NUFFIELD
NEW ZEALAND

HOW CAN PASTORAL DAIRY FARMING REMAIN COMPETITIVE?

Ryan O'Sullivan

2017

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1. EXECUTIVE SUMMARY

The NZ dairy industry has always historically enjoyed the advantage of being the world's lowest cost producer of milk with our cheap pasture feed resource being the envy of the dairy industry globally.

Despite this, farmers in the Europe and the US, the worlds 2nd and third largest exporters are eyeing opportunities for growth to compete with NZ in the global milk market. They are using a containment (housed) dairy model to achieve this and becoming increasingly competitive on many production and cost metrics through the application of efficiency, scale and productivity gains. These same techniques are being applied to world grain production with resultant excess of supply over demand suppressing prices, a key driver for profitability in containment livestock industries.

The question for the NZ dairy industry in light of this is 'How can pastoral dairy remain competitive?'

The aim and purpose of this paper is to explore and evaluate the comparisons between pastoral based and containment-based production systems and determine where the advantage for NZ will lie in the future i.e. how we can compete and stay relevant.

This is an important discussion, the NZ dairy industry is a key part of the NZ economy and its prosperity is important on many levels. Over the past decade, the NZ dairy industry has pursued a volume (growth) model but due to emerging environmental constraints, this has evidently run its course and a value model is the next opportunity.

Information gathered on the topic followed two main themes: production systems and consumer insights. Dairy farming businesses, particularly scale or expanding operations were consulted in the US and Europe with a view to establishing resilience of their business models, future prospects and intentions. Consumer market insights were observed, mainly in Asia and the US, to establish what trends are currently occurring in dairy consumption and consumer preferences.

The key findings suggest that cost competitive marginal milk will be delivered onto world markets from the US, Europe and others, but there are opportunities for NZ to differentiate and pursue a value proposition around 'grass-fed'. Our free-range pastoral model is unique in a global volume context and difficult for most dairying nations to replicate. Many consumers are actively seeking out food produced from sustainable, high animal welfare production models and this is an important opportunity for NZ.

The recommendations from this research contain a key message around the NZ dairy industry continuing to do what it does best on-farm. Beyond the farm, we need to look at ways to tell our story and leverage the differentiation that already exists in our national milk supply.

There are of course a number of challenges along the way and some of these will be discussed. This report endeavours to provide only a perspective based on observations offshore. It is up to the industry to evaluate the merits of the discussion and find a way forward.

2. FORWARD

My wife Tina and I are equity managers on a dairy and support operation in South Canterbury. I was fortunate to be awarded a Nuffield scholarship, my intention being to study water and nutrient management abroad which I figured was fairly relevant to some of stuff we were and still are grappling with as farmers, not just in Canterbury but nationwide.

However, soon after kicking off Nuffield overseas I was to have a 'light-bulb' moment.

While on the Global Focus Program, our group of 8 scholars visited a number of dairy farms in the US and Europe. Being a dairy farmer myself, I found this interesting and was proud that NZ was often acknowledged by other dairy farmers as being a world leading dairy industry.

While visiting a large dairy business in upstate New York, the business owner, an ex Dairy business professor from Cornell University explained how he and his partners had built up a 7,700 cow dairy business in less than five years and had a particularly bullish outlook for US dairy and their own growth plans. During the presentation, he then asked if there were any Kiwis in the group and when I volunteered, he lined me up and said, 'NZ exports a lot of milk, but you're just small and cute, we are going to seriously compete with you on the world markets'.

I nodded and could barely conceal my mirth at such an outrageous statement. After all, everyone in the industry assumes that US containment dairy is high cost and non-competitive in a global sense. I then listened as he reasoned and justified this statement with some plausible arguments. He talked about the ability to build infrastructure at low cost, very high per cow production, rapid genetic gain, readily available affordable feeds, cheap labour, sophisticated ruminant nutrition, and being able to hedge milk prices, feed costs or the margin in between.

Reflecting back on it later I knew I had to find out more about this, test it and evaluate it and establish what the implications could be for the NZ dairy industry.

Like all dairy farmers we have seen the ups and downs of payout, seasons and the other challenges all farmers face. And also like all farmers, we want to know what the future might hold for us and the generation after us.

Seeking out some answers to these sorts of questions and reporting back to industry is one of the key purposes of the Nuffield scholarship. The program provides the framework, contacts and opportunity to make this happen.

3. ACKNOWLEDGEMENTS

This program is a fairly big personal undertaking and it would not be possible without the support of many people.

To my cohorts of Nuffield 2017, Matt, Dave, Rebecca, Nadine and Jason. It has been great representing Nuffield NZ in 2017 alongside you, we've got on well and I look forward the ongoing friendship.

Thanks you to the Nuffield NZ trustees, Juliet McLean, Dan Shand, Andrew Watters, Mike Tayler and Craige Mackenzie. A particular mention for the work and support of Anne Hindson and also Desley Tucker. Thanks to Hamish Gow and Patrick Aldwell for assisting with this report.

Another mention to Mike Taylor for annoying me about Nuffield over a period of time, I am (retrospectively) grateful for your persistence.

The 'Brazil GFP' team, Roland, Kristina, Glenn, Dan, Brendon, Georgie and Cam, I was lucky to part of a great group of people, it was a crazy and fantastic experience to share with you all which will remain a lifelong memory. Looking forward to catching up sometime, someplace in the future.

To the fellow international Nuffield scholars around the world and other hosts who offered a bed, a feed, social interactions, contacts, planning, suggestions and assistance, thanks a million, I feel privileged to now be a part of the Nuffield community and return the favours in the future.

To the team on farm, thanks for stepping up and doing the business.

To my farm business equity partners, hopefully the lack of interruption in farm performance during my absence has gone unnoticed.

Last but not least, a deep gratitude to my wife Tina and children Quinn, Lucia and Edie for allowing me the opportunity to do this. A strong and tolerant partner is a key part of a Nuffield being possible and I thank you for keeping things ticking over while I was away and for putting up with my periodic distractedness over the last year.

'A great way to learn about your country is to leave it'

Henry Rollins

4. *INTRODUCTION*

A positive and vibrant dairy industry is of critical importance to NZ as a whole. Dairy accounts for around 1/3rd of merchandise exports by dollar value at about $15 billion dollars. It employees over 47,000 people, 33,500 behind the farm gate and the rest in downstream services (Dairy NZ, 2017). Spending on-farm is a large part of provincial NZ economic base.

As a country, we are blessed with the natural physical resources required to grow grass for livestock to graze in-situ for a large part of the year. We have a high skill level around harvesting that pasture and have great industry support to assist with execution and research.

Our long heritage of exporting milk products has created trading networks, relationships and a solid reputation across the globe as a quality milk producer and exporter.

Steadily increasing demand for dairy, particularly in Asia and a structural shift in dairy commodity prices over the past ten years has seen a rapid increase in NZ cow numbers as farmers have responded to the price signals. Higher returns have also been capitalised into land values and hence balance sheets which has further fuelled this expansion. Since 2007, NZ milk collections have grown from 14 billion to 21 billion litres. The dairy industry regulatory framework has required this new milk be accepted by Fonterra and along with other new entrants, significant dairy processing assets have been added to process the milk. Given the rapid volume pressure, most additional processing asset expenditure was allocated to production of bulk powders.

Unfortunately, in more recent times, not all New Zealanders see the benefits of the dairy industry.

We are now beginning to grasp the fact that the current outdoor cow grazing and wintering model is leaking nutrients into the environment in some situations. The expansion of the industry has got ahead of the science to manage and mitigate the external nutrient loss effects. The full awareness of this issue is relatively recent, and a lot of effort is being brought to bear on the problems by farmers and the science community. There have been some significant gains made in reducing e-coli levels in waterways, as well as phosphorous run-off and sedimentation. Diffuse nitrogen loss is proving to be the difficult nut to crack.

