Acknowledgement

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James Morrison Consulting is a boutique strategy consultancy providing independent advice and project management to boards and senior management in New Zealand. www.morrisonconsulting.co.nz
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Executive Summary

This supplementary document comprises the background material used in the development of Making Dairy Farming Work for Everyone, the Strategy for Sustainable Dairy Farming 2013-2020.

Entering a new phase
The previous 2009 Strategy for Dairy Farming was launched as the global financial crisis (GFC) unfolded. In its aftermath, other countries responded with fiscal stimulus policies that had important implications for New Zealand and the dairy industry. Large economies like the United States (US) engaged in competitive devaluation of their currencies in order to boost exports and employment. This prompted a global currency war that resulted in the New Zealand dollar rising significantly against the US dollar and other major currencies, effectively making New Zealand exports less competitive. These policies have not arrested the ongoing realignment of economic power towards countries on the Pacific Rim, particularly Asia, and away from Europe. New Zealand is well positioned in terms of proximity and strong trade relationships to take advantage of this shift. However, the world is also entering a new phase where capital will be more expensive. This could expose those in the dairy industry who are too highly leveraged.

Highly volatile
Since 2009, the recovery in global dairy markets has been characterised by some historically high average prices, but also high volatility. This volatility is expected to continue but overall the global outlook for dairy markets is extremely positive, particularly in Asia with forecast global volume demand growth of at least 100 billion litres by 2020. High expected demand and prices in global dairy markets will stimulate global milk production, and New Zealand dairy farming is not capable of meeting all this new demand. The US dairy industry is well positioned despite historically higher cost structures to emerge as a significant exporter in global dairy markets.

Major land use
Dairy farming is phenomenally successful in New Zealand, and it has grown to become a major land-use across the nation. Milk production grew 47 percent in ten years to reach 1.69 billion kilograms of milksolids in 2012. It now accounts for 21 percent of New Zealand’s grasslands and 46 percent of stock units. On the back of milk production, New Zealand exported a staggering $13.7 billion in dairy products in 2012, accounting for approximately 29 percent of New Zealand’s total goods exported by value. This directly contributed $5 billion to New Zealand’s GDP, more than a third of the total primary sector including farming, horticulture, mining, forestry and fishing. The dairy sector employs approximately 45,000 people in New Zealand, including an estimated 10,000 who are self-employed. It has a key role in the government’s business growth agenda which seeks to double the value of food exports by 2025.

Competitive advantages
New Zealand’s dairy farming has competitive advantages in global markets that have seen it grow to account for over a third of the world’s traded dairy market. These advantages arise from a number of important factors both on- and off-farm. However, New Zealand’s competitive advantage is not a static quality and is enhanced, or eroded, by changes at local and global levels.
There is also a fundamental shift in the expectations of farming which places greater responsibility on farmers for outcomes beyond the farm. This shifting of goal posts is partly a consequence of dairy farming’s own success and growth such that it has significant impacts within New Zealand. It is also due to a growing public awareness of the long-term consequences of unsustainable behaviour.

There are four key areas of responsibility close to the farm, each with critical issues that dairy farming acknowledges and must deal with.

<table>
<thead>
<tr>
<th>Historical competitive advantage</th>
<th>Key changes</th>
</tr>
</thead>
</table>
| Resilient, low-cost dairy farming systems | • Structural increases in both farm operating costs and also farm debt  
• Strong New Zealand currency eroding international competitiveness |
| Progression system that developed experienced, motivated dairy farmers | • Farming system diversification  
• Virtual loss of sharemilking career pathway for new entrants  
• Insufficient agricultural graduates  
• Poor functional literacy and numeracy |
| Plentiful access to fresh water resources | • Restrictions on water use for irrigation and the dairy shed  
• Competition with other water users  
• Key eastern agricultural regions forecast to spend more time in drought¹ |
| Export orientation | • Emergence of other nations targeting dairy export markets where demand is outstripping supply |
| Reputation for product integrity and reliability | • Heightened sensitivity in export markets  
• Exposure to risks of tampering or adulteration of product in-market  
• Exposure to risks of pest and disease threats entering New Zealand  
• Coordination challenges as a consequence of industry fragmentation |
| Growth and capital renewal | • Slower industry growth, leading to less new investment across the value chain |

