



What's the Beef?

Opportunities for Beef on Dairy in New Zealand

By Matt Iremonger

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In submitting this report, the Scholar has agreed to Nuffield New Zealand publishing this material in its edited form.

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Executive Summary

Over 2 million calves are produced from the dairy herd in NZ every year, some are either retained for herd replacements, or are raised and finished on dry stock farms. However, approximately 1.8 million non-replacement or bobby calves are slaughtered annually at 4-7 days of age.

The opportunity for beef on dairy is to shift the value chain from dysfunctional to functional. If the end product has a greater value, then financial participation and therefore functionality increases for all activities involved in creating, rearing, growing, processing, marketing, and delivering a beef product to the end consumer from the dairy industry.

Financial effectiveness is the fundamental aspect throughout any value chain, facilitating the flow of resources, transactions, and incentives at each stage.

Unless there is more money for the end product of non-replacement calves, the value chain will continue to focus on cost minimisation of the calf as a by-product of milk production.

Money saves the bobby calf, but to realise more value with the consumer a successful beef on dairy value chain requires several key changes that contribute to delivering a product that has a higher value to the consumer, and increased effectiveness and efficiency.

1. Understand the Customer Needs: Grain fed is often a customer preference, especially in Asia markets. Short fed grain finished beef could be an opportunity to align the value chain activities with customer requirements. Grain fed also creates products that deliver value and meet customer demands of product consistency and reliable supply effectively.
2. Improve Integration and Coordination of Farming Systems: This involves seamless communication, collaboration, and synchronization of activities to ensure smooth flow and timely delivery of products or services, dairy farms, rearers growers and finishers.
3. Efficiency and Cost Optimisation: Using genetics designed to minimize costs and maximize efficiency at every stage of beef production optimises resource utilisation to achieve production cost advantages.
4. Sustainability: The opportunity to communicate and validate existing environmental, social, and governance (ESG) factors of a low carbon beef sales platform to deliver value to the consumer.
5. Technology: Meat grading is critical to improve value, give visibility and confidence of product quality and consistency of eating experience for the consumer.
6. Continuous Improvement and Innovation: marketing and branding of beef on dairy needs to continuously seek ways to introduce new digital transaction functions, and data analysis to optimise processes, and innovate across all stages of the value chain.

By shifting from a production driven to a consumer demanded beef on dairy value chain there is a prospect to enhance value and provide an opportunity for beef on dairy and the non-replacement dairy calf.



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Acknowledgements & Foreword

It seems to be a cliché that Nuffield opens doors you would never expect – however, like all clichés it's a fact.

I will not be able to thank the farmers, academics, companies, organisations, individuals and random strangers that gave their time, shared their knowledge and contributed significantly in small and large ways to the opportunity to learn more about agriculture globally and NZ's small role within it.

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The GFP group was a diverse, great team that was supportive, considerate and fun – we had some great conversations and discussions and enjoyed each other's company.



GFP: Kylie, David, Liz, Anthony, Marlon, Carina, Tom & Jess.

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The 2023 Nuffield Scholar cohort, James, Kerry & Kylie, are outstanding individuals and I look forward to continuing to learn more from you all.

Trying to understand if there is an opportunity for beef on dairy was started by Katy, Alice & Abby – my family and favourite people. I am thankful for your continued and unwavering support, even though I am endlessly frustrating. The highlight was to share some time overseas together during the year.



Family: Katy Abby & Alice

The opportunity to undertake the Nuffield year was only possible with the help, assistance and encouragement of Brent & Belinda Thomas, and our professional advisors Stu Bayliss, Andrew Laming and Brooke Cromie.

I am grateful for the fantastic team I work with on farm at Willesden & Kaimoo, who enabled me to be away, and were very understanding and continued to do the amazing job they always do producing food for the equivalent of more than 10,000 people every year.



The biggest overarching lesson I took away is that as NZ agriculturists we need to get out meet people, especially our customers and take a more positive view of challenges. We need to look at what other countries are doing in these spaces with the humility that we don't have all of the answers ourselves.



List of Abbreviations

AACo: Australian Agricultural Company

ASPCA: American Society for the Prevention of Cruelty to Animals

B&L/B&LNZ: Beef & Lamb NZ

CAB: Certified Angus Beef

CBP: Composted Bed Packed

CEO: Chief Executive Officer

CPTPP: Comprehensive and Progressive Agreement for Trans-Pacific Partnership

DNZ: Dairy New Zealand

EBV: Estimated Breeding Value

ESG: Environmental, Social, Governance

GFP: Global Focus Program

GMO: Genetically Modified Organisms

GRSB: Global Roundtable for Sustainable Beef

LLC: Limited Liability Company

MLA: Meat & Livestock Australia

MPI: Ministry of Primary Industries

MSA: Meat Standard Australia

NZ: New Zealand

USDA: United States Department of Agriculture

USRSB: United States Roundtable for Sustainable Beef



Chapter 1: Introduction

1.1 What's the Beef?

Recently there has been increased public concern over bobby or non-replacement calves within the NZ dairy industry. A bobby calf or non-replacement calf is defined as an unweaned calf that is intended for processing within approximately the first week of life for human consumption or pet food (MPI).

Currently, just over 4 million dairy calves are born each year between July and September in NZ. Approximately one quarter of these will be kept as replacements with the remainder either sold to be raised as beef cattle, killed on farm, or sold as bobby calves and sent to slaughter between 4-7 days of age.

This is an underutilised resource; can we do more with the production of these surplus calves?

What are the opportunities for dairy beef?

Globally it's referred to as **Beef on Dairy**, as that's the focus for producers, a genuine beef focus, not simply a by-product of dairy systems, but a complementary income stream.

First, we need to examine the beef industry. Why do NZ beef producers not receive the same product value compared to other producers in international markets?

NZ beef doesn't have consistent:

1. **Performance = eating experience.**
2. **Supply = they can't get it when they want it.**
3. **Grading = our competitors have a simple system that has brand awareness.**

Also, we need to acknowledge that the majority of the consumers don't want grass fed, and a lot of reason for that is the lack of consistency of eating experience and flavour.

For all of these reasons NZ beef producers are discounted.

So, is there an opportunity for beef on dairy?

A value chain that is customer driven not production driven. Basically, we need to understand our customer better.

The only way we solve for the issue is with financial benefits. More income drives change.

The low price of NZ beef limits the economics of beef on dairy value chain. This limits enthusiasm and economic stimulus, and in fact is a disincentive for participation in the value chain.



1.2 Overview of the Beef Industry in New Zealand

The New Zealand beef industry plays a crucial role in the country's economy and agricultural landscape. The beef industry is primarily pasture-based, leveraging the pasture-based farming system.

New Zealand had approximately 3.7 million beef cattle, including breeding cows, calves, and steers.



The beef sector in NZ has an annual volume of 677 kilotonne of carcass weight of which 83% is exported, generating \$4.6 billion in revenue.

However, only 60% of the volume originates from the traditional beef on beef sector, while the other 40% comes from culled cows and slaughtered bobby calves from the dairy industry (MPI).

The beef industry is NZ's third most important agricultural industry in terms of export revenues, (MPI, B&LNZ).

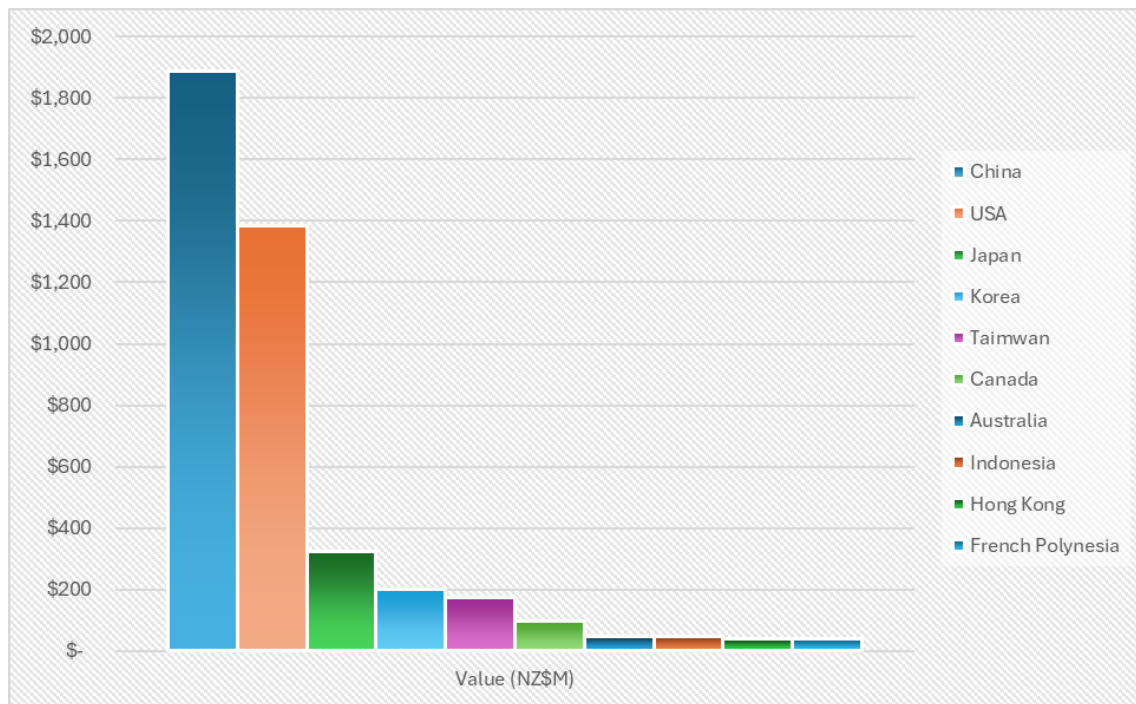
The volume of New Zealand's beef exports to China grew by 7% in 2022/23 from the year prior to 224,000 tonnes and the value grew by 5% to nearly \$2 billion. This was a record volume and value to China.

Beef exports to Japan have been growing steadily since the signing of the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) in 2018.

In 2017/18, New Zealand's beef exports to Japan were 14,221 tonnes worth \$137 million and these have more than doubled to 32,337 tonnes worth \$259 million in 2022/23, highlighting the benefit of the CPTPP to the sector.



The top ten beef NZ export markets in 2022/23 were;



Source: Meat Industry Association.

However, the beef industry has some challenges around inconsistent supply, discounted product price compared to competitors, and it's not well supported in market.

This is reflected in the comments from representatives of CofCo (Chinese State owned & Fortune 500 meat importer), that "NZ has very limited relationships in market and is not participating in any food shows or industry events", (CofCo Henry Zhao 22.8.23).