Resultant water quality deterioration is of growing concern across NZ society. Regional councils, by giving recognition to National Policy objectives on freshwater are re-drafting district plans. Many of these plans are prescribing limits and exercising more control over higher intensity farming. Much of this new framework is going to make expansion of dairying very limiting and in some cases, existing intensive dairy farms may have to find ways to cut nutrient losses. As such, milk growth out of NZ looks constrained.

At an international level, underlying demand for dairy continues to grow, however, the supply demand equation has come firmly back into balance due to increased production out of post-quota-Europe and the US who are also looking to grow and exploit the opportunities to sell milk

into Asia. Invariably, this new supply is being provided by large scale containment dairy farms. These businesses are ruthless in their application of scale, efficiency and productivity gains and are able to produce large volumes of milk at increasingly lower break-even price points. While they largely have their environmental impacts in hand, their bigger challenge is coming from negative perceptions around animal welfare and factory farming.

If the NZ dairy industry is indeed approaching 'peak cow' like some suggest, it is a good time to take stock and reflect on the future. If the volume game has run its course, we have two options:

1. Capture Effluent (pour concrete, keep growing dairy but off-paddock).
2. Capture Value (achieve growth by adding value to milk but retain our current pasture-first farming model).

The discussion forthwith will shed some light on the merits, challenges and opportunities on both based on overseas perspectives.

Our production system off pasture is unique in the world and the pasture fed/free range story is a significant emerging trend being sought after by consumers. Our GHG emission per kg of milk is the most efficient globally and our scientists are looking at ways to reduce this further plus the nitrogen output from cows. We are still a vast majority of family farm businesses and have a good availability of skilled management tier labour. Despite system drift and cost inflation, our best practice farms are still competitive cost producers and as such, still resilient to volatility on global markets.

This makes our industry globally competitive, the question is, how do we keep it that way?

5. METHODOLOGY

As mentioned earlier, the topic for this report was born out of the Global Focus Program (GFP). This is a 6 week 'field trip' in which 8 scholars took in 6 countries (Brazil, Mexico, US, Ireland, France and NZ) looking at a diverse range of agribusinesses. Following GFP, a month was spent at home doing desktop research on contacts, reviewing literature and overall planning of a second leg of travel focused on the topic. Then followed 10 a week tour of Malaysia, China, Israel and the Netherlands, including return visits to Ireland and the US.

The information was collected with interviews in person where possible including a look at the production facility, be it a farm, factory or market. Some interviews were conducted over the phone where travel was not practical. Interview questions were largely unstructured and the objective was to seek out the underlying themes. The analysis was not evaluated in any formal statistical sense but more focused on defining the themes as they became more apparent and consistent. The main themes that arose and were the basis for research and line of questioning were:

1. Containment dairy systems in both the US and Europe are showing tangible gains in output per unit of input using a combination of management practices.

2. World grain costs, driven by excess of supply over demand are at affordable levels for conversion to milk in these systems and this is underpinning profitability.

3. Europe, free of the shackles of the previous quota system has the ability and scope to grow milk supply, with many farmers intending to do so.

4. US milk production continues to expand at a steady pace with large scale operations growth more than compensating for the small scale operators exiting.

5. Consumer trends, tastes and demands are evolving quickly, with a segment of consumers becoming very aware of how their food is produced.

6. Grass fed is a very strong consumer proposition in meat and milk, particularly in the US

Many of these themes are expanded on further with this report concluding with recommendations for the NZ dairy to consider.

6. A COMPETITIVE INDUSTRY

It is a well known, all business endeavours whether its dairy farming or candlestick making will not just exist, but prosper if they by circumstance or design, can maintain a **sustainable competitive advantage.**

Type 'sustainable competitive advantage' into Google and it will generate the following basic definitions:

'A condition or circumstance that puts a business in a favourable business position'.

'The leverage a business has over its competitors'.

Michael Porter (1985), an American economist and expert on the topic expands this further:

"A firm's relative position within its industry determines whether a firm's profitability is above or below the industry average. The fundamental basis of above average profitability in the long run is sustainable competitive advantage. There are two basic types of competitive advantage a firm can possess: low cost or differentiation".

For the NZ dairy industry, our sustainable competitive advantage has historically been our *low cost* of production, off a pasture feed base.

In terms of *differentiation*, this is interpreted as 'value-add', a concept anyone involved in the primary industries will be familiar with –moving basic commodities up the value chain into differentiated products.

This report suggests, our *low cost* producer status is being challenged from high efficiency industrial containment dairy operations offshore and our *value add* strategy, despite best endeavours and a few exceptions, is far from world leading.

However, one unique proposition, or advantage we still do possess, is producing milk off pasture with animal grazed free-range outdoors. Leveraging this and creating a differentiation around it is a logical strategy, to renew/reinforce a sustainable competitive advantage for the NZ dairy Industry.

7. GLOBAL DAIRY SITUATION

This section puts world dairy supply and demand and the role NZ plays into some context.

7.1 Milk Market Demand

Global dairy production/consumption is estimated at some 800 billion litres (IDF*, 2016*). A large proportion of this milk is produced by famers with a handful of cows, goats or buffalo and the milk consumed in a local village without ever seeing a processing plant.

The formal milk market- that is milk that is delivered and processed is approximately 390 billion litres globally. (NZX, 2017)

Given milk is perishable and a staple of the human diet, many countries seek to be self sufficient in milk supply to meet domestic demand. As a result, dairy is one of the most heavily protected/subsidised agri-food enterprises globally. Access to markets for exported dairy products is difficult, illustrated by the fact that if all global dairy tariffs were eliminated tomorrow, and New Zealand's milk production is held constant, the value of New Zealand's dairy exports would increase by $1.3 billion (*NZIER, 2017*). (approx 80c per kilogram milksolids at the farmgate).

Dairy, when compared to say grain or even meat is a relatively complex farming enterprise. It requires a number of key physical and management attributes and resources to do it effectively. A temperate climate for cow comfort, quality feed and genetics and given milks rapid perish-ability, requirement to refrigerate, transport and process in short timeframes.

Many parts of the globe, particularly tropical geographies struggle to scale up viable dairy production due to a lack of some or all of the above.

The forecast growth in demand globally for formal market dairy products is estimated at 2-3% CAGR [compound annual growth rate] (*Fonterra 2015*). This is a large amount of milk- as an absolute number about one entire NZ dairy industry each year. A large proportion of this demand is forecast to come from the emerging middle classes in Asia as well as population increases in both Asia and Africa. For the most part, these are countries where for the reasons mentioned above, domestic production and self sufficiency is a challenge and reliance on imports will be inherent to meet this demand.

The 2-3% forecast growth in demand, like all forecasts has some risk and assumption attached including economic growth in those countries, as well as oil prices, exchange rates and geopolitical factors among other things. It is also very feasible that synthetic and more non-dairy 'milks' will compete for some of this market in the future.

There is underlying trend occurring in global dairy markets as to the type of products importing countries are seeking. As economies become more developed and urbanised, incomes rise, tastes change and cool storage supply chains develop to the extent that consumers tend to move away from bulk powders (reconstituted milk) and seek a larger suite of finished ready to consume dairy products. (Woodford, 2017).

Of the total global supply of milk, only 7% is traded across borders. Given that this is such a small proportion, any demand and supply imbalances result in large volatility of prices, with no better example than the 2015/16 NZ milk price collapsing to $3.90/kgms from $8.60/kgms just two years prior.

7.2 Milk Market Supply

When it comes to exporting and global trade of milk, there are three main players- The European Union, NZ and the US.