¹Scenarios of Regional Drought under Climate Change, NIWA 2011
Areas of responsibility | Key issues / challenges
---|---
A duty of care to manage natural resources sustainably, particularly water | • Environmental footprint of dairy farming  
• Catchment capacity to absorb nutrients entering waterways and ground-water  
• Attribution of water quality to land-use  
• Allocation of resources to competing uses, and under different value systems
A duty of care for farmed animals | • Increased awareness of welfare of farmed animals  
• Changing perceptions of welfare  
• Less tolerance for animals bearing the consequences of human failures
A duty of care for people employed on and around dairy farms | • Highly demanding farm work environment and long hours, particularly during calving  
• Health and safety issues arising from physical nature of the work  
• Farming attitudes and work culture
Role in local communities | • A highly mobile workforce, with individuals changing farms and districts on regular basis  
• Pressure on rural community resources and infrastructure

There is a fifth responsibility for dairy farming in New Zealand, which is outside the farm gate. It is a responsibility that comes with dairy farming contributing substantially to New Zealand’s economic welfare, and being a key part of the nation’s business growth agenda. Dairy farmers have a responsibility to plan for sustainable growth. They also have an interest in seeing the industry improve the value of milk produced in New Zealand and increase the value of exported dairy products, to the benefit of all of New Zealanders.

Dairy farmers have a responsibility to plan for sustainable growth. They also have an interest in seeing the industry improve the value of milk produced in New Zealand and increase the value of exported dairy products, to the benefit of all of New Zealanders.
Global Economic Context: After the Global Financial Crisis

The 2009 Strategy for Dairy Farming was launched as the global financial crisis (GFC) unfolded. The preceding years were characterised by widening national deficits and asset bubbles around the world, fuelled by debt financing and speculation. In the aftermath of the crisis whole nations failed under the burden of that debt. The response of nations, and their ongoing economic recovery, has important implications for New Zealand and the dairy industry.

Currency wars

Governments and reserve banks around the world responded to the GFC with measures designed to stimulate their economies. In large part, these strategies amounted to competitive devaluation of currencies in order to boost exports and employment. The US has been particularly active in pursuing ‘quantitative easing’ to this end since 2009. Arguably many Asian economies including China had been actively holding their currency valuations down for the better part of a decade since the Asia financial crisis in 1997. In any case, with the huge US economy entering the fray, this raised the stakes considerably. A critical juncture was reached in 2013 with Japan declaring its intentions to devalue the yen. The global situation now has the hallmarks of a ‘currency war’ where many nations, particularly the largest economies, are all engaged in competitive devaluation.

The problem for smaller economies such as New Zealand is that it is not possible to compete effectively in a global currency war. The result is an appreciating currency which is damaging to exports as goods become relatively more expensive and less competitive, and also because the confidence in markets is eroded. It also raises the spectre of trade protectionism where this can potentially be justified as a form of retaliation against competitive devaluation. The effect on New Zealand’s and other currencies versus the US dollar is highlighted in the figure below. Australia and New Zealand’s currencies have appreciated the most, each being 56 percent higher in the first quarter of 2013 relative to the US dollar than in the first quarter of 2009.

Figure 1. Change in currency value relative to US Dollar 2009-2013

<table>
<thead>
<tr>
<th>Country</th>
<th>Change 2009-2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia (AUD)</td>
<td>+56%</td>
</tr>
<tr>
<td>New Zealand (NZD)</td>
<td>+56%</td>
</tr>
<tr>
<td>Chile (CLP)</td>
<td>+28%</td>
</tr>
<tr>
<td>Philippines (PHP)</td>
<td>+17%</td>
</tr>
<tr>
<td>Brazil (BRL)</td>
<td>+16%</td>
</tr>
<tr>
<td>China (CNY)</td>
<td>+10%</td>
</tr>
<tr>
<td>Britain (GBP)</td>
<td>+8%</td>
</tr>
<tr>
<td>Japan (JPY)</td>
<td>+1%</td>
</tr>
<tr>
<td>EU (EUR)</td>
<td>+1%</td>
</tr>
<tr>
<td>US (USD)</td>
<td>+0%</td>
</tr>
<tr>
<td>India (INR)</td>
<td>-1%</td>
</tr>
<tr>
<td>Argentina (ARS)</td>
<td>-29%</td>
</tr>
<tr>
<td>Australia (AUD)</td>
<td>+56%</td>
</tr>
<tr>
<td>New Zealand (NZD)</td>
<td>+56%</td>
</tr>
</tbody>
</table>

1‘Quantitative Easing’ refers to central banks creating money electronically and using it to purchase assets from banks and other institutions, thereby creating more money for the same amount of goods
2Values calculated from the average of daily exchange rates for first three months of each year
A recovery of the US economy, and a step back from quantitative easing, will allow the New Zealand and Australian currencies to trade at lower levels. Equally, poor economic performance in New Zealand and particularly negative sentiment in key export sectors such as dairy, could also affect the exchange rate. At the point of writing this report, commentators are suggesting that the New Zealander dollar could fall back to a value of 75 US cents.