Comparatively, Fonterra has more than 670 full time staff in China to support the trade of \$4 Billion of exports by Fonterra. Across the total NZ meat industry there is only a very small handful of staff for a trade worth \$2 Billion; despite this, surprisingly and disappointingly, NZ's largest meat processing cooperative has no one in market.

This is consistent with some trading partners in Japan's commentary that "NZ has little representation, inconsistent supply, and grain fed is preferred – we look to discount grass fed", (Tomo San, Top Trading 16.8.23)

NZ Trade and Enterprise in China observed that the "opportunities are to have more presence and support in market, NZ needs a connection into the market and not just use contractors – this must be locals, and NZ needs a grading system to compete", (Richard Dunsheath, NZTE 24.8.23).

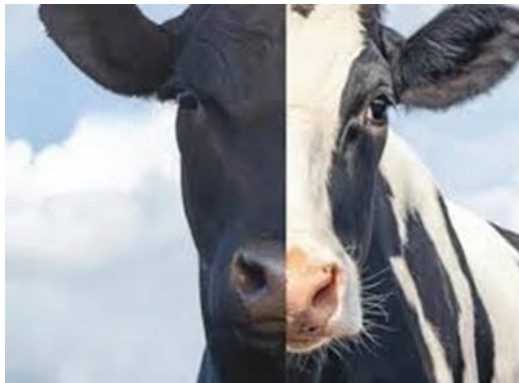


1.3 Overview of the Beef on Dairy Industry in New Zealand

Dairy farming involves the raising of cattle primarily for milk production. The NZ dairy herd of 4.8 million cows is typically made up of Holstein-Friesian, Jersey or KiwiX cows, (DNZ).

The primary source of revenue for these farmers comes from selling milk, typically in NZ through a processor – which is dominated by Fonterra as the largest processor.

Many dairy farmers in New Zealand have adopted specific breeding programs to optimise the crossbreeding process. These programs often involve selecting beef genetics with desirable traits such as high growth rates, meat quality, and suitability for New Zealand's farming conditions and include Charolais, Wagyu, Hereford & Angus as popular options.



Like any agricultural endeavour, beef on dairy is subject to market fluctuations, including changes in beef prices and consumer demand.

One of the main challenges to success has been the lack of financial participation along the value chain; someone is often missing out. Often this can be the calf rearer, the grazier/backgrounder or the finisher.

Also, the product is often less than successful as a farming system, either underperforming animals or underperforming at processing with lower quality meat or both.

Further development in areas such as genetics, nutrition, and animal husbandry would improve the efficiency and a better product delivered to the consumer to derive an improved product price would drive profitability of beef on dairy operations.

Ultimately better in-market returns for beef would provide for greater value chain financial performance and economic viability.



Chapter 2: Dairy Farming in NZ

2.1 Evolution of Dairy Farming in New Zealand

Dairy farming in New Zealand has its roots in the early European settlement period, dating back to the late 18th and early 19th centuries. European settlers brought with them knowledge and practices of dairy farming, establishing small-scale dairy operations solely for local consumption.

Throughout the 20th century, dairy farming expanded rapidly in New Zealand, driven by the favourable climatic conditions, fertile land, and growing demand for dairy products both domestically and overseas. This period saw the establishment of larger dairy farms and the adoption of more intensive farming practices using irrigation development for expansion into non-traditional dairy production regions.

The formation of dairy co-operatives in New Zealand played a crucial role in the development of the dairy industry by providing farmers with collective marketing, processing, and distribution capabilities. The most notable of these co-operatives was the New Zealand Dairy Board, which later evolved into Fonterra, one of the world's largest dairy companies.

New Zealand's dairy farming is characterized by pasture-based systems. Unlike many other countries where grain feeding is common, New Zealand's mild climate and generally abundant rainfall or irrigation water resources make it well-suited for pasture-based dairy farming. The focus on maximizing the utilisation of pasture resources through techniques such as rotational grazing and pasture management.

The dairy industry produces 20.8 billion litres of milk annually, of which 95% is exported earning \$25.7 Billion in export earnings – approximately 25% of NZ total export receipts, (DNZ).

Recently there has been increasing emphasis on sustainability and environmental stewardship in New Zealand's dairy industry. Dairy farmers have implemented practices aimed at reducing environmental impacts, such as nutrient management, riparian planting, and effluent management.

2.2 Geographic Distribution and Concentration

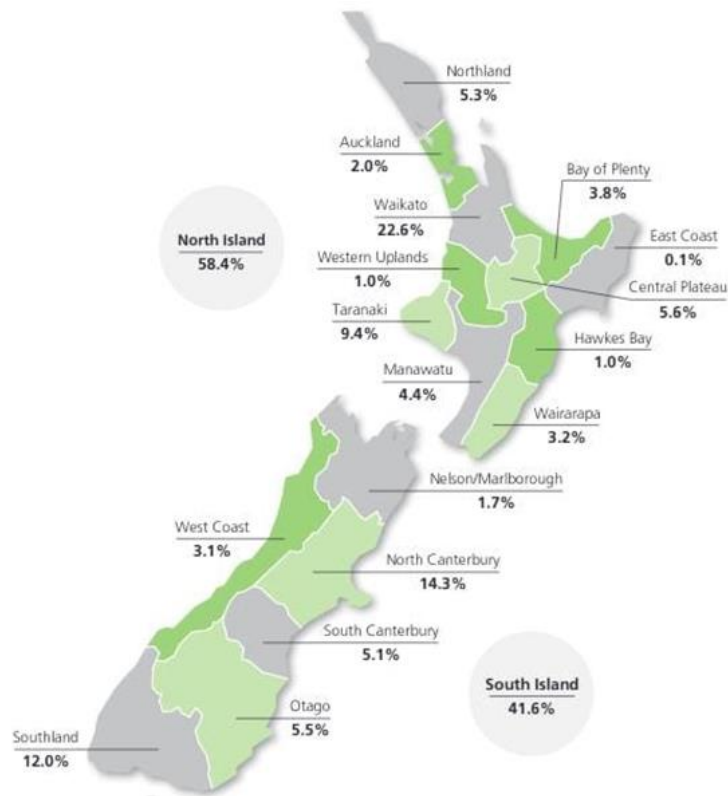
Dairy farming in New Zealand is distributed across various regions, with concentrations in areas known for dairy farming and favourable environmental conditions.

Waikato Region:

The Waikato region, located in the central North Island, is often considered the heartland of New Zealand's dairy industry. It has a high concentration of dairy farms. The region's fertile soils, abundant rainfall, and temperate climate make it well-suited for dairy production.

Canterbury Region:

In the South Island, the Canterbury region is another significant hub for dairy farming and beef operations. The region's flat irrigated plains provide ample opportunities for dairy production. Canterbury's proximity to processing facilities and export ports also facilitates access to international markets.



Source: Dairy NZ

Taranaki Region:

Taranaki, situated in the western part of the North Island, is known for its high rainfall making it conducive to dairy farming.

Southland Region:

Southland, located at the southern tip of the South Island, is characterized by its cooler reliable climate and extensive rolling grasslands.

Northland Region:

Northland, in the northernmost part of the North Island, experiences a subtropical climate with ample rainfall. While not as prominent as in other regions, beef on dairy farming is practiced by some dairy farmers in Northland, particularly in areas with favourable grazing conditions.



2.3 Beef on Dairy as Part of Dairy Farming

The emergence and growth of beef on dairy practices in New Zealand have been influenced by various factors, including market demand, technological advancements, and the desire for increased farm profitability.

As dairy farmers sought to diversify their income streams and capture additional value from their operations, they recognised the opportunity to produce beef-cross calves alongside milk production.

Using beef genetics is certainly not new – and has for a long time been part of the production system.

The further development of beef on dairy practices has been supported by advances in genetic selection and artificial breeding programs.

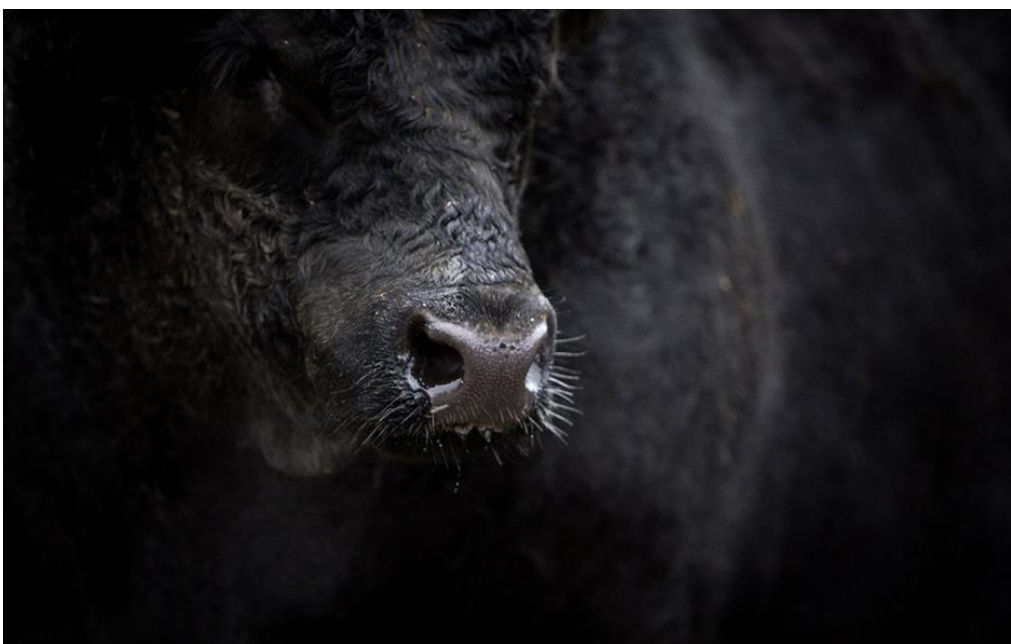
Dairy farmers began selectively breeding their cows with beef bulls to produce offspring with desirable traits for beef production alongside short gestation and calving ease.

Research institutions, industry organizations, and agricultural extension services such as Dairy NZ and Beef & Lamb have played a role in promoting and supporting the adoption of beef on dairy practices.

Some dairy farmers have embraced beef on dairy practices as part of their broader sustainability initiatives by reducing calf wastage.

The emergence of beef on dairy practices in New Zealand reflect a convergence of market forces, changing farm management strategies around sustainability and is likely to play an increasing role in the diversification and profitability of New Zealand's agricultural sector.

Improving the beef genetics of non-replacement dairy calves has been attracting some interest, with sustainability and a more reliable supply of cattle the main drivers.





Chapter 3: Sustainability

3.1 What is Sustainability?

All primary agricultural producers, by necessity, have throughout the history of agriculture, due to geographical and physical constraints, market competition, financial necessity and reduced input availability or the inflationary cost of inputs; driven for greater efficiency and increased performance: simply – farmers have continually needed to produce more from less.