Figure A: World Dairy Exports, Percentage of total cross-border exports

World Dairy Exports By Country *72 Billion kg of milk equivalent*	(%)
EU28	27.2
NZ	26.6
USA	14.2
Aust	6.3
Belarus	5.4
Argentina	2.6
Rest of world	17.7
	100

Source: Eurostat, 2016

7.3 Europe

The European milk industry is the world's second largest milk block behind India at 157b Litres, and is replacing NZ's position as largest exporter. (Eurostat, 2016). European dairy farming is largely a containment dairy system (the main exception being Ireland) using locally grown forages and some imported grains as feedstock. Production has historically been capped under a quota system and this was revoked in April 2015. Thinking at the time was that removal of the quota system would see only a modest lift in production, given other constraints around supply including nutrient caps, land, feed and labour resource. However, since then there has been a reasonable lift, to the extent that there is currently c.400,000 tonnes of skim milk

powder in EU intervention stockpiles. (Woodford, 2017). For December 2017 alone (Fonterra, 2018) EU production was up 6% on the previous December, which on the size of their milk block equates to a 4% annual increase out of NZ.

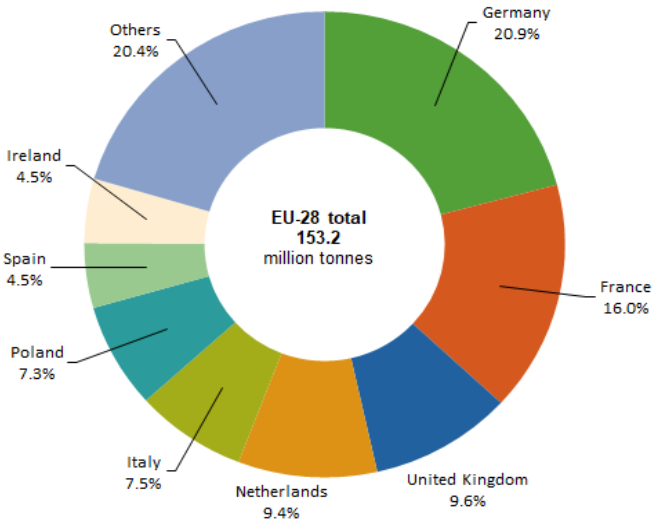
Ireland has shown the largest increase in milk production post EU quota but from a relative low base. Eastern Europe is still relatively undeveloped with good potential.

The EU has some useful advantages in the marketing of milk including:

- Large domestic market
- Large successful farmer Co-ops including Friesland Campina, Arla and several in Ireland
- Some strong brands in the value-add category and good market presence and links into in Asia.
- A largely flat milk curve, lending itself to value add/fresh products and milk plant efficiency.
- Subsidies: while no longer linked to production, most farmers receive payment from the EU based on land area. While not a big number, it is useful enough, particularly to keep the smaller operators going. EU intervention also maintains a price floor on commodities from time to time.

The key countries in the EU for milk production are as follows:

Figure B: EU Milk production by country



Source: Eurostat, 2017

7.4 United States

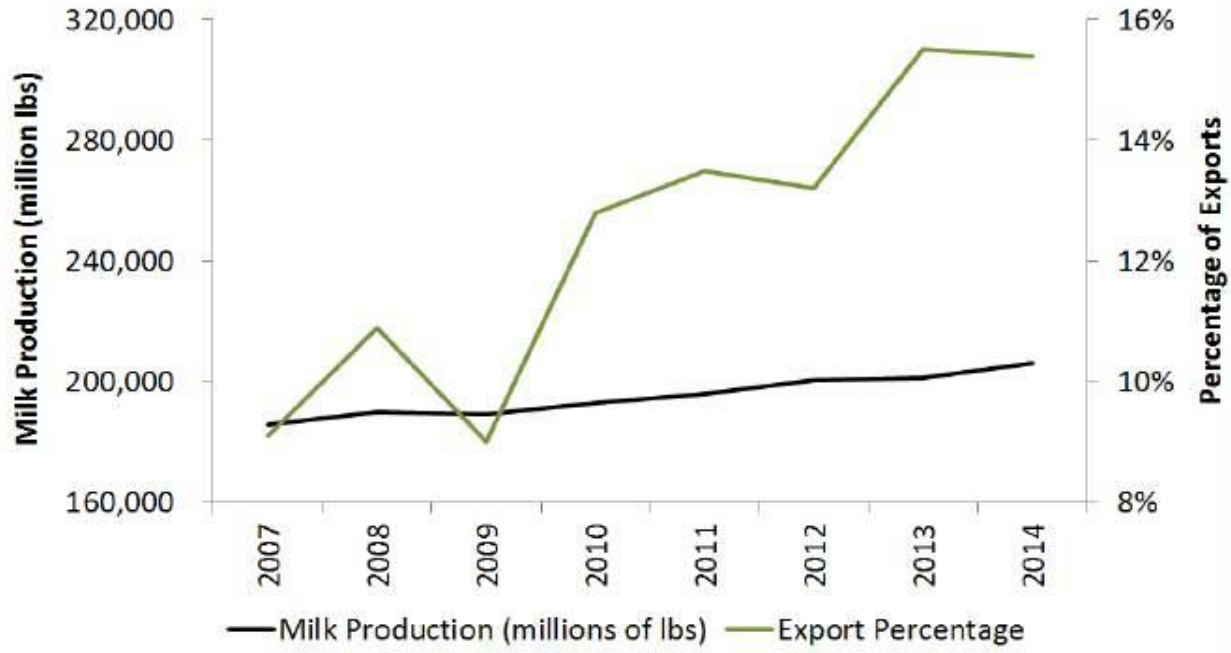
The US produces 93 billion litres of milk with production concentrated in the North East and California close to population densities. There is a large dichotomy in the US dairy industry:

1. A significant number of smaller family farms, many of whom are looking to exit the industry due to low margins, lack of family succession and difficulty attracting labour.
2. A growing proportion of existing and new entrants creating 'mega farms'-large scale feedlot industrial production facilities, many locating outside of traditional dairy areas targeting lower production costs with cheaper feed, lower cost infrastructure and less environmental compliance hurdles.

The extent of this trend is apparent in the fact that currently, a massive 53% of the milk produced in the US, now comes from just 3% of operators. (M Stephenson, 2017)

The US has a remarkably consistent historic compound annual milk growth of 2% per year. US domestic milk consumption is reasonably mature. Surplus milk is being exported and this proportion is growing each year from about 14-15% of total production.

Figure C: US Milk Output (RHS) and Export Percentage (LHS).



Source: US Dairy Export Council, USDA, Progressive DairyMan, DairyNZ

US milk processors don't have lot of experience in marketing and exporting dairy and tend to be an opportunistic player when global prices are high. However, there is a clear realisation among the industry that in order to grow, they have to export and a lot of due diligence is taking place on what they should produce and who they should sell to. (Gough, DFA). If they

can develop export channels (easier said than done) and support existing volume growth, they will be exporting a similar amount of milk to NZ in as little as 5-7 years time.

While there is no direct on farm subsidies in the US, there are various hedging and insurance schemes which ultimately result in a net transfer of funds from the taxpayer to the agri-sector each year of some USD$7b part of which accrues to the dairy in margin support mechanisms. (Drake, 2017)

7.5 Rest of World

The other exporting countries all have a role to play although given their relative size compared to the big three, any changes have an incremental effect on world supply in global context.

South America in particular has physical resources to ramp up output (currently 35 billion litres) although this has been the case for some time and little seems to change in volume terms.

India is an interesting proposition and merits a mention. While largely self sufficient in dairy up till now, the demographic forecast trends, like Asia reflect a burgeoning middle class and a population expected to surpass that of China in around 2030. The challenge to remain self sufficient in dairy in the face of c. 7% consumer demand growth versus c.4% production growth will be difficult (IUF, 2009). India may become an importer of significance in the medium/long term.

Findings and Discussion

The next section of the report expands on the key themes which developed during research and interviews.