**Global power shift**

A change in the economic global order is well underway, and this has important implications for New Zealand. While the US remains the largest economy in terms of GDP, with the European Union close behind, these nations are not growing anywhere near as fast as the Asian, South American and Australasian economies. Of the world’s twelve largest economies, China, Indonesia, India, Brazil, Australia and Korea all posted annual GDP growth rates over 6 percent expressed in USD terms. Only Russia came close to this with 5.9 percent growth per annum. The US averaged 2.6 percent while the UK and European economies all contracted over the past five years. Given the preceding discussion of competitive devaluation of the US dollar, this is a sobering result for Europe. These figures represent a shift in the locus of economic power to the Pacific Rim nations.

The Asian Development Bank has forecast that Asian nations will account for 52 per cent of the global economic output, followed by Europe at 18 percent and North America at 16 percent by 2050. Some commentators have observed that this emerging world order is simply a return to the balance of power that existed prior to the industrial revolution when Asia accounted for 60% of the world economy.

New Zealand can benefit from this shift in economic power, and has already moved its trade focus away from Europe and towards Asia and Australia. New Zealand is also well advanced in having free trade agreements in the region. These arrangements now represent the future of trade, with the WTO effectively sidelined.

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**Figure 2. GDP figures for 2013 and GDP compound annual growth rates 2008-2013**

<table>
<thead>
<tr>
<th>Country</th>
<th>2013 GDP (USD Billions, 2013)</th>
<th>5 year CAGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>19,500</td>
<td>2.6%</td>
</tr>
<tr>
<td>China</td>
<td>14,800</td>
<td>14.8%</td>
</tr>
<tr>
<td>Japan</td>
<td>8,300</td>
<td>8.3%</td>
</tr>
<tr>
<td>Germany</td>
<td>5,900</td>
<td>5.9%</td>
</tr>
<tr>
<td>France</td>
<td>3,600</td>
<td>3.6%</td>
</tr>
<tr>
<td>Brazil</td>
<td>860</td>
<td>8.6%</td>
</tr>
<tr>
<td>UK</td>
<td>3,100</td>
<td>3.1%</td>
</tr>
<tr>
<td>Italy</td>
<td>2,800</td>
<td>6.2%</td>
</tr>
<tr>
<td>India</td>
<td>2,200</td>
<td>9.1%</td>
</tr>
<tr>
<td>Canada</td>
<td>1,900</td>
<td>3.6%</td>
</tr>
<tr>
<td>Australia</td>
<td>1,700</td>
<td>8.3%</td>
</tr>
<tr>
<td>Spain</td>
<td>1,500</td>
<td>3.6%</td>
</tr>
<tr>
<td>Mexico</td>
<td>1,100</td>
<td>13.1%</td>
</tr>
<tr>
<td>Korea</td>
<td>1,000</td>
<td>13.1%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>7,600</td>
<td>13.1%</td>
</tr>
</tbody>
</table>

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*International Monetary Fund, World Economic Outlook Database, 2013*

*Asia-2050, Asian Development Bank, 2011*
The end of cheap capital?

Capital is likely to be more expensive towards 2020. In the three decades leading up to 2008 capital became progressively cheaper and more readily available. This was driven by a number of factors including the investment rate of mature economies declining from 26.1 percent of GDP in 1970 to 20.8 percent in 2002. Cumulatively, this gap accounted for US$7 trillion not invested. This made for a substantial decline in capital demand, and contributed strongly to a capital surplus and lower interest rates.

The economic recovery policies employed by central banks since the GFC, including ‘quantitative easing’ and low interest rates, have created even cheaper capital. However, this phenomenon is directly linked to competitive devaluation and can only last as long as those policies are sustained. Other pressures are building for a return to higher interest rates.