There is a global movement asserting to represent increasing farm efficiency that uses terms like sustainability, carbon zero, regenerative. These terms, (and other similar terms), have varied definitions but with little agreement.

The trajectory of competition to capture increasing value from the consumer of agriculture products has over time seen shifts from “conventional” to “natural”, then for a subset this morphed into the creation of an organic movement.



We are now in the age of sustainability/carbon zero/regenerative as a methodology by the multi-national agribusinesses to capture greater value from the consumer.

We have seen the monetisation of the system that has found a way to convince the consumer into being willing to pay a premium that leaves the consumer with a “guilt free” consumption experience and increasing the volume of trade of preferable “guilt free” goods.

The participants within agriculture along the value chain use these terms in varying ways, which can be quite different dependent on whether it is a large corporate primary producer, agrichemical company, a processor, retailer, or a simple sole trader/small scale farmer.

The impact across the value chain spectrum has often increased the cost of production. This can be reflected in higher consumer prices, reduced profitability, or a combination of both.

Primary producers of the world have not participated fully or understood the conversations around sustainability and what impact this movement has created.



Ultimately, customers, for the most part, are looking for food safety and product consistency at an acceptable price.



3.2 NZ Agricultural Sustainability

The ideology around “sustainability” has tended to paralyse NZ Primary Producers and our sector representatives by the fear that we might alienate our community, customers, or our global allies.

NZ is at times an inward looking and negative country. NZ is a small country that is geographically isolated, this comes with challenges and opportunities.

This limits NZ Primary Producers by not understanding the opportunity to communicate the continual agricultural improvement.

NZ needs to look at the challenges as opportunities, improve, grow and adjust to consumer and customers’ needs by communicating and forming relationships that are based on cooperating to compete.

The way forward is to improve our communication and engagement to unlock the understanding of the work that has and continues to be done throughout the value chain improving “sustainability”.

NZ has an opportunity to utilise our innate pastoral agricultural advantages by continuing improvement and demonstrate, as well as validate, that we are increasing soil health, water quality and carbon utilisation and sequestration.

There are likely a range of ways this can be achieved, for the beef sector in particular one opportunity is to turn the non-replacement/bobby calf into a sustainability advantage.

NZ has a unique point of difference for beef on dairy production that is low carbon and pasture raised. This is something that few producers globally can compete with.



3.3 Global Beef Sustainability

The Global Roundtable for Sustainable Beef (GRSB) is a multi-stakeholder initiative aimed at advancing sustainability within the global beef industry. Established in 2012, the GRSB brings together stakeholders from across the beef value chain, including producers, processors, retailers, civil society organizations, and governmental agencies, to collaborate on sustainable beef production practices.



One of the primary functions of the GRSB is to develop and promote globally applicable principles and criteria for sustainable beef production. These principles encompass various aspects of sustainability, including environmental stewardship, animal welfare, social responsibility, and economic viability.



The GRSB offers guidance and resources to help beef producers and other stakeholders implement sustainable practices. This includes tools and frameworks for assessing and improving sustainability performance, as well as guidance on certification schemes and labelling initiatives.

While the GRSB is headquartered in, Denver, Colorado, USA, it has a global presence, with members and affiliates from around the world, including NZ. This global perspective allows the GRSB to address sustainability issues that are relevant across different regions and production systems.

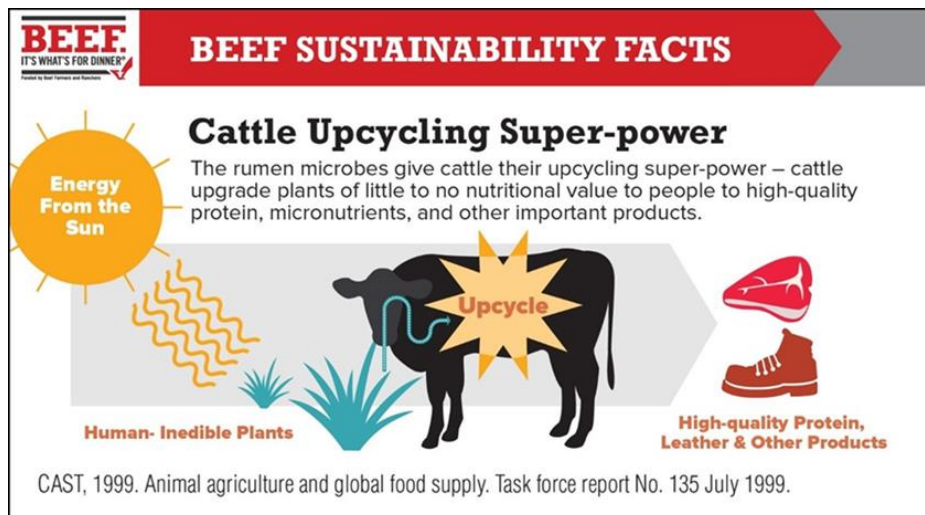


3.4 NZ Beef on Dairy Sustainability

Approximately 1.8 million non-replacement or bobby calves are slaughtered annually, which are undesirable for replacements or for beef production, (MIA)

Carbon accounting is a significant reason globally many companies have targeted beef on dairy programs. The International Dairy Federation has a carbon accounting methodology, which stipulates that 85% of the dairy cows emissions are attributed to her milk and 15% to her calf. By contrast a beef-on-beef calf starts life with 100% of the dams' emissions attributable.

The origin of calves used to produce beef has an important impact on the level of GHGs emitted. Per kg beef on dairy calves have a lower emissions intensity (kg CO₂ equivalent) compared to their beef-on-beef counterparts, because the beef-on-beef calves are dominated by the maintenance of the breeding cow, while in the case of beef on dairy those emissions are mainly attributed to milk, (de Vries et al, 2015).



The downstream production system from birth of either the beef on beef or beef on dairy calf is proportionate to the dry-matter intake, which is a result of genetics and nutritional and farms systems management.

Beef on dairy is a significant opportunity for sustainable beef due to the lower emissions profile. Per Kg beef GHG emissions are 29% lower for beef on dairy animals compared to a beef-on-beef animals. Integration beef into dairy production offers great opportunities to reduce the GHG emissions.

Breaking down the barriers to understanding what the consumers desires and then supporting the customer in providing the best outcome. This starts with communication of what we are doing, and continue to do, in advancing agricultural efficiency in constant improvement of "sustainability".

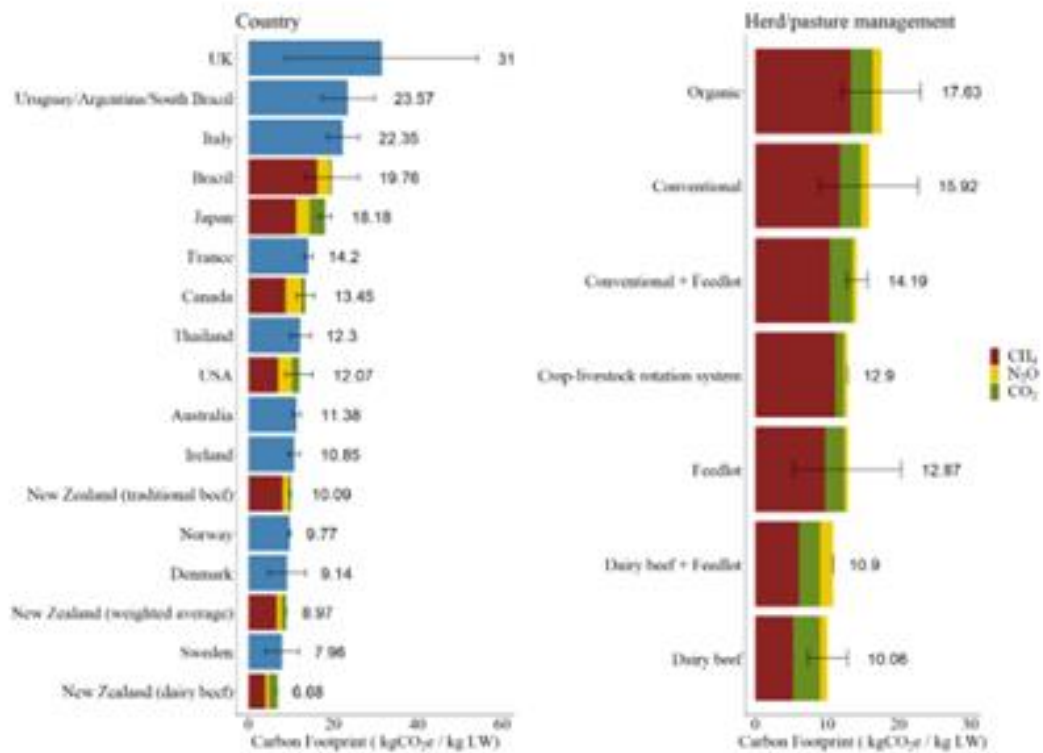


Figure 1: Cradle-to-farm-gate carbon footprint (kg CO₂e per kg LW) for beef production in different countries and by different cattle management systems using Live Weight (LW) as a functional unit. Error bars denote the standard deviation. Note that there were differences between countries in number of reported studies. Blue bars represent where data were not available for calculating the greenhouse gas breakdown.

Source: Meat Industry Association & B+L NZ

“Sustainability” is an opportunity to increase farm profitability, NZ has an opportunity to harness this trend in a positive way.

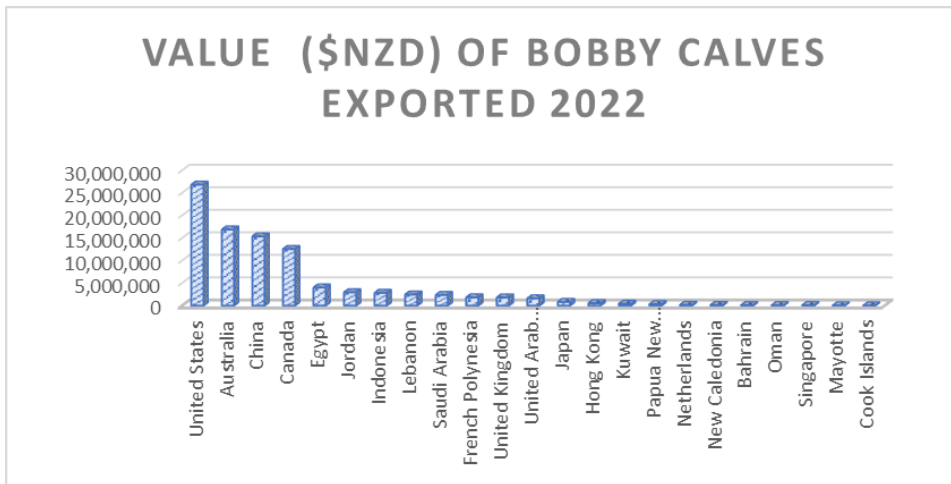
Although some groups in NZ have integrated beef into dairy systems, (e.g. Pamu/Firstlight/NZ Wagyu) further expanding the integration would be beneficial for both sectors.