8. WORLD DAIRY PRODUCTION SYSTEMS

8.1 Containment Dairy

Any trip abroad looking at livestock industries soon impresses just how many animals are kept indoors. Containment dairy, year round indoor is widely practiced in the US and much of the Eurozone as the major farming system. These systems involved feeding cows a total mixed ration (TMR) diet composed of a mix of grass/maize/corn silage, carbohydrates and concentrates which better enable higher milk production per cow through greater control of feed intake quality and increased daily dry matter intake. Indoor TMR systems also offer cows protection from environmental extremes such as heat, cold and wet. They also have to requirement to capture all animal effluent and therefore the ability to control its disposal. (Teagasc, 2016).

As more technology is applied to these systems, there are some impressive productivity and efficiency gains being made around nutrition, genetics and cow comfort. Scaling up of these systems drives other efficiencies and 5,000 cow farms in the US are becoming common with multiple units adjoining. The largest private US dairy farmer is now approaching 100,000 cows (Rice Dairy, 2017) with modules across multiple states to hedge differing state-by-state federal milk pricing and feed availability/costs.

Figure D: Typical Large Scale Containment Free-stall Barn. Fonterra Farms, China

However, the industrialisation of these farms has not gone unnoticed and this farming system, along with feedlot beef production is raising concerns with a segment of consumers.

8.2 Pastoral Dairying

Pastoral dairy barely deserves a mention under the heading of global dairy production systems because it very much a minority exception. While there are some pastoral based systems being practiced in pockets around the world, notably the UK, South America, and limited areas in the US and Europe it is a not a significant volume of production (particularly in cross-border trade milk) and many are a hybrid of housed with occasional access to pasture typically over the warmer months.

NZ and Ireland stand alone as being the a majority pasture based system proponents with cows outdoors and free range grazing pasture for the bulk of an annual lactation. This is owing mainly to latitude and a temperate climate, plus having the skills to operate this system. Total milk production from these two countries totals some 27 billion litres, a mere 4% of all global milk production.

Milk production from pasture has always retained a competitive advantage in terms of cost of production and on a variable cost basis, is still competitive. When fixed costs however are included (i.e. opportunity cost on assets) it does loses a lot of ground to other countries. More on this later.

The other important issue with pastoral farming is that pasture is typically say 80% of the diet and productivity gains in pasture yield are glacially slow. Annual pasture dry matter yields, all environmental and management factors being equal are about 0.2% gain p.a. (*Grasslands, 2013*). The grass we sow today has 2% better yield potential than the grass we planted in 2007. If we compare a biotech corn crop for example, a staple component of TMR rations as both grain and silage, it is achieving annual productivity gains of 2-3%. (*World of Corn, 2016*) Grass is non-GMO plant, which is competing with many GMO forage feeds used in containment dairy systems. Given the relatively low emphasis placed on driving ryegrass yields in terms research dollars in a global scale (it is ranked the 173rd globally planted crop by area), it is reasonable to assume the productivity gap will continue to widen.

Cheaper feed and enhanced conversion rates are a potentially long run advantages the containment dairy industry will benefit from.

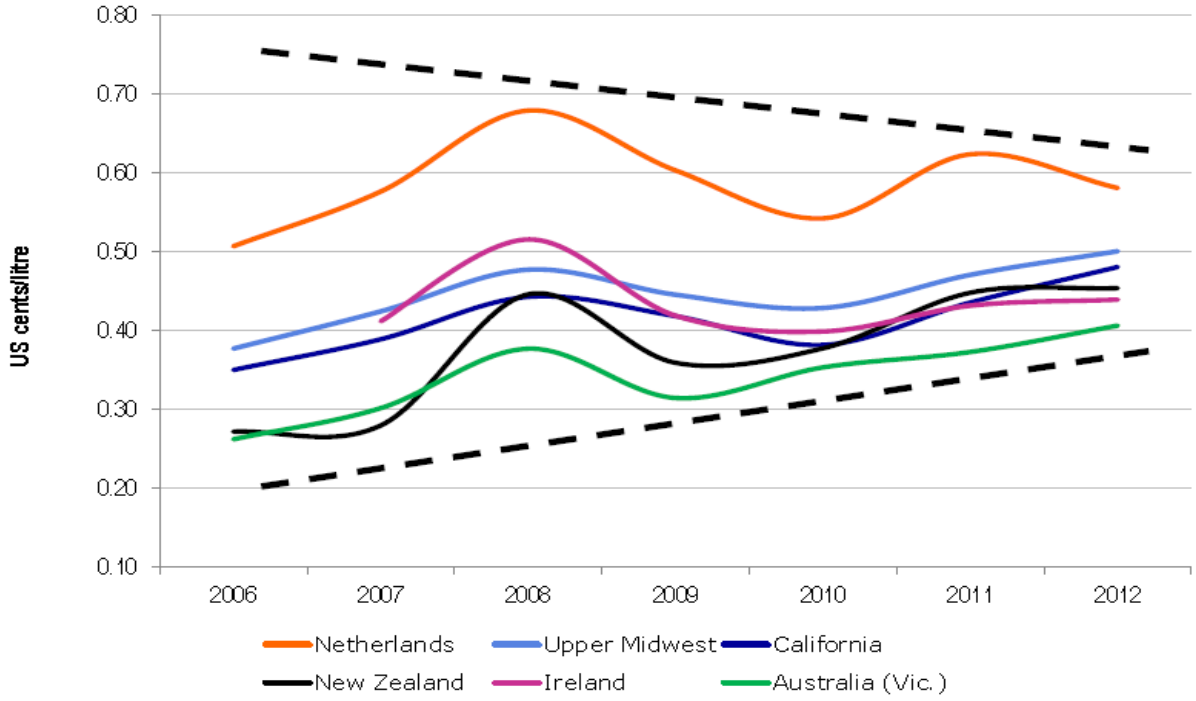
Figure E: Tipperary or Manawatu? A close resemblance exists in NZ/Irish Dairy systems.

9. GLOBAL DAIRY PRODUCTION COSTS

Cows require about 10kgDM of feed to produce 1kgof MS therefore the cost of the feed is a key driver to the cost of the milk. Obviously less say in NZ or Ireland where you use predominantly home-grown pasture, more in say China if you import your alfalfa from Idaho.

If we consider the graph below, there is a clear convergence of operating costs between NZ and the rest of the world.

Figure F: Farmgate milk production costs for key export countries



Source: On-Farm Consulting, Dairy NZ Economic Service, Teagasc.

The key drivers occurring here are:

1. NZ productivity stagnant.
2. Containment dairy productivity gains (cost reduction per unit of output)
3. Cheaper world grain and feedstock prices (on the current part of the cycle).

9.1 NZ Dairy Productivity

Productivity is a measure of physical farm efficiency or how well a business converts input resources into production. For a dairy farm to become more efficient it must increase the production of milk and/or reduce the resource inputs required to produce that milk- effectively more from less. It is an important measure for any business or industry and reflects ability to achieve long term growth and survival. The definition of productivity is as follows:

Productivity = Physical Outputs (Production)

Physical Inputs (Resources Used)

New Zealand dairy collective behind farm gate productivity is stalled. The annual DairyNZ Economic Survey has some good discussion and metrics around this topic. It has assessed, using Dairybase data for the 10 years ended 2016, five years *total factor productivity* has increased, 5 years decreased and over the total period, a net zero change.

A significant driver of increasing operating cost on NZ dairy farms has been feed as farmers respond to higher milk prices by moving into higher input systems. As a whole, NZ farmers are collectively poor at achieving an economic response to supplementation. Most of the problem is pasture substitution, but also NZ farmers are subject to much higher volatility in feed costs and milk prices than overseas producers, which makes profitable execution of a higher input/higher profit system much more difficult.

Other sundry operating costs are under constant upward pressure due to inflation, wage expectations etc.