The world is now at the beginning of a new global investment boom fuelled by growth in emerging markets across Asia, Latin America and Asia. This boom is driven by demand for housing, infrastructure and services. Projections suggest investment rates should rise, and could exceed 25 percent of GDP by 2030, or more than double levels in 2010.

Rising investment demand will exert upward pressure on interest rates over the next 20 years, and it is unlikely that this will be matched by increased savings rates. A key factor in savings rates is the rebalancing of China’s economy which has been the world’s largest source of savings. Increasing affluence and consumption in China, and an ageing population, will probably see Chinese savings rates fall. Overall, the whole world’s population is aging and this will also tend to reduce global savings as the cost of health care, pensions and other services rises relative to the productive sector.

The outlook for interest rates is that they could rise by as much as 150 basis points. In 2010 it was expected that this could become apparent in real long-term interest rates such as 10-year bonds by 2015 as investors anticipated the structural shift.

The key question for debt holders is how long the current low interest rates can be sustained by central banks around the globe engaged in competitive devaluation. Logic suggests that these policies are not a long-term remedy, and that at some point there will be a return to fundamentals. There are already signs in 2013 of a climb in long-term interest rates. If the major economies agree to scale back their current actions, long-term fixed rates are likely to rise more rapidly. Already there are signs that this is occurring. Inevitably, a shift in long-term rates will then spread to floating rates. These increases will place considerable financial stress on highly leveraged investors.

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4Farewell to cheap capital: The implications of long-term shifts in global investment and savings. McKinsey Global Institute, Dec 2010
Global Context: Other Priorities

Global priorities extend beyond the financial crisis and its consequences. These concerns shape international policy and trade, affecting New Zealand and the dairy industry alike. The World Economic Forum provides an analysis of global risks and challenges to drive collaborative efforts in shaping the future, and building a resilient global society. The biggest global risks in terms of likelihood and impact are outlined in the table below\textsuperscript{7,8}.

Chronic fiscal imbalances and water supply crisis are considered to be in the top risk categories for both likelihood and impact. This is unchanged from 2012. Risks of rising greenhouse gas emissions, major systemic financial failure and severe income disparity are also rated as having a high likelihood of occurring and a high impact if they do occur. Of these, a major systemic financial failure would have the greatest impact. Clearly, the world is still reeling from the global financial crisis.

The work also highlights the interdependencies between each risk, and suggests that individual countries must develop resilience in both economic and environmental systems at the same time. This is needed so that adverse events in one sphere do not cascade into negative consequences across all other areas.

Table 1: Global risks for 2012 and 2013

<table>
<thead>
<tr>
<th>Top 5 Impact</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Major Systemic Financial Failure</td>
<td>Major Systemic Financial Failure</td>
</tr>
<tr>
<td>2</td>
<td>Water Supply Crisis</td>
<td>Water Supply Crisis</td>
</tr>
<tr>
<td>3</td>
<td>Food Shortage Crisis</td>
<td>Chronic Fiscal Imbalances</td>
</tr>
<tr>
<td>4</td>
<td>Chronic Fiscal Imbalances</td>
<td>Diffusion of Weapons (WMD)</td>
</tr>
<tr>
<td>5</td>
<td>Extreme Volatility in Energy and Agricultural Prices</td>
<td>Failure of Climate Change Adaption</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Top 5 Likelihood</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Severe Income Disparity</td>
<td>Severe Income Disparity</td>
</tr>
<tr>
<td>2</td>
<td>Chronic Fiscal Imbalances</td>
<td>Chronic Fiscal Imbalances</td>
</tr>
<tr>
<td>3</td>
<td>Rising Greenhouse Gas Emissions</td>
<td>Rising Greenhouse Gas Emissions</td>
</tr>
<tr>
<td>4</td>
<td>Cyber Attacks</td>
<td>Water Supply Crisis</td>
</tr>
<tr>
<td>5</td>
<td>Water Supply Crisis</td>
<td>Management of Population Ageing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Top 5 Overall\textsuperscript{9}</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Water Supply Crisis</td>
<td>Chronic Fiscal Imbalances</td>
</tr>
<tr>
<td>2</td>
<td>Chronic Fiscal Imbalances</td>
<td>Water Supply Crisis</td>
</tr>
<tr>
<td>3</td>
<td>Food Shortage Crisis</td>
<td>Rising Greenhouse Gas Emissions</td>
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<tr>
<td>4</td>
<td>Severe Income Disparity</td>
<td>Major Systemic Financial Failure</td>
</tr>
<tr>
<td>5</td>
<td>Extreme Volatility in Energy and Agricultural Prices</td>
<td>Severe Income Disparity</td>
</tr>
</tbody>
</table>

