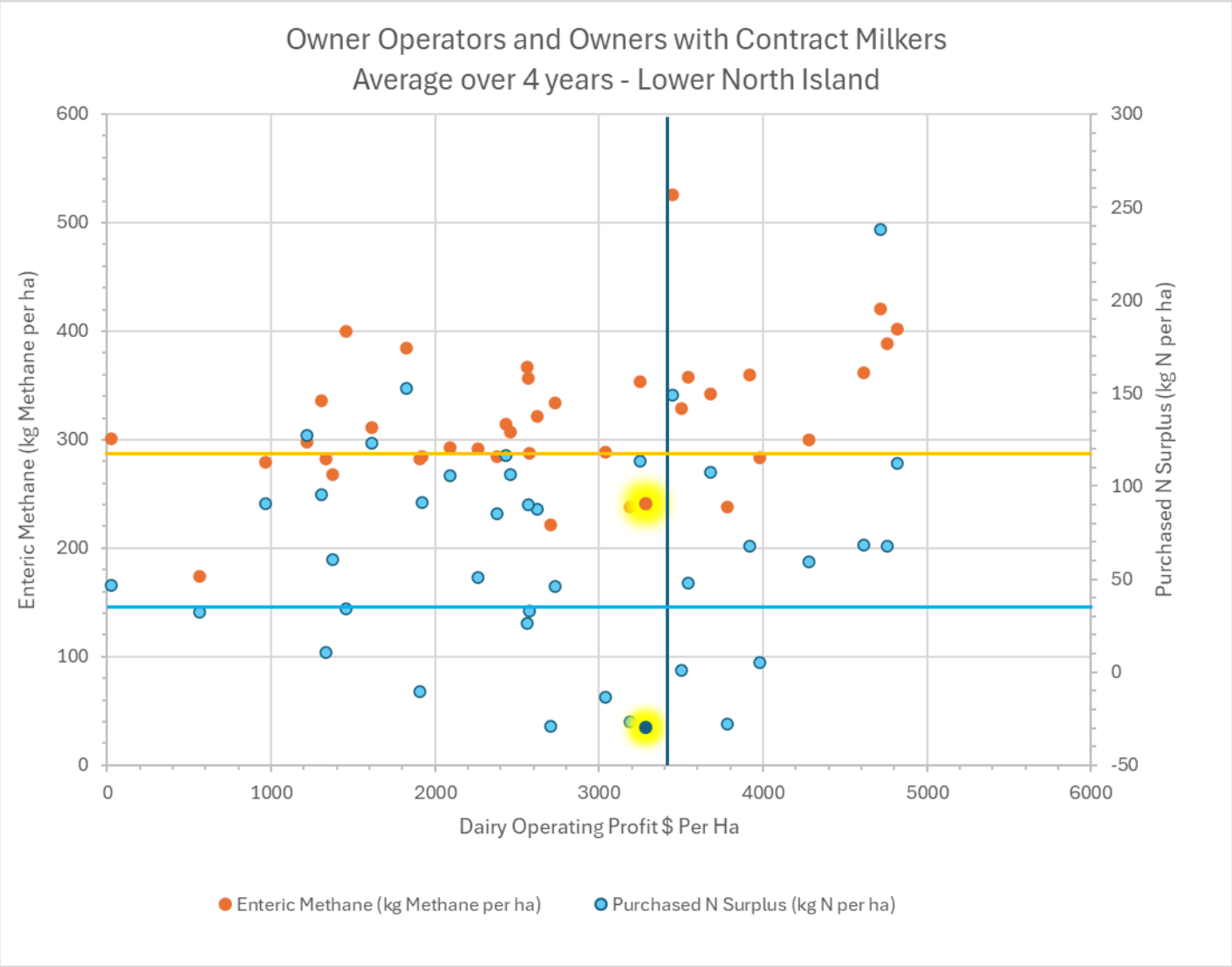
Bay of Plenty



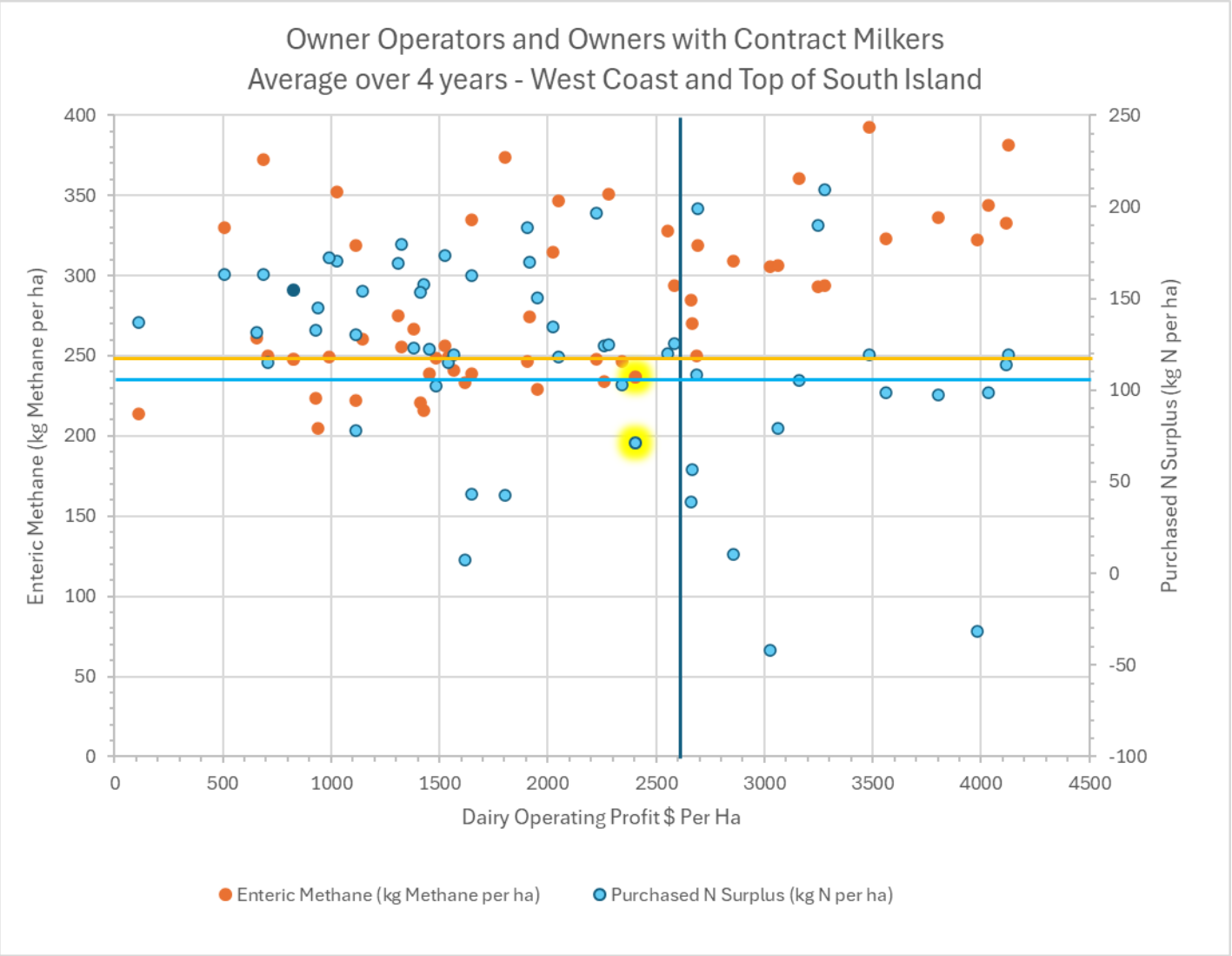
Taranaki


Owner Operators and Owners with Contract Milkers
Average over 4 years - Taranaki
Enteric Methane (kg Methane per ha)
Purchased N Surplus (kg N per ha)
Dairy Operating Profit $ Per Ha
550
450
350
250
150
50
-50
250
200
150
100
50
0
-50
0
1000
2000
3000
4000
5000
6000
7000
Enteric Methane (kg Methane per ha)
Purchased N Surplus (kg N per ha)