If we look to the future, many outside of the dairy industry would argue that we are not fully accounting for the full externalities of dairy farming and have recently proposed such things as a nitrogen tax, a water tax and account for GHG emissions. As impractical as these are, given the political and public sentiment, some of these 'taxes' becoming a reality could not be ruled out, putting us further down the competitiveness curve. Also the domestic labour market is tight, with some reliance on migrant workers and minimum wages in NZ are high (with upward pressure) by world standards. Dairy farming by nature is demanding work and the industry historically has been well served by young people starting out with the vision of industry progression and farm ownership. Is this going to be the motivation for the next generation of people working in the industry and if not, what are their rewards going to look like?

In summary, NZ costs of production behind the farm gate are under upward pressure, some of it within the control of farmers, but some of it not. Increasing productivity to keep rising costs relative is the solution but doing more from less is never easy, as the numbers suggest.

9.2 Containment Dairy Productivity Gain

It is obvious, talking to farmers the US and Europe that their operations are becoming increasingly sophisticated and precision oriented. In the pursuit of better efficiencies, there are a number of key strategies being employed. Some of these observed include:

Breeding- use of sexed semen is common with a large number of daughters offering genetic gain at a rate 2x that of mixed semen. There is also recognition that 700kg Holstein Friesians are not the most efficient animal and there is increasing use of other breeds to create more milk components per kg of liveweight, better cow comfort, handling and more longevity. (Horner, 2017). The main requirement for high numbers of replacements is that the containment dairy industry, depending on where per cow production sits can have a very high involuntary culling rate of 35-40% as cow longevity is severely curtailed by the demands of very high milk production.

Figure G: 2016 Queen of US dairy production, Gigi produced 75,000lb of milk or about (2,200kgms at 6.5% solids). Stands 5 ½ foot tall and weighs 950kg.
Source: Bur Wall Registered Holsteins.

Feeding & Diet: as scientific knowledge on the rumen function evolves, more high analysis diets are being employed to optimise return on feed inputs. Nutritionists are prescribing diets which not only focused on optimising milk yield, they optimise input price by substituting low cost by-products depending on availability to optimise milk yield to cost of feed. In the US the top cow is producing some 2,200kgms. Even after adjusting for liveweight and lactation days this is an impressive output and containment farms are progressively moving the needle on better productivity.

Although dairy farming is a biological system, containment farms are able to isolate variable factors that challenge pastoral farmers such as weather, fluctuating feed quality, walking, etc.

***Cow comfort*:** Given very high milk production, cow metabolism generates a lot of internal heat and keeping cows cool in warmer seasons and climates can be a challenge. This is currently managed with sprinkler and ventilation systems, although one US farmer advised that given their massive roof area, use of solar powered air-conditioning systems maybe not too far away. Barn design and layout has improved this also.

Technology*:* Application of agri-tech in these TMR systems is also increasing and it is a more suitable environment to do so than a pastoral setting. Some of the monitoring equipment now available on cows can significantly alter management and performance. Robotic milking and individual cow monitoring devices are just two examples. Over 48% of the cows in the Netherlands are milked in robots and as well carrying out the milking function at a frequency that suits the animal, instant live milk testing can detect a heat event, presence of infection and

daily milk composition. Necklace type cow monitoring devices can monitor rumination activity and from that farmers can assess and optimise suitability of the particular diet. In Israel (which is a world leader in dairy innovation) a dairy farmer (Tal, 2017) admitted that he spends most of the morning each day, not milking, but in front of his computer revising data incoming from his herd, looking for issues, exceptions and opportunities to tweak performance at an individual animal level. Every single milking cow in Israel has a monitoring device attached and despite the very challenging natural environment, national average production per cow is among the highest in the world.

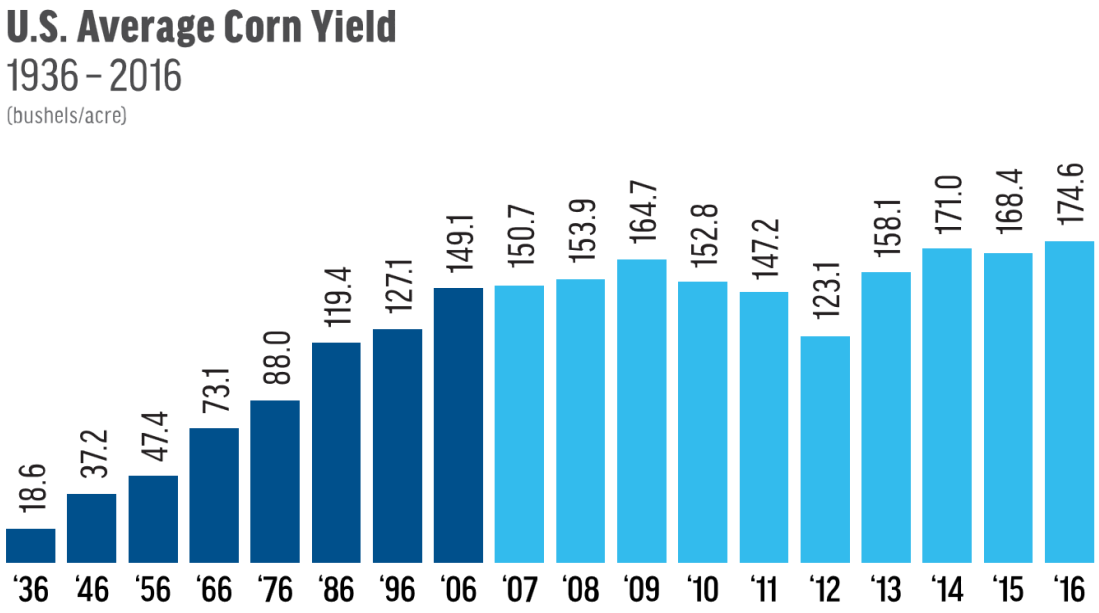
9.3 Cost of grain

The world is currently awash with cheap grain on the back of five straight year's excess supply over demand (FAO, 2017). The emergence of Brazil as a large scale producer and improved productivity (yield per ha) has been a big driver. This has kept prices moderate and suppressed the production costs of pork, chicken, red meat and dairy to low levels in recent years.

Like all commodities, supply (and price) is cyclical and it is noticeable looking at historical data, there has been an absence of a significant global drought event for some years. Interestingly, a number of the larger scale US dairy farmers have a policy of having 1.5-2 years feed on hand to mitigate the impacts of a one off failed or poor harvest.

Corn has been an interesting crop to research and as a competition with grass, it is a formidable opponent. As a C4 plant it is very efficient at photosynthesis and genetic modification has made a significant difference ease of weed and pest management and hence yields . Average yields have been steadily climbing to as per the graph below and the average for the decade ending 2016 was 158 bu/ac. (bushels per acre). The increase in yield, over an 80 year period since 1936 represents a very impressive CAGR of 2.7%.

Figure H: Average US Corn Production for the 10 decades ended 2016.



Source: USDA, NASS, Crop Production 2016 Summary, Jan. 12, 2017

The best commercially grown crop in the US in 2017 yielded 520 bu/ac (Rouse, 2017) giving some idea of its potential. Also of note is that about 20% of US corn is used in the ethanol industry and given the rate of technology advances in the energy sector (electric cars, battery performance) this end use is unlikely to create demand pressure on the feed industry, in fact the reverse is more likely.

9.4 Global Dairy Operating Cost/Balance Sheet Comparison

It is of interest (and fraught with mathematical complexity) to compare the production costs of milk between the 3 main players in international trade. The variable (cash) costs can be calculated with some reliability, but opportunity costs are more difficult with a lot of assumptions required.

Opportunity cost refers to the balance sheet -what it tied up in assets to produce milk. Invariably in NZ, land for grazing cows is owned, in the US and Europe, forage is mostly purchased off nearby arable farmers with a small area owned by the dairy farmer to locate buildings and infrastructure. Leasing of land is also more common abroad. Many of the larger scale US famers are now looking to purchase their own land to grow crops, get more vertically integrated and enable more efficient effluent disposal. As such there is a wide variation in balance sheets structures and returns to assets.