Slaughtering surplus dairy calves at 4 days of age may become increasingly controversial, and therefore reducing the number slaughtered while creating a higher value calf suitable for red meat production can give economic benefits to the dairy sector.



Chapter 4: Current State of Non-Replacements Calves in the Dairy Industry

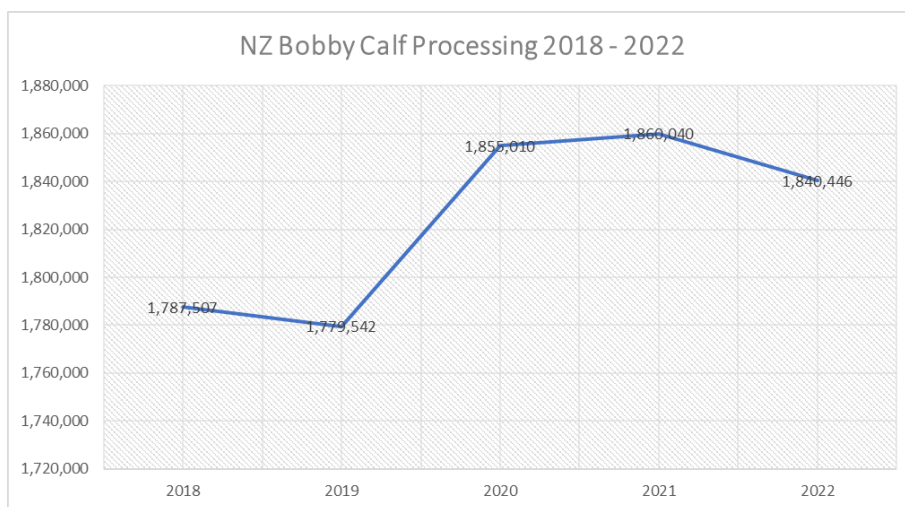
Around 430,000 beef on dairy calves from the dairy herd are retained to be raised and finished on dry stock farms (B+LNZ). However, approximately 1.8 million non-replacement or bobby calves are slaughtered annually.



Source: Meat Industry Association

Dairy farmers are increasingly seeing value in genetic selection and breeding programs to produce beef-cross calves with desirable traits for beef production. Attributes such as increased growth rates & high meat quality.

Dairy farmers have been implementing improved calf rearing practices to optimize the health, growth, and development of beef-cross calves. This includes providing appropriate nutrition, housing, and healthcare to ensure calves reach market weight efficiently and profitably this drives beef performance.



Source: Meat Industry Association



Ongoing research and development efforts by the likes of Dairy NZ, Beef & Lamb and Fonterra are focused on genetics, nutrition, management strategies, and market opportunities.

Dairy farmers are required as part of their broader sustainability initiatives as the industry continues to evolve, Fonterra dairy farmers, for example, from 1st June 2023 must ensure that all non-replacement calves enter a value stream.

Beef on dairy can play an increasingly important role in the sustainability, diversification and income generation of dairy and dry stock farms.



Chapter 5: Opportunity for NZ Beef on Dairy Production

Sustainable Pasture Raised Beef & Sustainable Pasture Raised, Grain Finished beef.

The opportunity for the NZ beef on dairy value chain is not one of reinvention. The opportunity is for the existing value chain to deliver consistent financial reward to the participants in that value chain reliably.

This requires the ultimate end value of the processed animal to be of sufficient worth in the market to provide financial return for all participants to flow down the value chain.

The only way in which further value can be extracted from the market and customer is to deliver against the demands for consistent eating experience, consistent supply, meat grading and validated sustainability.



We need to accept that a large proportion of the consumers don't want grass fed and want an offering that is grain fed. The demand in international markets, especially Asia is mostly for grain finished beef, (A. Gidley-Baird, Rabobank).

Capturing greater value is only possible in a value chain that is customer driven not production driven.

Farming Systems:

NZ farms could improve the integration of farming systems between dairy and beef production. An approach that maximizes land utilisation and offers synergistic benefits. For instance, beef on dairy progeny can be utilised to supply the beef grazing sector, as opposed to the traditional beef on beef supply from breeder hill country type farms.

Surplus animals from the dairy herd have always gone into the beef supply chain, as bobby calves or cull cows, and we have an opportunity to increase the value of this trade for both the beef and dairy industries.



The importance of building a collaborative beef on dairy supply chain that deliver value for non-replacement dairy calves, builds long term resilience for the beef and dairy industries and strengthens assured supply to our beef supply chain.

Grain Fed:

There is an opportunity to access the higher value grain fed market segments. This requires the transition beef on dairy cattle to a grain diet for a period of between 70-100 days to allow for greater marbling and a consistent supply program that is not impacted by weather and pasture supply challenges.

The grain diet opens up market access for the significant grain fed segment of high eating quality sustainable beef product.

To enable this to be undertaken compost barns could be utilised. Also known as deep-bedded pack barns or compost bedded pack (CBP) systems, are innovative housing systems used in beef production.

These barns provide a comfortable and sanitary environment for beef cattle while also promoting manure management and nutrient recycling.

Compost barns are typically large, open-air structures with a deep bedding system consisting of organic material such as straw, sawdust, or wood shavings.

The barns are designed to provide ample space for cattle to move around and lie down comfortably, with a roof to provide protection from the elements while still allowing for natural ventilation.

The chair of the NZ Climate Change Commission, Dr Rod Carr said barn-feeding livestock was an example of a practice that leveraged technology being used in Europe.

“For some farmers that might mean changing aspects of their business model. Our farmers will need to assess the options available to them and should be incentivised for practices that work for their businesses”, and that it was “increasingly obvious that you can create meat and milk protein with lower total emissions using different farming practices”, (Stuff Gerhard Uys, May 2023).





Genetic Selection and Breeding:

Genetic selection and innovative breeding programs is an opportunity that can enhance the quality and productivity of beef on dairy operations. Traits such as growth rate, feed efficiency, and carcass quality would be optimised to produce high-quality beef from dairy breeds using the most advanced international breeding genetics.

Beef genetics with high calving ease and short gestation length in addition to the sires having high EBVs for growth, eye muscle area, yield and marbling (IMF) and feed efficiency would be desirable.

Nutrition and Feeding Management:

The opportunity both pastoral and grain fed nutrition and feeding strategies specifically tailored to beef on dairy systems to optimise animal health, growth, and efficiency. This includes balancing feed rations, utilizing pasture efficiently, and incorporating supplementary feeds possibly including GHG mitigation when necessary.



Short fed Beef on Dairy in a Feed Barn Colorado, USA

Sustainability:

The opportunity is for beef on dairy calves is to have a platform of sustainably sourced cattle for beef without the need for capital investment in a breeder herd and the associated land and infrastructure to support that herd.

Currently NZ Primary Producers are being asked to reduce scope 3 emissions to provide for sustainability objectives for our customers to provide to consumers.

NZ Primary Producers are providing these Ecosystem services for free as the benefits are used by our customer and negotiated away during procurement negotiations due to our price taker positioning.



Meat Grading:

Provides several benefits to both producers and consumers including quality assurance, market value, and consistency of product offering.

Grading ensures that meat products meet specific quality standards, differentiates the product based on quality and allows consumers with a simple way to assess the quality of meat products before purchase.

Grading ensures consistency in meat quality and helps the product meet consumers expectations; this encourages repeat purchasing.

Market Development and Branding:

Development of strong market for beef produced from dairy cattle requires effective branding and marketing strategies. Emphasizing the unique qualities of beef from dairy cattle, such as tenderness, flavour, and the sustainability credentials. This will differentiate it in the marketplace and attract consumers.





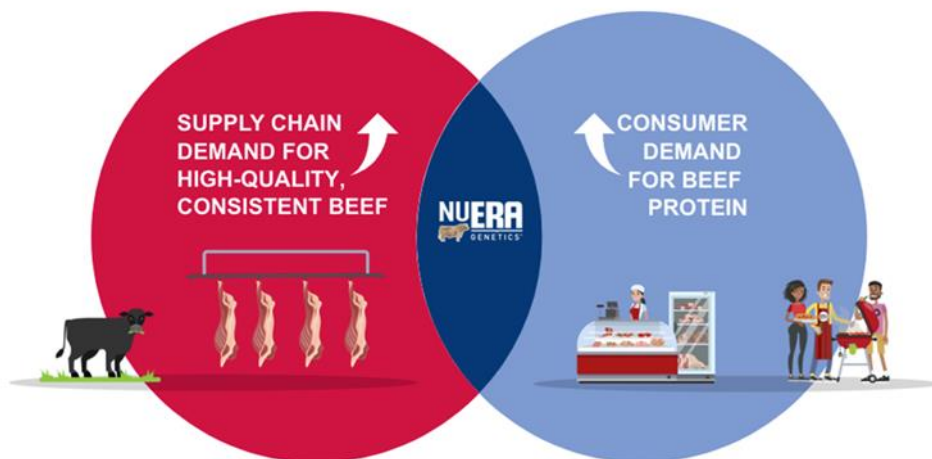
Chapter 6: Factors Influencing Adoption

6.1 Market Challenges

The beef market, like any agricultural commodity market, can be subject to significant price fluctuations due to factors such as supply and demand dynamics, weather conditions, trade policies, and consumer preferences.

Achieving consistent beef quality and meeting market specifications can be challenging, particularly for pasture-based beef production. Variability in factors such as genetics, nutrition, management practices, and processing methods can affect beef quality attributes such as tenderness, marbling, flavour, and consistency, which may impact market acceptance and consumer satisfaction.

Customers are the “EnviroLux” with an elastic price.....and the only way to get a premium is to ensure a 52-week supply, (Sam Tretheway, Tasmania 26.7.23).



Source: ABS Genus Global

The beef industry is highly competitive, with numerous producers, processors, and retailers vying for market share. Differentiating beef on dairy products and establishing a competitive market position can be challenging in this competitive landscape.

Consumer preferences and trends in the beef market are continually evolving, influenced by factors such as health and nutrition concerns, sustainability considerations, animal welfare standards, and culinary trends.

Compliance with regulatory standards and food safety regulations is essential for beef producers to access international markets. NZ farmers must navigate regulatory requirements related to animal health, welfare, traceability, food safety, labelling, and environmental stewardship to ensure compliance and market access.

Consumer perceptions of beef products may be influenced by perceptions of quality and value. Some consumers may perceive beef on dairy products as offering value in terms of affordability, versatility, and availability, particularly if marketed as a sustainable option.