\textsuperscript{7}Global Risks 2012, Seventh Edition, World Economic Forum  
\textsuperscript{8}Global Risks 2013, Eighth Edition, World Economic Forum  
\textsuperscript{9}Inferred from Likelihood and Risk
Since 2009, the recovery in global dairy markets has been characterised by some historically high average prices, but also high volatility. This is outlined in the price history for traded milk powders shown in the figure below. Underlying this price volatility are fundamental factors such as regional climatic events. However the market effect of these events is amplified by historically low levels of stocks held around the world, and a generally smaller ‘buffer’ relative to the increasing size of the world dairy trade as a proportion of total production.

The global outlook for dairy markets is extremely positive insofar as strong demand growth is forecast to continue over the next decade, particularly in Asia. Forecast global volume demand growth of at least 100 billion litres by 2020 represents more than five times New Zealand’s total milk production in 2012. This demand growth is forecast to outstrip supply growth in the key markets of Asia, India, Middle East and North Africa. China and India in particular represent significant market opportunities for dairy exports. On the strength of these forecasts, there is a reasonable expectation of high prices in global dairy markets. New Zealand’s own Ministry for Primary Industries’ forecast is for milk price trending over $8 per kilogram of milk solids by 2015, although a slight correction is expected in 2016.
High expected demand and prices in global dairy markets have important consequences as they stimulate milk production. New Zealand dairy farming is not capable of increasing production sufficient to meet the entire new demand. This stimulus is also occurring as the major dairy production blocs of the US and European Union (EU) are re-orienting themselves towards export markets. For the EU in particular, this will also coincide with a significant restructure in dairy price support and trade protection policy through Common Agricultural Policy reform in 2015. Critical in this reform is the expiry of production quotas, which will free European dairy industries to increase production and develop export markets.

According to a 2012 report\textsuperscript{13} the growth in EU exports will be lead by cheese and skim milk powder, mostly on rising demand from North Africa, Middle East, China and other countries in South–East Asia. However, it is not clear how rapidly EU production will expand and at the moment it is less than EU quotas.

The ability of dairy producing regions to respond to economic signals and increase exports is contingent on being organised for exports. This means having both the capacity in farming systems to increase production economically, as well as large-scale systems for assurance of meeting export standards in the finished product. Most European nations’ dairy farms are characterised by a significant proportion of small herds (i.e. less than 100 cows) more orientated towards domestic markets. This suggests Europe still has significant industry restructuring ahead of it at farm level. South American nations have a typically low cost position and moderately large herds, but currently lack infrastructure and scale to compete at the same level as New Zealand. Anecdotally, alternative land-use such as cropping soya beans provides attractive alternatives in countries such as Argentina. By comparison, the US is already well positioned in dairy farming despite historically higher cost structures. A cross section of herd characteristics and 2010 production costs for dairy producing nations is shown below\textsuperscript{14}.

\begin{table}[h]
\begin{tabular}{|l|c|c|c|c|c|}
\hline
Country & Cows (million) & Average herd size & Typical large herd size & % of milk estimate from large herds & Production Cost (USD / 100kg ECM, 2010) \\
\hline
Ukraine & 2.59 & 1.4 & 540 & 20% & 20.4 \\
Uruguay & 0.43 & 71 & 380 & 5% & 20.9 \\
Belarus & 1.48 & 22 & 1,095 & 75% & 23.4 \\
Argentina & 1.69 & 157 & 400 & 15% & 23.7 \\
New Zealand & 4.53 & 376 & 975 & 40% & 29.1 \\
Chile & 0.43 & 27 & 1,020 & 25% & 32.1 \\
Russia & 8.95 & 2.8 & 1,060 & 20% & 32.9 \\
Brazil & 23.51 & 20 & 570 & 5% & 33.9 \\
USA & 9.19 & 146 & 2,220 & 60% & 34.6 \\
China & 6.70 & 5.5 & 340 & 30% & 40.9 \\
Germany & 4.19 & 46 & 650 & 10% & 43.8 \\
\hline
\end{tabular}
\caption{Structure and cost competitiveness of international dairy herds}
\label{tab:structure}

\textsuperscript{13}Prospects for Agricultural Markets and Income in the EU 2012-2022, EC for Ag and Rural development, Dec 2012