Basically, NZ and Ireland tend to have lower cash costs but potentially much higher opportunity cost of milk when all imputed costs for owned resources are taken into account. Further complicating this is capital appreciation which does occur on land, partially offsetting opportunity cost over the long run. Countries like the US in have higher variable costs but opportunity cost can be much lower – infrastructure costs are much cheaper than in NZ.

The message here is that variable costs are only part of the equation and the full economic cost of marginal milk is more a valid comparison.

To illustrate this, refer the table comparing an open corral dairy (cows in open air dirt pens outdoors fulltime) in New Mexico, US with a typical NZ dairy unit. Using local metrics on production and prices, we get to a similar comparable figure of operating EBIT per cow. The US farm however has a very low asset footprint i.e. open pens, silage bunkers, large rotary parlour, livestock and equipment, total circa US$4000/cow. The NZ farm has a very high asset footprint, land, stock and plant at say $35/kgms.

Figure I: US Open Corral vs NZ Dairy EBIT/Balance Sheet Comparison

Assumptions	**USNM**		NZ Metrics	**NZ**
Milk production 90lbs/day, 305 days (lbs/yr)	27,450		kgms/cow/yr	420
Mailbox milk price per cwt (hundredweight)	16.50		milk price	6.00
Cash costs per cwt	13.50		FWE/kgms	3.80
EBIT (milk price less cash costs)	3.00		EBIT	2.20
EBIT per cow (ebit x annual milk prodn)	822		EBIT/cow	924
Fixed assets per cow (L&B, S&P)	4,000			16,000
Opportunity cost of capital @2.5%*	100		3.5%**	560
Net return of milk per cow	USD$722			NZD$364
*Typical US interest rate				
**Calculated as interest rate of 6% less 2.5% long run capital gain				

Source: Author (the assumptions used in the above table were derived from interviews with US dairyman and the authors own knowledge of NZ dairy P&L and balance sheet metrics. The figures are approximations and while there are variations either side of the numbers used, the objective was to make an approximate valid comparison)

After deducting the relative opportunity costs from the EBIT per cow, the net return is materially higher for the milk produced on the US farm.

The above case uses examples from both extremes of the opportunity cost spectrum and some broad assumptions but it does illustrate the point...NZ milk while being competitive on cash costs, far less competitive on total economic cost and something to be aware of when thinking about where global marginal milk will be produced.

The continued long run appreciation of real estate in NZ has made up a fair proportion of the historical return to the NZ famer. NZ is a small country, land is a scarce and by general economic principle, excessive value is always capitalised into the most limiting resource. According to DairyNZ figures from 2011 to 2016, average dairy farmer's equity growth has increased $653,000.

Of that growth just $48,000 has arisen from trading profits, the rest from capital gain. Sustainability of 'balance sheet farming' and capitalising profits into land values is a concern in NZ dairying.

While not everyone complains about their farm going up in value, excessive land price inflation has and is creating some issues. This includes debt levels (higher values require higher gearing), loss of the pathway to farm ownership for sharemilkers, loss of herd owning sharemilking jobs and lack of appetite/liquidity to invest off farm in downstream processing and marketing i.e. dairy co-operative shares.

Another relevant question in this area is what further investment is collectively going to be required from NZ farmers to account fully for environmentally externalities. It would appear the definition of environmentally sustainable is a bit of a moving feast in NZ depending heavily on an N loss output based model. Nevertheless, it has been well publicised that NZ dairy farmers have invested several hundred million in effluent system upgrades (DairyNZ) in the last 5 years, add to this investment in fencing and riparian planting, more efficient irrigation systems and other initiatives and it begins to add up. The unknown equation: is it enough to achieve required water quality outcomes now being sought by Regional Councils and the community? Complicating this further is legacy or cumulative pollution; is what we are seeing today in water quality arising from farming practices last season or three decades ago? It is likely that some further investment is required, in some locations, in off paddock facilities for example. Such investment will invariably impose increased fixed and operational cost.

In summary, NZ dairying is very capital intensive by world standards and highly leveraged. Admittedly, a lot of the capital is tied up in land, a long term appreciating asset and certainly a better investment than sheds and equipment. Operational margins are still respectable but are no longer world leading by the time debt servicing is accounted for and there is less significantly less resilience than there was 10 years ago. Strong levels of capital gain have been an antidote but value is still ultimately intrinsic to long run profit margin and as such, could be more constrained in the medium term. Imposition of a capital gains tax would have a material effect on this also.

Figure J: Cheap new US milk. Expanding mega farm in New Mexico: strip of concrete, water trough and wire fence around dirt pens.

Now that the discussion on costs has been evaluated, it is useful consider the other sustainable competitive advantage available for NZ milk producers: product differentiation

10. DIFFERENTIATION/VALUE ADD:

10.1 What is the Opportunity for NZ Milk?

The question that keeps lingering when looking through industrial containment dairy farms around the world is this: how is the milk we produce in NZ from cows grazing outdoors in rolling green pastures directly competing with the milk that comes from this 'farm'?

The simple answer is most of NZ milk is standardised, commoditised and competes alongside other global milk, the price ultimately referenced on GDT (Global Dairy Trade).

Obviously the solution to this problem is differentiation: adding value, shifting milk up the value chain into specialised consumer focused goods where the margins are higher and volatility is lower.

There are however, some harsh realities and observations of value-add in the NZ Dairy Industry context:

1. In the scheme of things, NZ does not have yet a competitive advantage in this space. Roughly 2/3rd of all NZ milk is converted into powders and as such, NZ dairy is seen globally is seen as a commodity producer. In fairness, with the 7b litre 'tsunami' of

new milk that has hit NZ processors over the past 10 years, there has been few other options

2. We lack brands with global equity and recognition (exception say Anchor in some markets) compared to say a Nestle.

3. We don't have a sophisticated scale domestic market and profile to launch from. An example of this is the success of A2M Company baby formula. First it got to number one in Australia, then leveraged off this to become relevant in Asia.

4. The year round milk supply to manufacture- many goods in this category are fresh, short shelf life. Our seasonal supply curve is entrenched and any large scale departure from that is not a viable option on farm.

5. The extensive capital investment required to become and stay relevant in this game. It would require further investment in the billions of dollars in both value-add-capable processing assets and creating successful markets and brands.

6. Market access: it is not possible to put products on the shelf where we please without paying, in many cases, prohibitive tariffs due to protectionist trade policies inherent in dairy trade.

To have some idea of the challenges involved in this space, one only needs to walk down the aisle of a large supermarket anywhere in the developed world. The fast moving consumer good (FMCG) in the dairy refrigerated section is busy and ruthlessly competitive. Talking to people in sales and marketing in this segment, this is not a place for the Johnny-come-lately. The products in this category (specialty cheeses, yogurts, beverages, deserts) are typically products with 30g of dairy ingredient selling for $3.99...all innovation, slick marketing and branding wrapped up in a smart package and not a lot of actual milk. At good prices and it is a very high return on the actual dairy component.

However, on average, for each FMCG occupying space in a supermarket chiller, there is 6 other products released that didn't make it three weeks post launch. (Maude, 2017). That is they were researched, developed, manufactured, packaged, promoted and released to the market, before failing to sell at the quantity required to keep the supermarket happy. The profit on the one that succeeds must provide a return to it, but also compensate for the investment in the failed products. Products in this category seldom hold a leadership position for long before being crowded out by similar offerings.

Validation of the above is in the example of Fonterra Consumer business. According to the 2017 Fonterra Shareholder Council report, 12% of Fonterra's milk is processed into this category, but margin and volume growth is very flat over time, despite having some 'well known' brands and high quality products.

There are some examples where NZ milk has achieved some outstanding value add results including Tatua Dairy Co-op, A2M Company, and Fonterra Food Service but these lean toward business to business sales rather than direct to consumer.

Realistically, selling bulk ingredient (powders) is still going remain a big part of the NZ dairy industry. Value-add will be a slow evolution requiring good strategy, innovation, capital and time.