6.2 Economic Considerations

One of the economic motivations for adopting beef on dairy practices is the opportunity to diversify income streams. By producing beef-cross calves alongside milk production, dairy farmers can generate additional revenue from beef sales, and increase their sustainability credentials.

Beef on dairy farming has the potential to increase farm profitability by capturing additional value from beef calf production. The sale of beef-cross calves can provide dairy farmers with a source of income that complements revenue from milk production. This may also provide the opportunity for a hybrid system incorporating wintering barns for out of season beef production.

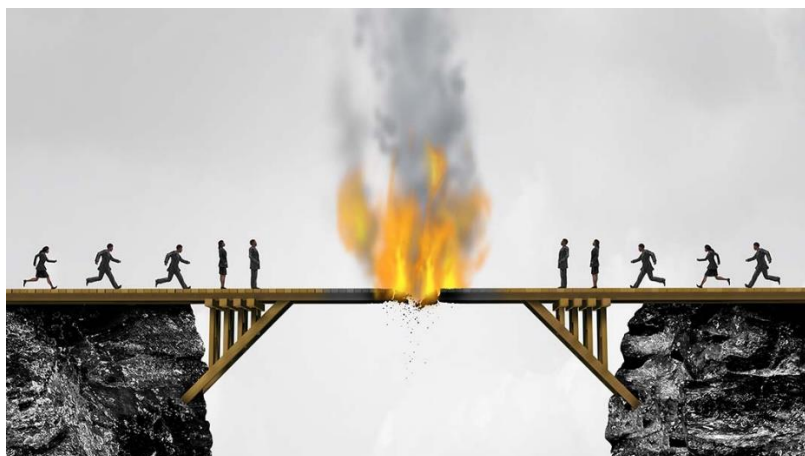
Economic considerations for adopting beef on dairy practices are influenced by market demand for beef products. New Zealand's reputation for producing high food safety agricultural products positions beef on dairy as an opportunity for farmers to capitalise on global demand for premium beef.

6.3 A "Burning Bridge"?

The US market is a risk for Fonterra with bobby calves, this is reputational with the customer for the brand, and it needs a plan, (Andrew Kempson, Fonterra Chicago, 7.9.23)

The driving force, imperative or "burning bridge" that pushes farmers to make the decision to integrate beef on dairy as a primary catalyst for adoption and for developing targeted strategies to promote uptake of beef on dairy practices should be independently financially driven and not regulated by the processor.

This financial consideration around consumer acceptance provides an opportunity to consider the potential for increased profitability through diversification of income streams, capturing additional value from beef production, as a compelling economic incentive for dairy farmers to embrace beef on dairy.

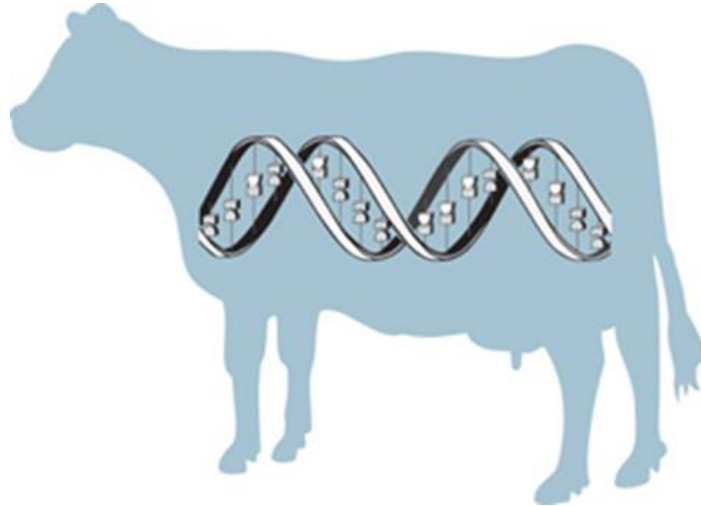


Adopting beef on dairy practices should be a financial strategy to improve business performance, and demonstrate commitment to sustainable farming practices, thereby enhancing their social license to operate.



Chapter 7: Breeding & Genetics

Genetics play a crucial role in enhancing beef on dairy performance by influencing key traits related to beef production, growth and carcass quality.



Dairy farmers selectively breed their cows with beef genetics to produce offspring with desirable traits for beef production. The choice of genetics is critical, as they drive traits such as growth rate, muscling, meat quality, and feed efficiency in beef-cross calves.

"Genetics is critical, EBVs that provide a high marble score is #1", (Andrew Simmonds AACo 12.7.23).

Genomic selection technologies enable dairy farmers to identify animals with lower genetic merit for dairy production and use as replacements to then apply beef genetics. This is done by using the likes of MINDA to be analysing the DNA of animals, farmers can predict the genetic potential of calves for various performance traits before they are born.



YOUR DAIRY ISN'T LIMITED TO MILK



Carve out new opportunities and put beef embryos to work for your herd. SimVtro® HerdFlex™ beef embryos are commercially produced high-quality IVF embryos delivering an opportunity to improve your beef-on-dairy program, earn a greater return on investment and tap into new markets.

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Contact your local Select Sires team member to order your embryos today.

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Source: Select Sires

Dairy farmers can establish breeding objectives and selection criteria based on desired beef production traits, and market preferences. Traits commonly targeted for improvement in beef on dairy programs include growth rate, muscling, carcass conformation, marbling, tenderness.

By prioritising traits that align with market demand and production goals, farmers can breed animals that excel in beef production while maintaining essential traits for dairy cows such as gestation length and calving ease.

Genetics play a fundamental role in enhancing beef on dairy performance by influencing the genetic potential of animals for desired beef production traits. By implementing strategic breeding programs, leveraging genomic technologies, and prioritizing traits that align with market demand and production goals, dairy farmers can optimise beef on dairy performance and maximize the profitability and sustainability of their operations.



Chapter 8: Nutritional Management

8.1 Feed Strategies for Beef on Dairy Cattle

Implementing appropriate feed strategies is crucial for optimising the growth, health, and performance of calves in beef on dairy operations.

Providing beef-cross calves with a balanced diet that meets their nutritional requirements at different stages of growth to formulate rations that include adequate levels of protein, energy, vitamins, minerals, and roughage to support optimal growth and development.

During the early stages of life, milk feeding plays a critical role in promoting growth and health in beef-cross calves. US producers feed milk or milk replacers for a longer period to support growth rates which is critical for performance at a later stage in the production system and has a large influence on beef eating quality.

By implementing appropriate feed strategies tailored to the nutritional needs and growth requirements of beef-cross calves, farmers can optimise performance, promote marbling and meat quality, and therefore maximize profitability.

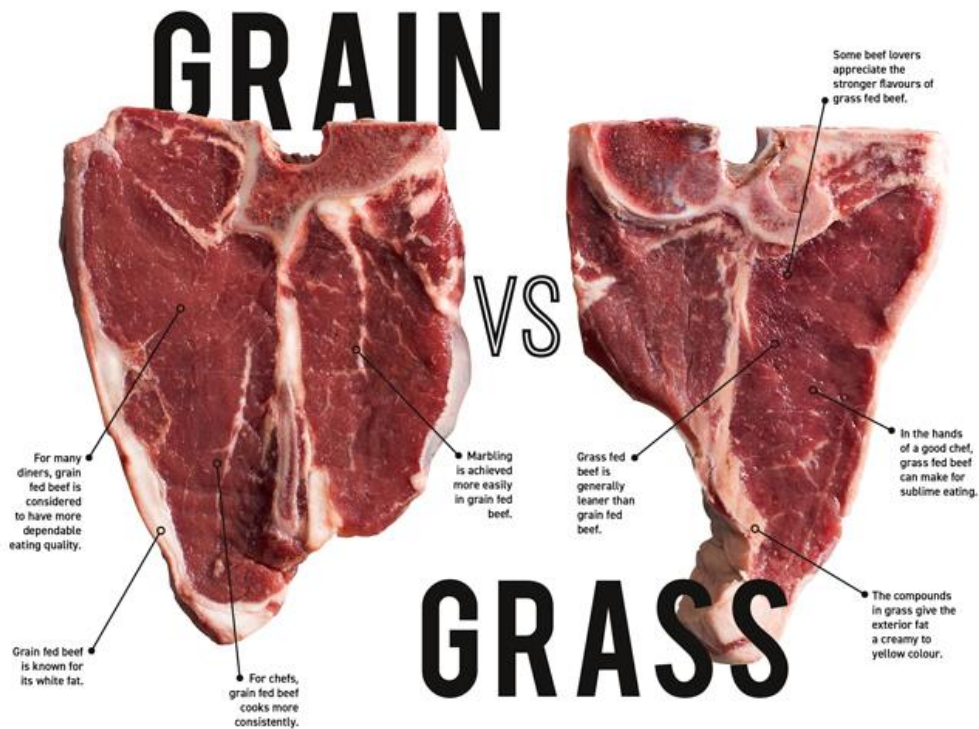




8.2 Impact of Nutrition on Beef Quality

A balanced diet that meets the calf's energy, protein, vitamin, and mineral requirements is essential for promoting muscle growth, bone development, and overall carcass quality and eating experience.

Nutrition can influence the marbling and flavour of beef by affecting fat deposition and composition in the carcass. Diets that provide a balance of energy sources and promote gradual growth can lead to optimal marbling and flavour in beef, resulting in higher-quality meat products.



Source: USDA



Chapter 9: Meat Grading

9.1 Benefits of a Meat Grading System

NZ does not have standardised meat grading system. This results in inconsistency of product at market – with some good quality and poor quality mixed together, then being discounted to the lower quality.

In South Korea Daesang Corporation, a customer for NZ meat products found “*Certified Angus Beef, USDA and MSA are like brands in South Korea – consumers recognise these and are happy to pay a premium. Ultimately, NZ meat industry needs to invest in promotion*”, (Min Cha, Daesang Networks, South Korea, 18.8.23).

Meat grading provides several benefits to both producers and consumers.

Quality Assurance:

Grading ensures that meat products meet specific quality standards, providing consumers with assurance regarding the quality of the meat they purchase. Grading criteria typically include factors such as marbling, colour, texture, and maturity, which contribute to the overall eating experience.

Market Value:

Grading allows producers to differentiate their products based on quality, which can lead to higher market value. Higher quality grades often command premium prices in the market, providing incentives for producers to focus on improving the quality of their livestock.



Supermarket in Seoul, South Korea with USDA Graded branded meat products.



Consumer Confidence:

Grading provides consumers with a reliable way to assess the quality of meat products before purchase. This transparency helps build trust between consumers and producers, leading to increased confidence in the meat supply chain.

Consistency:

Grading standards ensure consistency in meat quality across different producers and regions. This consistency helps consumers know what to expect when purchasing meat products, regardless of where they are buying them from.