\textsuperscript{14}Sourced from DairyNZ Economics group analysis, IFCN data

\end{table}
The US is notable for its relatively large herds, and has the potential to organise these in developing a competitive dairy export capacity. Higher world dairy prices and a weak US currency have already seen US dairy exports rise dramatically in the past decade from US$1.67 billion in 2005 to US$5.21 billion in 2012. This trebling of dairy export returns is based on approximately twice the total export tonnes. This represented over 14 percent of total US milk solids in 2012. US export growth has not been in the traditional export growth products favoured by New Zealand. Instead of milk powders, the main US export growth has come from whey products, lactose, cheese and liquid formats. This reflects the structure of the US industry, particularly a domestic surplus of whey product streams from cheese manufacturing. Anecdotally, the US industry has been able to exploit export markets where low-cost whey powder is substituted for skim milk powder in dairy drinks.

US commentators predict that there will be continued growth of US dairy exports. The domestic U.S. market for dairy products is regarded as mature, and there is a slowdown in growth of per capita cheese consumption. Consequently, dairy exports are an important strategy to absorb a large share of increases in milk production. Incidentally, US commentators also expect climate change to affect global supply, particularly for New Zealand where En Nino / El Nina weather cycles will create volatility, and opportunity.

Tom Suber, President of the US Dairy Export Council, recently made the following points:

- U.S. dairy export growth has been phenomenal over the last few years in a variety of markets, especially in Asia, and our share, in some markets, exceeds that of New Zealand.
- Increasing use of supplemental feed is undermining New Zealand’s longstanding cost advantage as it moves away from primarily pasture-based production due to geographic and environmental constraints.
- Through dairy farming investment in China, South America and elsewhere, New Zealand itself has acknowledged its inability to build domestic milk output quickly enough to meet global demand.
- Global growth in dairy demand is expected to continue in a way that supports prices at historically elevated levels.
- New supply growth out of Oceania and Europe will likely remain unable to satisfy that demand, leaving a sizeable gap (what the Innovation Center and Bain & Co. call “the latent demand gap”) that the United States is poised to fill.

US dairy export growth has taken place in the context of US subsidies for biofuels. Following a long history of US subsidies for bio-fuels, the Energy Independence and Security Act (EISA) passed in late December of 2007 ratcheted up the target for biofuels considerably. Hundreds of US state and federal subsidies in the USA are now worth half or more of the retail price of ethanol and biodiesel. This has inflated the value of corn in particular, and hence increased the cost of feed for alternate uses such as dairy farming. Any policy change which reversed this effect and lowered the cost of feed would make US dairy farming even more competitive and accelerate the US export push into world dairy markets.

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16USDA, James Morrison Consulting Analysis
17AgMRC, Agricultural Marketing Resource Centre, Iowa State University, 2012
18Cheese Market News, January 2013
19State and federal subsidies to biofuels: magnitude and options for redirection; Koplow D, Int. J. Biotechnology, Vol. 11, Nos. 1/2, 2009
The Significance of Dairy Farming in New Zealand

Growth of dairy farming

Dairy farming is phenomenally successful in New Zealand. A relatively high return on assets has driven significant conversion to dairy farming, and consequently it has grown to become a major land-use across the nation. The New Zealand dairy herd now contains over 900,000 more cows than a decade ago, occupying an additional 240,000 hectares. Accordingly, it accounts for 21 percent of New Zealand’s grasslands and 46 percent of stock units.

Overall, milk production has grown 47 percent in ten years to 2012 to reach 1.69 billion kilograms of milksolids. This growth has been partly achieved through expansion into relatively new areas, predominantly in the South Island. While the North Island has increased production at a rate of approximately three percent per annum to 2012, the South Island has increased production at closer to nine percent per annum over the last five years. This means the South Island’s share of milk production has increased from 26 percent to 39 percent. It also means that dairy farming is now present in virtually every region, and accordingly operates in a diverse range of soils and climatic conditions.