10.2 The Grass-Fed Proposition.

A smart strategy is about defining a different proposition, that the bulk of the worlds milk producers cannot replicate: GRASS-FED

Even for a farmer, observing cows in a large scale containment environment is confronting and it takes some getting used to. We practice a farming system in NZ totally different and one that many consumers around the world relate to. Walk down any supermarket aisle and on most dairy products, the ubiquitous image of cows grazing outdoors is displayed. The reality of world dairy systems is much different, but fortunately in our favour, consumers are beginning to understand this.

Herein lies the opportunity for NZ milk to differentiate.

> *'The ability to market a sustainable green brand image can attract customers and is an incentive for farmers and manufacturers alike to adopt more sustainable practices. Dairy companies who operate in countries where the feeding system is predominantly pasture based have particular scope to capitalise on their green brand image when marketing dairy products.'*
>
> Deliotte 'Dairy trends and Opportunities' Publication

The concept of 'grass fed' in terms of milk (and meat) production as a consumer value proposition has been interesting to observe in offshore markets. There is some real momentum building behind the grass fed protein claim due to growing consumer awareness of the benefits of grass fed and many food businesses and producers are scrambling to create or supply a label to exploit this trend.

Before we go further, grass fed needs some explanation around semantics. Grass fed, for the purposes of this paper, refers to grass, clover (pasture) and associated forages which may be used in the diet or dry period. 'Pasture grazed' is arguably a more accurate description.

Anyone inspecting dairy produce in a US supermarket recently will find it hard to miss the milk (and meat) products on the shelves claiming 'Grass fed' origins.

Talking to shoppers in a couple of California supermarkets who sought out dairy products making grass fed claims revealed the purchase decision fell into two categories:

1. Better perceived animal welfare outcomes. (e.g. cows frolicking around in the sunshine, expressing natural behaviour vs. cubicle housing)
2. Product characteristics and the perception that the product was more wholesome, and natural and tasty. (which genuine grass fed milk is). There was a known or implied expectation that GMO feed was not fed to the cow, and it was hormone free.

Further research and observations have revealed:

- There are a plethora of marketing definitions for 'grass-fed' or 'pasture raised' and basically the only rule is what you defend in the market.
- The premium being extracted at the retail end is about halfway between conventional price and organic price.
- For many consumers, grass fed is becoming a (more affordable) proxy for organic.

It was simultaneously amusing and frustrating for a NZ farmer, who grazes cows on pasture, 85% of the time, to research and dig deeper on some of the claims these products made.

Most of it is fairly marginal in terms of dietary intake of grass by the animal and resultant milk composition. As mentioned, the US is the market where most of the marketing hype around grass fed is currently occurring. High end supermarkets shelves are stocked with grass fed milks, yoghurts and even grass-fed whey protein sport formulations. Again, most of the locally produced product will have some outdoor grazing claims, ranging from 30-50% of the time outside and a similar proportion of actual pasture intake.

Another good example is the is the Dutch who have a generic label able to be used by milk processors who can demonstrate (via an on-farm audit) that their cows graze outdoors for 120 days per year, for at least 6 hours per day. The label 'Weidemelk costs the consumer about 4 euro c/l premium who are more than willing to pay and some of which is passed on to the farmer. The Dutch cows (at 8,400 litres per year average output) are like F1 racing engines prescribed a diet of carefully balanced high octane feeds and standing pasture to them is like a tank full of diesel. The farmers don't really see the point, the milk is no different and the cows don't seem to mind either way (farmers usually have to chase them out of the free-stall barn). But the consumer cares and perception is reality. Through clever marketing of happy cows and healthier milk, value is captured- full credit to the Dutch.

It was certainly surprising the scale and momentum behind grass fed in the US and historical experience suggests, food trends that originate in the US or California, migrate across the globe over time. If it hits Asia to the same extent, its game-on for NZ dairy if we can get organised to capitalise on it.

Figure K: US Wholefoods Supermarket: Grass fed product dairy offerings very prominent, but not a lot of integrity in some of the claims.

10.3 Fashion or Trend?

Some consumer trends have turned out to be fashions –popular in the short term then becoming irrelevant. It is not possible to know for sure if the grass fed proposition will be around in 10 -20 years, or if it will be a premium or ultra premium niche offering. There is certainly weight behind the argument that it will be relevant, at least for the segment of consumers who can afford to care, for some time given:

- Large scale industrial containment dairy production is where the global marginal milk is being produced. Small scale family farms are declining in number and genuine grass fed is a small niche segment. It's too hard for the large scale operators to incorporate pasture into their systems.
- Consumers are seeking more natural food, "tasting like used to taste".
- Consumers have distrust of 'big agriculture' and perceive factory farming to be exploitive of animals. Synthetic meat is leveraging off the back of this perception.
- The feed industry supporting containment dairy, corn and soy in particular, operates a very extractive farming model with large environmental impacts and widespread use of GMO. The Mississippi river discharges 146,000 tonnes of nitrogen per annum into the Gulf of Mexico, being N loss to groundwater from the US corn/soy croplands.
- Livestock farming contributes 18% of global GHG emissions. This uncomfortable truth shadows all livestock farming systems but there is recognition that pastoral dairy has a lower emission footprint than containment per kg of product.
- Animal's free range grazing 'cage free' resonates with consumers.
- Organic has been around for a long time and has a number of parallels with grass fed.
- Genuine grass fed milk differentiates itself with different components, taste and fatty acid profile than corn based milk.

There is no question that grass fed is a distinct category and a niche. Whether it maintains an identity and brand is actually around effective marketing and telling the story.

Central to the story though is being able to prove it and this is where the currently available technology around analysing food can help true grass fed production systems become distinct from the pretenders.

At Iowa State University Leopold Centre for Sustainable Agriculture they have found a technique for determining exactly how much grass a cows has eaten by a milk test. The method is fluorescence spectroscopy, a kind of molecular fingerprinting which involves beaming light at the product and measuring for luminescent signals in response. It will pick up how much chlorophyll is in the milk which is a direct correlation to how much pasture the cow is consuming. The test is cheap and easy with instant results. Organic Valley, a US company with 2,000 organic member farmers see it as a game changer for demonstrating transparency in their premium range of organic and grass fed dairy products and for exposing the imposters with false claims.

10.4 Grass fed Milk Characteristics

There have been numerous studies done on the composition of the milk comparing grass fed cows and corn based diets. To summarise the findings, in comparison to milk produced off corn diets, grass fed milk has:

- Higher components (milksolids, say 6.5-7% to over 8%), i.e. more creamy and rich.
- Higher conjugated linoleic acid (CLA), an unsaturated fat
- Elevated levels of Omega 3

Probably the most obvious consumer product where the above is displayed visually is in Irish or NZ butter compared to US butter. Its yellow colour and smooth consistency is much different to the pale crumbly US butter and Irish Dairy Co-op Kerrygold have managed to leverage this to a significant extent, selling 20,000 tonnes of butter in the US in 2017, an increase of 30% over the year before. Ornua (Irish Dairy Board) North American head Roisin Hennerty says the 'local consumers are responding to our message about the grass fed difference'.

Another example is Fonterra Food Service who manufacture a suite of dairy ingredients which exhibit better characteristics in cooking and baking applications than containment derived milk.

In terms of the CLA unsaturated fats, a study by Harvard School of public health found in a study of 4,000 people, that the people with the highest concentration of CLA's –the top 5th of all participants had a 36% lower risk of a heart attack compared to those with the lowest concentration. Cow's milk is the primary source of CLA and grass fed milk has 5 times the levels of corn based milk.

While some would argue, there may be not much in it from a human nutrition point of view, you could say the same about A2 milk 3 years ago –never let the facts get in the way of a good marketing opportunity!

10.5 Leveraging the grass fed story in the marketplace.

This is a complex proposition and should be a strategy crafted by innovative marketing minds and is not within the scope of this report.