Market Access:

Grading standards are often recognized internationally, facilitating trade by providing a common language for describing meat quality. This opens up export opportunities for producers, allowing them to access a wider market.

Educational Tool:

Grading provides valuable feedback to farm producers on the quality of their livestock. By understanding how their animals are graded, producers can make informed decisions about breeding, feeding, and management practices to improve the quality of future livestock.

Support for Food Safety:

Grading primarily focuses on quality attributes, it indirectly supports food safety by encouraging good handling practices throughout the meat production process. The grading process often involves inspections that help ensure meat products meet safety standards.

9.2 Case Study: USDA Meat Grading System

The USDA meat grading system, overseen by the United States Department of Agriculture (USDA), is a voluntary program that provides standards for evaluating the quality and consistency of beef, lamb, and pork, but primarily focuses on beef grading, which is the most widely utilised aspect of the system.

Beef products labelled with USDA grades provide consumers with information about the expected quality and characteristics of the meat. This labelling helps consumers make informed choices when purchasing beef products.

The USDA quality grading system assesses the palatability factors that affect the eating experience of beef, primarily focusing on marbling, maturity, colour and texture.

“USDA grading has resulted in improvement in cattle performance, with the total US graded cattle herd producing <2% prime in 2016, to now over 10% prime in 2022”, (Dr Belk, Colorado State, 19.9.23)



The USDA recognizes eight quality grades for beef:

Prime:

This grade represents the highest quality of beef with abundant marbling, making it very tender, juicy, and flavourful. Prime grade beef is typically found in high-end restaurants and specialty markets.

Choice:

Choice grade beef has less marbling than Prime but still offers good quality, tenderness, and flavour. It is widely available in supermarkets and restaurants.

Select:

Select grade beef has minimal marbling and tends to be leaner and less tender than Prime and Choice grades. It is a common choice for consumers looking for a leaner option.

Standard and Commercial:

These grades represent beef with minimal marbling and are typically used for ground beef and processed meat products.

Utility, Cutter, and Canner:

These grades include beef with characteristics not suitable for retail sale and are primarily used for processed meat products.

How The USDA Grades Your Steak!

Highest Quality! ABUNDANT MARBLING	Great Quality! MODERATE MARBLING	Good Quality! SLIGHT MARBLING
 USDA PRIME Less Than 2% of Steaks Are Graded USDA Prime!	 USDA CHOICE	 USDA SELECT

Marbling is the most prized feature in steaks. It is characterized by thin streaks of fat between muscle tissue. When cooked, the fat melts. This gives the meat unparalleled tenderness and a rich, buttery flavor.

Source: USDA



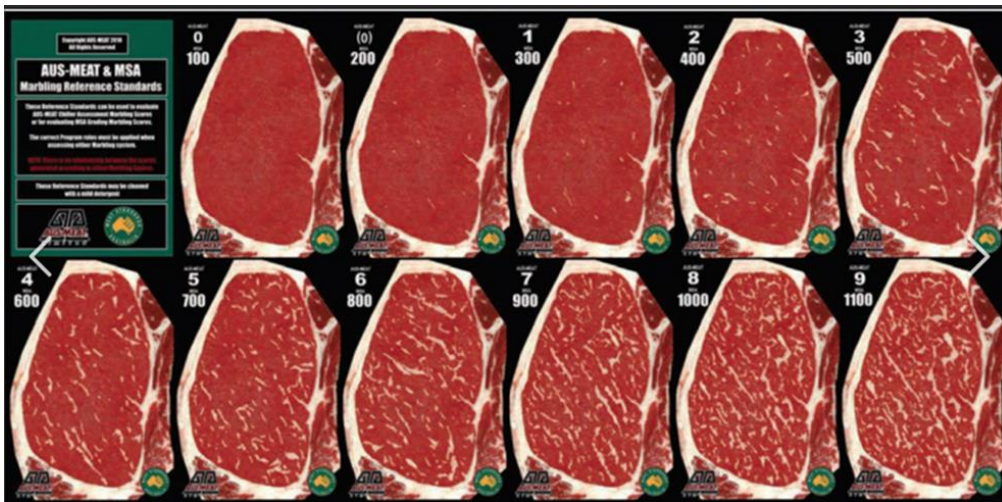
9.3 Case Study: Meat Livestock Australia MSA Grading System

The Meat Standards Australia (MSA) grading system, developed by Meat & Livestock Australia (MLA), is a voluntary, science-based grading system used to assess the eating quality of beef and sheep meat.

Similar to the USDA system, the MSA grading system involves collecting data on various quality parameters from individual carcasses at the processing plant.

This data is then analysed using statistical models to predict the eating quality of different cuts of meat.

The MSA Index is a numerical score assigned to each carcass based on its predicted eating quality. The index takes into account factors such as marbling score, meat colour, fat colour, pH level, and rib fat depth. Higher MSA Index scores indicate better eating quality.



Source: MSA

Carcasses that meet specific quality criteria and achieve a minimum MSA Index score are labelled as MSA Graded. These carcasses are expected to deliver a consistent eating experience.

Carcasses that do not meet the quality criteria for MSA grading are labelled as Non-MSA Graded. These carcasses may still be suitable for consumption but may exhibit more variability in eating quality.



Osaka, Japan Supermarket selling "A5 Graded" Australian Wagyu

Products derived from MSA Graded carcasses are labelled with the MSA logo, indicating their predicted eating quality. This labelling helps consumers make informed choices when purchasing meat products.



Chapter 10: Case Studies of Beef on Dairy

10.1 Examples of Beef on Dairy in New Zealand



Black Origin is a Wagyu beef production business in New Zealand established in 2015.

Black Origin aims to combine the origin of Japanese breeding genetics and 200-year-old techniques with New Zealand's grass, grain, water and air.

The Wagyu calves are produced from dairy farms, back grounded on grazing farms then transitioned into loafing barns for up to 420 days.

The Black Origin products are sold domestically as well as exported to among others Japan and China.



Black Origin product at Stone Grill, Shanghai, China.

Black Origin differentiated its brand in the market by emphasizing the unique attributes of New Zealand Wagyu beef, including its flavour, tenderness, and natural grass-fed and grain finished aspect.



First Light™

First Light Foods is a NZ Wagyu beef production distinguished by producing grass-fed Wagyu beef, a rarity in the global Wagyu market.

While traditional Wagyu production often involves grain feeding to enhance marbling, First Light Foods focuses on a pasture-based diet, which they believe results in a healthier product with a unique flavour profile.

Firstlight has selected genetics for grassfed Wagyu. All First Light grass-fed Wagyu cattle are the progeny of full blood Wagyu bulls across one of two cow herd systems, either beef on beef (often Angus) or New Zealand “Kiwi” cross dairy cows.

Firstlight uses independent validation and labelling including, Non-GMO, No antibiotics or added hormones, Certified Humane, ASPCA® Certified (The American Society for the Prevention of Cruelty to Animals among others.



Firstlight product, Berkley, California.

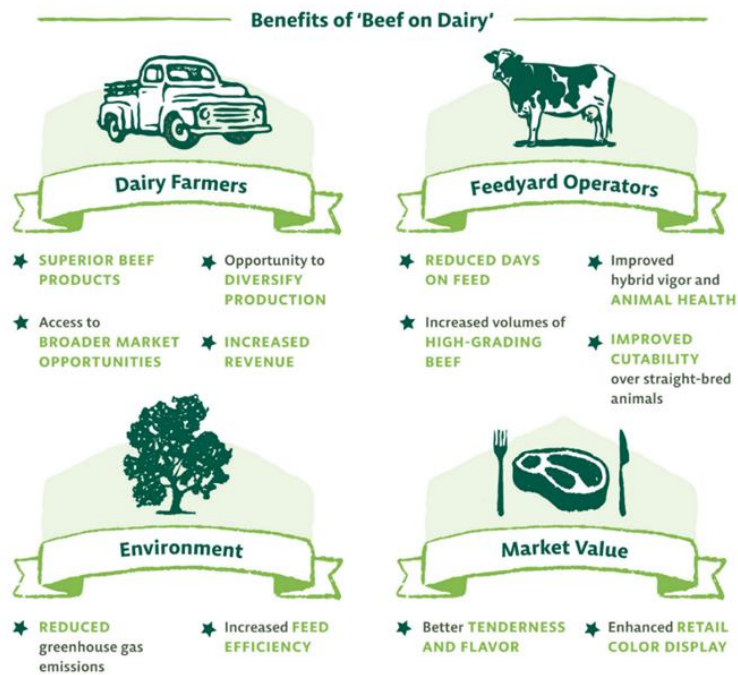
First Light 100% grass-fed wagyu has been recognised by winning the World Steak Challenge in London (2018 & 2019).

The company supplies its products to high-end restaurants, specialty butchers, and through an online presence domestically in New Zealand, and exported to many places significantly United States, and in particular California.



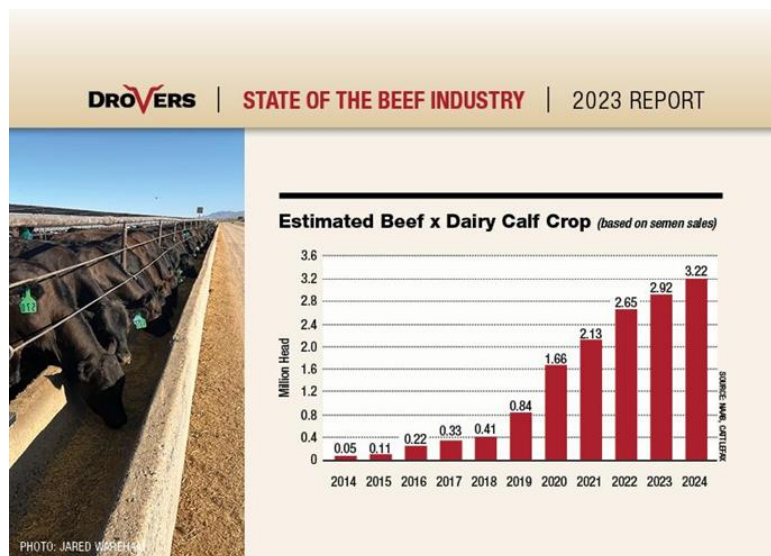
10.2 Examples of Beef on Dairy USA

Globally many processors are attracted to the beef on dairy supply chain due to consistent supply. Internationally beef on dairy trend is in full swing in the USA, with ag news site Drovers recently describing it as “arguably the most significant advancement for the US beef industry in a generation”.



Source: Cargill & Nestle

Beef on dairy as part of the US beef industry has grown significantly.



Source: Drovers Ag



Sustainable Beef LLC

Founded by three families in Nebraska, Sustainable beef constitutes three parts;

1. Supply Chain Management
2. Cattle Procurement
3. Cattle Processing

Desiring better performance from cattle the founding families sought out the best genetics, but to extract value for the genetics they realised we had to form a close relationship with the customer, (Trey Wasserburger 15.9.23).