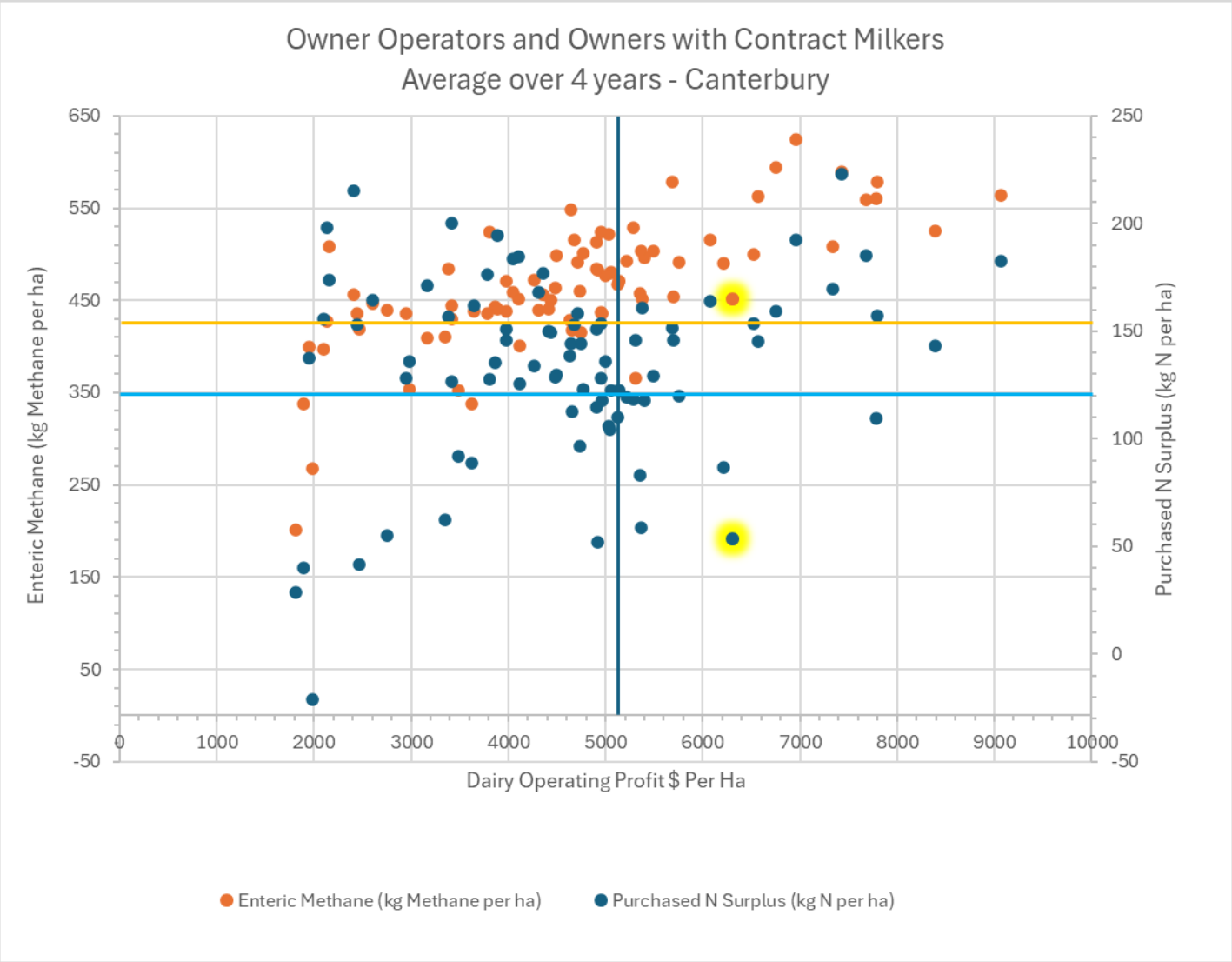
Lower North Island



West Coast and Top of the South Island



Canterbury


Owner Operators and Owners with Contract Milkers
Average over 4 years - Canterbury
Enteric Methane (kg Methane per ha)
Purchased N Surplus (kg N per ha)
Dairy Operating Profit $ Per Ha
650
550
450
350
250
150
50
-50
250
200
150
100
50
0
-50
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
Enteric Methane (kg Methane per ha)
Purchased N Surplus (kg N per ha)

Southland and Otago