There are some observations from a farmer's point of view that are relevant background, in any consumer food strategy.

Promotion of the NZ grass fed in value-add dairy would broadly fall into 2 categories: Consumer and Food service/ingredients.

Consumer

Being successful in this space comes with all the other challenges mentioned above including capital, brands, processing assets and flat milk curves.

Undoubtedly this is where the highest margins are but to play here, we inevitably get closer to the customer

One of the unintended benefits of being a commodity player is that it is business to business with a degree of separation from the consumer. The odd indiscretion around animal welfare or environmental issue in NZ dairy goes largely unnoticed by our customers. Compare this for example to what the Dutch farmers have to endure, where the mere separation of a cow from a calf can make national headlines citing animal abuse.

If we occupy the moral high ground on happy grass fed cows, we have to take the high(er) ground on animal welfare and environmental performance and full transparency in our production system. There are arguably a number of risks to the grass fed brand lurking just below the surface in the NZ dairy industry including:

- The bobby calf industry
- cows wintering in very muddy conditions
- lack of cow shelter in very hot or adverse weather
- Our growing addiction to imported PKE in addition to pasture (rather than a strategic input when pasture is limiting).

These realities occur in NZ dairy farming, if only periodically, and if not managed properly, do not compliment the grass fed/happy animal proposition as a whole. Some of these issues are an environmental issue as well as an animal welfare issue. It is not possible to promote the good and hide the bad in the age of video/social media and instant global information dissemination.

As an industry, we have to acknowledge the trade off, the closer we get to the premium consumer, the more responsibility we have with transparency in our production system.

We are also not able to promote this if our resident population are not prepared vouch for us. If the NZ dairy industry is seen locally as dirty, destructive and unsustainable, we can forget about a credible international brand claiming the opposite.

Food Service/Ingredients

If we step back and look at the bulk of NZ milk processors, they are in the ingredients game. Manufacturing powders, cheeses, butter, creams etc. to supply other food businesses. NZ product is sought after, high quality and safe. There are some advantages in this category... cheap to manufacture, works with our seasonal supply curve and we get premiums here and there for specification variances.

The downside is prices and returns are indexed off GDT. GDT is a reflection of the world supply and demand equation. Hence volatile and will be increasingly dictated by the EU and US who are growing milk output relative to us.

We need to find global ingredient customers who want grass fed product claims and build relationships with them. If we can set up a framework around accreditation of grass fed, and no other milk exporter can follow us, then we have a better model: Exclusive supply, hard to replicate = good agri-food strategy.

The Irish dairy industry is working on the same things now are probably ahead, but there is room for both of us. Arguably, we should be collaborating; there is NZ and Ireland together, then daylight between the next sovereign dairy producer that can make any reasonable grass fed claim on milk.

11. VISION FOR THE NZ DAIRY INDUSTRY.

In say ten years from now, the NZ dairy industry would look something like this:

- Most milk is still processed and sold through a Co-op with the farmer participating up the value chain. The Co-ops are successful, well governed, innovative and strategic.
- Our high quality, rich, grass fed NZ milk commands a premium in the global market in diverse applications of ingredients and consumer goods. The authenticity of the grass fed claim is verifiable and unique to a few select producers.
- All farms are accredited for high standards in animal welfare, nutrient and effluent management, everyone complies, regulation is not an imposition
- The industry is held up by all NZ as a key driver in the economy, environmentally benign, valued in the community and seen to enhance the standard of living for everyone.

- We retain and enhance our ability to harvest grass with cows, attract and grow good people and provide opportunities.
- We connect with our consumers via digital platforms and our farming models are embraced as being unique and fully transparent.
- Premium farmgate returns allow prosperity on farm permitting lower intensity systems and farming methods such as once-a-day milking allowing a more enjoyable and flexible work environment for families and farm staff.

Something for us to aspire to...

12. CONCLUSION

The NZ dairy industry has lost its licence to operate with the NZ public on due to environmental externalities. While the industry will gain control over these pollution issues with new science and management techniques, the milk growth phase out of NZ will be on a far more incremental basis than it has been in recent years.

We have two options in front of us to move forward:

1. Keep expanding by pouring concrete and moving into off paddock systems, Capturing effluent, move to a hybrid grazing/containment system, probably then drift to full containment, lose any competitive advantage in operating cost or opportunity to market a unique system and hope we can survive.
2. Collectively continue to develop and implement the science and management techniques to reduce N loss and use our pasture based, animal friendly, high quality milk production system to leverage a premium return in the marketplace.

As was outlined early in this report, sustainable competitive advantage is one of two things: low cost or differentiation. Many global milk producers have chased us down on low cost, but they will not viably replicate genuine grass-fed milk.

13. RECOMENDATIONS

1. Know our place in the dairy world

We are a nation of the world's best grass-based dairy farmers. This has always been our competitive advantage and we need to hang on to it. The containment/TMR dairy game is not ours to participate in: the US and Europe will always have cheaper land, grain, concrete, steel, equipment, better genetics and skills. Drift across to high input systems or capital intensive infrastructure is not where our strength lies, particularly while our milk sales are based on commodities and ingredients. We need to remind ourselves that most of the world's

containment dairy farmers would trade places with us tomorrow for our simple low cost seasonal farming systems.

2. *Drive Grass-fed as a brand*

There is a strong grass fed movement from dairy consumers abroad and NZ is hanging around on the sidelines when we should be leading it. Other countries participating in this are dictating the rules in our own game. It's like having a rugby world cup without inviting the All Blacks. There are a lot of faux-grass fed milk products and claims. The NZ dairy industry needs to stand up and drive its own national generic global standard, much like organic or the GMO project, specifying a minimum intake of grass/forage in the diet/time outdoors. It can be validated by current testing technology and bring some realism into the grass fed milk segment . It would make sense to collaborate with Ireland on this to give it more international reach and credibility.

3. *Work at getting the NZ public back on side.*

This is arguably our toughest challenge given where we have got to. It is not going to be done by fancy TV ads and a more shut-up-and-get-on-with-it approach is required. We need to collectively step up, face the issues, put them right and move forward. We need to do it without complaining about how much it costs and shifting blame. The prize for leveraging NZ clean and green in agri-food is real, it's becoming increasingly valuable and it's not just dairy, it is pan-sector. We do not have the right to leave our farms and communities in a worse state than what we inherited. The cost involved in getting it right will be small change compared to the alternative.

4. *Think about our value-add journey and the taxi we get there in*

As farmers, there are two taxis to get to the future. The first taxi is a Co-op taxi, it has an upfront investment but as passengers, we participate in and get the benefits of the journey into the future. The second taxi is a corporate cab. This taxi is free, but any long term benefits of the journey accrue to the company, not to the passengers. The message is, value-add requires investment downstream of the farm by someone, no question. If we as farmers choose to not invest (or divest), someone else will do it for us and take the premium. Some would say it is an inherent failure of co-ops that they do not often come up with leading edge food and marketing strategies and successfully execute them. (And at times, one would be lacking in charity not to agree with that statement). It rests with the farmers however to get the right governance and top down culture to deliver. Another thing to remember is that if the corporate cab company gets market dominance, the NZ dairy industry will be a very different place. Farmers will be in business, but only just. It needs said that dairy farmers in countries that have de-constructed their milk co-ops in favour of corporates regret that outcome heavily and every NZ dairy farmer should take it on themselves to go and talk to one of them.

IN CLOSING

Sustainable practices throughout the dairy production supply chain, from paddock to plate are of increased importance to governments and global food companies that buy our dairy produce. It is also important to the other 4.85m people who call NZ home.

How we move forward from here as an industry will define us.

We must be smart, strategic and deliver to the triple bottom line of being sustainable inside the farm gate with animal farming practices and people, outside the farm gate by managing our environmental footprint and profitable for a whole range of reasons.

But no one ever said farmers don't like a challenge....

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