The realisation that premium programs start with the retailer and the consumer they aligned themselves in a joint venture with Walmart which purchased a 49% share of the business and funded the building of the Sustainable Beef packing plant with 1,500 head per day capacity, creating 800 jobs and will have a \$1.159 billion USD annual impact on the community.

Walmart's equity investment is part of a broader strategic partnership to source top-quality angus beef from Sustainable Beef LLC's new beef processing facility. Walmart has more data than Mastercard on the consumer of products and identified using this data that beef was the most expensive item in the shoppers cart. This data helps inform decision making on genetics of the cattle going into the program.





Sustainable Beef LLC sources genetics to ensure feed efficiency, grade quality, growth and profitability. Cattle are procured from producers based on indexes to deliver plant specifications of 1350pds live weight, a uniform 13.5inch ribeye in choice and prime grades.

Beef on dairy genetic cattle are providing a \$150/head advantage over the standard due to the uniform product and performance.

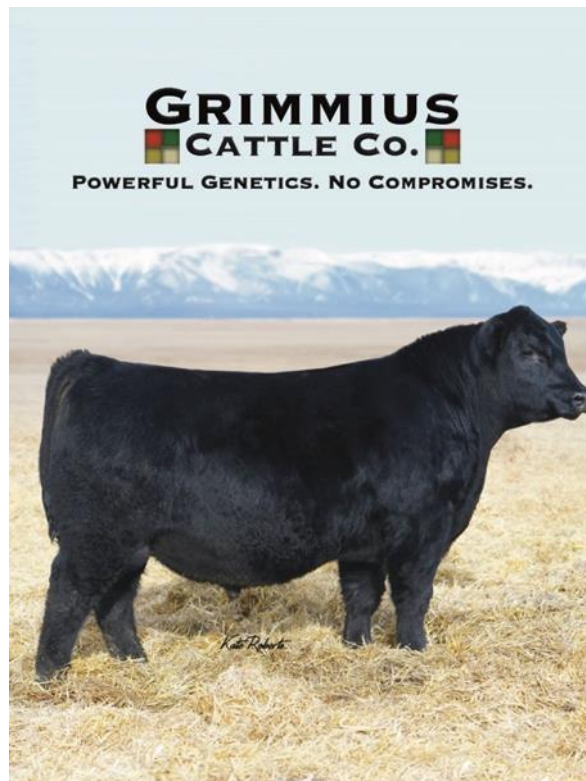
David Briggs, CEO of Sustainable Beef LLC: *"We set out on a journey two years ago to create a new beef processing plant to add some capacity to the industry and provide an opportunity for producers to integrate their business of raising quality cattle with the beef processing portion of the industry and do it in a sustainable manner. During this journey we found that Sustainable Beef and Walmart aligned on continuing to improve how we care for our animals and crops and provide consumers the positive experience of enjoying quality beef."*

Grimmius Cattle Company

Located near Hanford, in California's Central Valley, Grimmius Cattle Co has been a family-owned and operated business since its establishment in 1962. Specializing in raising and breeding high-quality beef cattle, Grimmius Cattle Company raises over 700,000 calves annually, (Noah Flores, 28.9.23).

A vertically integrated business that supplies genetics to dairy farmers, rears calves and finishes the cattle at feed yards, Grimmius business disciplines are driven by data with high animal health and welfare which has reduced losses to 2%.

The use of data analysis drives improvement of the business. Real time internal data recording measures genetic performance, nutrition requirements overlaid with growth and feed efficiency.





Grimmius provides Angus and Charolais genetics designed to add value throughout the supply chain. For dairy farmers, feeders and packers, the genetics are selected for production and phenotypical superiority.

Grimmius operates a calf buy-back program: dairy farmers purchase the genetics and Grimmius purchases the live calf back from the dairy farmer at a premium.

This provides an opportunity for the dairy farmer to add value to their calves born, and Grimmius ensures that they purchase a calf that has the genetic potential required.

Grimmius invested in advanced genetic selection and breeding programs to develop cattle breeds that excel in meat quality, feed efficiency, and sustainability. By focusing on traits such as marbling, tenderness, and growth rates, the company aimed to produce beef cattle that meet the evolving demands of consumers and the industry.

The company also has renewable energy sources and waste reduction strategies to further enhance its sustainability efforts, with a methane digester aligned with Chevron.

*Powerful Genetics.
No Compromises.*

PHENOTYPE MATTERS
We spend countless hours researching and sourcing the most elite and ideal genetics in the Angus breed. In those efforts, we strive to make sure leading genetic predictors do not override design and functionality. It is important for us to achieve balance in our selection process, especially when it comes to improving traits not easily described by our current EPD.

INNOVATION IN MARKETING
We will continue to offer semen on a monthly basis through our Grimmius Elite Online Sales for both our high-demand bulls, as well as new-release bulls. This process allows our customers the most open access to the genetics they want by avoiding traditional waiting lists. In this open market system, any producer can have first access to our premium bulls and be on the front end of the subsequent marketing.

Page 2 www.grimmiuscattle.com



Chapter 11: Technological Advancements

Technology will play a significant role in enhancing productivity and efficiency in the beef on dairy value chain. By leveraging technological advancements, dairy farmers can optimise breeding programs, improve nutrition management, enhance animal health and welfare, and streamline farm management practices.

Genomic technologies enable dairy farmers to make informed breeding decisions by identifying animals with undesirable traits to then use for beef production. Careful selection of beef genetics with desirable traits for beef production is critical for optimising the genetic potential of beef-cross progeny. Traits such as growth rate, muscling, carcass quality, and feed efficiency produce high-quality beef on dairy calves, whilst maintaining calving ease and gestation length.



ABS Genus in Wisconsin has improved feed efficiency genetics from 7:1 to 4:1 in their Elite Beef on Dairy.

Precision feeding systems, (in feed barns or similar system), utilise sensors, monitoring devices, and data analytics to optimize feed management and nutrition delivery for beef-cross calves. Automated feeding systems, ration formulation software, and real-time monitoring of feed intake allow farmers to tailor diets to meet the specific nutritional requirements of individual animals, optimising growth rates and feed efficiency.



Growsafe Feed Efficiency Modules: ABS Wisconsin

Data analytics and decision support tools analyse farm data, performance metrics, and production indicators to inform management decisions and optimise farm operations. Predictive analytics, machine learning algorithms, and farm management software provide



insights into production trends, resource allocation, and performance optimisation, guiding farmers in making data-driven decisions to maximize productivity and profitability.

Craig Hays, of Leachman Cattle of Colorado (now part of Urus), says that beef on beef breeding, selling 2,000 bulls will produce some 200,000 progeny, but with beef on dairy this has the opportunity this year of 2.5 million inseminations and over 1.5 million progeny.

This provides the largest private database of beef genetics and access to data from 9 million cattle in over 5,000 herds globally.



Urus has the largest AI program in the world.

Precision livestock farming technologies, including remote sensing, GPS tracking, and electronic identification (EID) systems, enable precise monitoring and management of beef-cross calves in the production environment. These technologies facilitate accurate tracking of individual animals, monitoring of behaviour and health parameters, and targeted interventions to optimise animal welfare and performance.



Young Beef on Dairy Cattle in Feedlot Nebraska

Vertical integration of the beef on dairy value chain, from calf rearing to finishing, provides the opportunity to capture additional value and maintain quality standards throughout the production cycle. Vertical integration allows for greater control over the supply chain and enhances efficiency, profitability, and product consistency.



Chapter 12: Future Outlook: Market Trends & Consumer Preferences

12.1 Product Development and Marketing

Internationally beef product development largely centres around value-added beef products such as premium cuts, gourmet burgers, and ready-to-cook meals.

Marketing has seen investment in brand development and promotional efforts to differentiate beef products in the market and create brand recognition.

All claims need validation to educate and verify for the consumer the nutritional benefits, culinary versatility, and sustainability credentials. Auditing and certification programs (such as Where Food Comes From) provide third-party verification of product quality, safety, and sustainability, have become significant drivers enhancing consumer confidence and market acceptance.



Emerging technology of blockchain digital platforms are positioning to enhance traceability and transparency in the beef supply chain. Blockchain is providing consumers with access to information about the origin, production practices, and handling of beef on dairy products builds trust and confidence in product quality and safety.

Empowering Farmers with the next generation global trading exchange!

An international Suppliers & Buyers network supported by AXIchain's digital cash payment solution and hands-free export document & freight management process, at your fingertips!

AXICHAIN
International Trade Platform

Axichain: blockchain platform for beef value chain.



12.2 Consumer Awareness and Perception

Consumer awareness and perception of beef products can vary depending on factors such as geographical location, cultural background, and socio-economic situation.

Currently there is interest in a shift towards a more plant-based diet, based on the assumption that plant food is more environmentally sustainable compared to animal food production, largely based on considerations of land and water use, energy conversion and greenhouse gas emissions.

However, the arguments for and against the efficiency and sustainability of animal versus plant food production are complex, and differences between plant and animal foods in relation to their protein quality and nutrient composition need to be considered, (Moughan, 2021).

“
Figures for the United States are that
T-W-O percent of the anthropogenic
greenhouse gas emissions in the
US are from the beef industry.
All of animal agriculture is 4, all of agriculture is 9.
So in the weird world that I
live in, the plant agriculture
produces 5% of the greenhouse gas
emissions and beef produces 2.
Meanwhile, the healthcare industry is 10%
© PETER BALLANTRAE

Traceability and provenance are increasingly important to some consumers who want to know where their food comes from and how it was produced.

The value proposition of beef products may be influenced by price sensitivity and affordability considerations. While some consumers may be willing to pay for beef products perceived as high-quality, others prioritise price and opt for more affordable alternative proteins.

The demand for beef products is influenced by various factors, including consumer preferences, market trends, household incomes, dietary choices, and sustainability concerns.





12.3 Trends and Developments: Alternate Proteins

The emergence of alternative protein sources, such as plant-based meats and cultured meat, may pose competition to traditional animal-based protein beef products, and may impact consumer demand.



However, meat supplies high-quality protein and various nutrients, some of which are not always easily obtained with meat-free diets and are often already sub-optimal or deficient in global populations. Although meat makes up a small part (<10%) of global food mass and energy, it delivers most of the global vitamin B12 intake and plays a substantial role in the supply of other B vitamins, retinol, long-chain omega 3 fatty acids, several minerals in bioavailable forms (iron & zinc) and a variety of bioactive compounds with health-improving potential (taurine, creatine and carnosine).

Historically and from an evolutionary perspective, meat has been cherished by human communities as a nutritional and highly symbolic food against a 3 million year backdrop of biosocial needs. Whenever intake was low, this was mostly due to limited access and availability or because of ideological and religious reasons. Today, however, arguments for a widespread reduction of meat consumption have emerged from various actors, mostly in high-income countries, (Leroy, et al, 2023).



While beef farming will always remain relevant, producers may face competition from alternative protein sources and need to communicate, educate, innovate and adapt to changing market dynamics.



12.4 Trends and Developments: Economic Tools

Supply chain disruptions, market volatility, and trade uncertainties all pose challenges for beef farmers, affecting input costs, market prices, and export opportunities.

To assist in mitigating these risks, farmers can establish long-term contracts with buyers, and implement risk management strategies such as forward contracting and hedging.

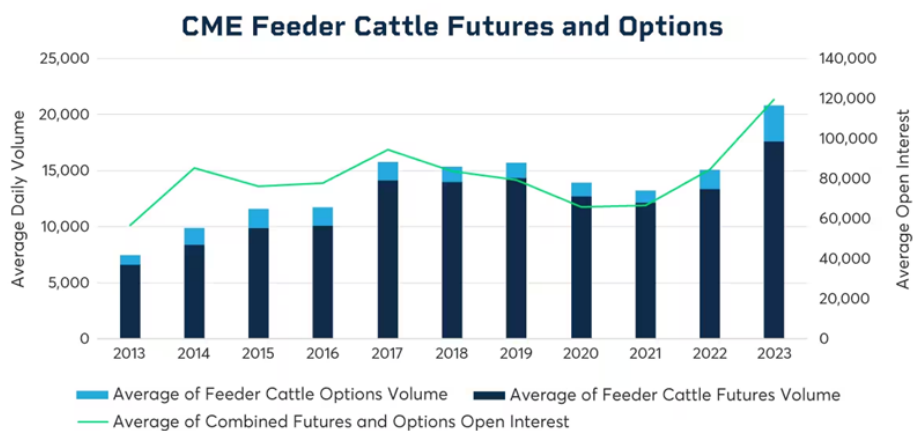
Given the volatility in input prices, weather conditions, and market prices, insurance products are being utilised to hedge against adverse price movements and uncertain conditions.



Stable: Agricultural commodity insurance provider.

Understanding the dynamics of supply and demand is difficult for beef producers, processors, and distributors. The globalisation of agriculture in general, makes the economic analysis of international trade dynamics, including tariffs, quotas, and trade agreements, complex in assessing market opportunities and risks in foreign markets.

To smooth out forecasting market trends, determine optimal production levels, and setting prices risk management tools such as futures contracts and options are successfully used, especially in the USA.



Source: CME Group

These economic tools, among others, provide valuable insights and decision-making support for stakeholders across the beef industry value chain, from producers and processors to retailers and consumers.



Chapter 13: Conclusion & Discussion

Pasture-based dairy farming is New Zealand's single largest agricultural sector and earns approximately 25% of NZ total export receipts. Over 4 million calves are produced from the dairy herd in NZ every year, with nearly 2 million non-replacement or bobby calves being slaughtered annually at 4-7 days of age, which has increased public concern over social licence.

The beef industry is NZ's third most important agricultural industry in terms of export revenues, with 40% of the volume coming from the dairy sector of culled cows and slaughtered bobby calves.

The "burning bridge" that pushes farmers to make the decision to integrate beef on dairy as a primary catalyst for adoption and for developing targeted strategies to promote uptake of beef on dairy practices should be independently financially driven and not regulated by the processor.

With increasing emphasis on sustainability and environmental stewardship dairy farmers have already implemented practices aimed at reducing environmental impacts. Sustainable farming practices are increasingly important for ensuring long-term consumer acceptance.

NZ is a small country that is geographically isolated, and has opportunities, to improve our communication and engagement to unlock the understanding of the work that has and continues to be done throughout the value chain improving "sustainability" and adjust to consumer and customers' needs.

The sustainability opportunity that NZ has is to utilise the advantages that pastoral agriculture provides, but needs to continue improvement and demonstrate, as well as validate, soil health, water quality and carbon utilisation and sequestration.

The unique point of difference NZ has for beef on dairy production that is low carbon and pasture raised, something that few producers globally can compete with. The beef sectors opportunity is to turn the non-replacement/bobby calf into a sustainability advantage.

Consumer education and engagement will play a crucial role in shaping the future of beef farming in New Zealand. Farmers will need to communicate transparently, engage with consumers, and build trust through storytelling, education, and advocacy efforts to promote the benefits of beef on dairy and address consumer concerns around sustainability and quality.

The beef market, like any agricultural commodity market, can be subject to significant price fluctuations due to factors such as supply and demand dynamics, weather conditions, trade policies, and consumer preferences.

Achieving consistent beef quality and meeting market specifications can be challenging, particularly for pasture-based beef production. Variability in factors such as genetics, nutrition, management practices, and processing methods can affect beef quality attributes such as tenderness, marbling, flavour, and consistency, which may impact market acceptance and consumer satisfaction.

Beef producers may also face competition from alternative protein sources and need to communicate, educate, innovate and adapt to changing market dynamics.



Despite potential challenges, beef on dairy farming in New Zealand is poised for growth and innovation. With increasing consumer demand for high-quality, sustainably produced protein, there are opportunities for beef on dairy farmers to capitalise on niche markets, differentiate their products, and expand export opportunities.

The financial consideration around consumer acceptance and social licence provides an opportunity to consider the potential for increased profitability through diversification of income streams, capturing additional value from beef production, as a compelling economic incentive for dairy farmers to embrace beef on dairy.

The future of beef on dairy farming in New Zealand will be characterised by the integration of technology-driven solutions and sustainability initiatives. Farmers will leverage precision farming technologies and genomic selection to optimise productivity and enhance sustainability credentials.

Genetics will play a fundamental role in enhancing beef on dairy performance. Implementing strategic breeding programs, leveraging genomic technologies, and prioritising traits that align with market demand and production goals, dairy farmers can optimise beef on dairy performance and maximize the profitability and sustainability of their operations.

Appropriate feed strategies tailored to the nutritional needs and growth requirements of beef-cross calves, will allow farmers to optimise performance, promote marbling and meat quality, and therefore maximize profitability.

Economic tools such as commodity insurance products, futures and options, among others, provide valuable insights and decision-making support for stakeholders across the beef industry value chain, from producers and processors to retailers and consumers.

The opportunity for beef on dairy is to shift the value chain from dysfunctional to functional. If the end product has a greater value, then financial participation and therefore functionality increases for all activities involved in creating, rearing, growing, processing, marketing, and delivering a beef product to the end consumer from the dairy industry.

Opportunity for NZ beef on dairy:

1. **Understand the Customer Needs:** Grain fed is often a customer preference, especially in Asia markets. Short fed grain finished beef could be an opportunity to align the value chain activities with customer requirements. Grain fed also creates products that deliver value and meet customer demands of product consistency and reliable supply effectively.
2. **Improve Integration and Coordination of Farming Systems:** This involves seamless communication, collaboration, and synchronization of activities to ensure smooth flow and timely delivery of products or services, dairy farms, rearers growers and finishers.
3. **Efficiency and Cost Optimisation:** Using genetics designed to minimize costs and maximize efficiency at every stage of beef production optimises resource utilisation to achieve production cost advantages.
4. **Sustainability:** The opportunity to communicate existing environmental, social, and governance (ESG) factors of a low carbon beef sales platform to deliver value to the consumer.



5. Technology: Meat grading is critical to improve value, give visibility and confidence of product quality and consistency of eating experience for the consumer.
6. Continuous Improvement and Innovation: marketing and branding of beef on dairy needs to continuously seek ways to introduce new digital transaction functions, and data analysis to optimise processes, and innovate across all stages of the value chain.

Beef on dairy represents a significant opportunity for dairy farmers in New Zealand to improve their sustainability credentials. As the industry continues to evolve, the integration of beef production into dairy farming operations is likely to play an increasingly important role in shaping the future of social licence for New Zealand's dairy industry.

Collaboration among stakeholders, including farmers, industry organizations, research institutions, and government agencies, will be essential for driving innovation and addressing common challenges in beef farming. Knowledge sharing, information exchange, and collaborative research initiatives will facilitate continuous improvement and best practice adoption across the sector.

Beef farmers in New Zealand will need to adapt to evolving market dynamics, consumer preferences, and regulatory requirements. Farmers need to position themselves to respond effectively to changing market demands and maintain competitiveness in the global marketplace. This requires engagement and forming of relationships.

New Zealand has an opportunity to demonstrate leadership in sustainable beef from dairy farms and by embracing this New Zealand can showcase its commitment to responsible agriculture on the world stage with beef produced from dairy.



Chapter 14: Recommendations & Actions

14.1 Strategies for Stakeholders

1. Embrace Technology, by investing in precision farming technologies and genomic selection to enhance productivity and efficiency on beef farms.
2. Explore value-added market opportunities such as meat grading, grain fed, premium cuts and sustainability branded lines to diversify revenue streams and maximize profitability.
3. Educate consumers, policymakers, and the broader community about the benefits of beef farming, including its contribution to sustainable agriculture, rural development, food security and human health.



4. Foster collaboration among stakeholders, including farmers, researchers, policymakers, and consumers, to share knowledge, exchange ideas, and address common challenges in beef farming.
5. Advocate for policies and regulations that support the growth and sustainability of beef farming, including incentives from the farmer cooperatives and processors, research funding, and market access opportunities.
6. Commit to improving relationships in market. Invest in significant physical red meat industry representation that builds, grows and promotes beef opportunities with a focus on understanding consumer and customer needs to drive the NZ producers and processors decision making.



14.2 Areas for Further Research and Development

1. Develop a sector wide NZ meat grading system to support the production value chain and the customer and consumer interactions.
2. Research genomic selection methodologies and breeding strategies to enhance the genetic potential of beef-cross progeny, improve growth rates, carcass quality, and optimise breeding programs.
3. Research grain feeding systems and feed barn innovation in beef on dairy farming to understand the benefits and costs of moving to a grain fed beef product.
4. Investigation into optimal nutrition management and feed strategies for beef-cross calves in beef on dairy systems, including diet formulation, feed efficiency optimisation, pasture management and nutritional supplementation to maximize growth rates and carcass quality.



5. Research on environmental sustainability practices in beef on dairy farming, including existing carbon sequestration, nutrient management strategies, to support sustainability.
6. Investigation into consumer preferences, market trends, and purchasing behaviours related to beef on dairy products to better understand market dynamics, identify emerging trends, and tailor marketing strategies to meet consumer demand and preferences.
7. Promotion of collaborative partnerships, knowledge sharing networks, and interdisciplinary research initiatives among stakeholders, including farmers, researchers, industry organisations, policymakers, and consumers, to facilitate information exchange and innovation.



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15.2 Visits & Interviews

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