![New Zealand Milk Production](chart.png)

**Figure 5:** Growth of dairy production in South and North Islands

<table>
<thead>
<tr>
<th>Industry Statistics</th>
<th>1992</th>
<th>2002</th>
<th>2012</th>
<th>10 year growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total effective hectares (mil ha)</td>
<td>1.05</td>
<td>1.40</td>
<td>1.64</td>
<td>17%</td>
</tr>
<tr>
<td>Dairy farms as % of grasslands</td>
<td>11%</td>
<td>17%</td>
<td>21%</td>
<td></td>
</tr>
<tr>
<td>Dairy cows (mil)</td>
<td>2.44</td>
<td>3.69</td>
<td>4.63</td>
<td>25%</td>
</tr>
<tr>
<td>Dairy cows as % of stock units</td>
<td>23%</td>
<td>35%</td>
<td>46%</td>
<td></td>
</tr>
</tbody>
</table>

**Table 3:** Growth of dairy farming as a significant land-use in New Zealand

While the North Island has increased production at a rate of approximately three percent per annum to 2012, the South Island has increased production at closer to nine percent per annum over the last five years.

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20 New Zealand Dairy Statistics 2011-2012; NZ Statistics (Infoshare); Livestock includes only cattle, sheep and deer

21 This metric is based on Effective Hectares (NZ Dairy Statistics) and Total Grasslands (Statistics New Zealand)

22 DairyNZ Economics Group; note that ‘stock units’ are used to provide a fair comparison across species

23 Note that 2012 was a favourable production season
On the back of milk production, New Zealand exported a staggering $13.7 billion in dairy products in 2012, accounting for approximately 29 percent of New Zealand’s total goods exported by value. This directly contributed $5 billion to New Zealand’s GDP, more than a third of the total primary sector including farming, horticulture, mining, forestry and fishing.

The sector’s influence extends well beyond its direct impacts. Dairy is closely intertwined with the rest of the economy. This includes the jobs it delivers, the income that these workers earn, its links to supplying firms, the effects of rural economic growth on urban centres, the tax revenue it provides and the public services that can be funded from this tax revenue.

The dairy sector employs approximately 45,000 people in New Zealand, including an estimated 10,000 who are self-employed. This does not include those employed in supporting industries. It is a particularly important employer in districts such as South Taranaki where it accounts for more than 1 in every 5 jobs.

The dairy industry is also crucial to New Zealanders’ high standards of living. The Legatum Institute currently ranks New Zealand fifth out of 142 nations for prosperity, which includes such things as ‘per Capita GDP’ (where New Zealand currently ranks 27th). Dairy’s contribution to GDP is not the only consideration. Dairy exports narrow the current accounts deficit, reducing national debt and consequently the nation’s risk premium. In the absence of a dairy industry, the nation’s $620 million trade surplus in 2012 would have been a $13 billion deficit resulting in increased borrowing costs.

**Business Growth Agenda**

The government’s Business Growth Agenda includes the ambitious goal to increase the ratio of exports to GDP from 30 percent to 40 percent by 2025. This sets a specific goal to double agricultural sector exports, which for dairy would mean adding another $13.7 billion in dairy exports. This could be achieved by increasing the volume of milk produced for export by another 700 million kilograms of milksolids, while at the same time increasing the average export value from $8.50 to $12 per kilogram.

### Table 4: Economic significance of New Zealand dairy exports

<table>
<thead>
<tr>
<th>Industry Statistics</th>
<th>1992</th>
<th>2002</th>
<th>2012</th>
<th>10 year growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy Export Value (NZ $millions)</td>
<td>2,904</td>
<td>7,453</td>
<td>13,659</td>
<td>83%</td>
</tr>
<tr>
<td>Dairy Percent of Export Receipts</td>
<td>16%</td>
<td>23%</td>
<td>29%</td>
<td></td>
</tr>
</tbody>
</table>

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24MPI, Statistics New Zealand.
26Dairy’s role in sustaining New Zealand, NZIER, Dec 2010
27Dairy products only, excludes live animal and meat exports
28Total Merchandise Exports Plus Re-Exports

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Figure 6: Scenarios for doubling the value of dairy exports by 2025
No reasonable milk growth scenario is proposing to double milk production by 2025, or even a figure approaching that. The business growth agenda therefore implies that the value per unit of dairy exports must increase significantly, between 50% and 100% above 2012 levels.

There have been numerous calls for the New Zealand dairy industry to increase the “value-added” component of dairy exports. In fairness, the dairy companies are committed to doing this but operate in a commercial reality where there is significant bulk demand for standard milk powders and relatively less opportunity to easily export high-value niche products. The key point here is that New Zealand does not ‘feed the world’, instead only producing enough calories to feed around 20 million people. In dairy specifically, it produces enough for 165 million people each consuming the average 103 kilograms of dairy products per annum29.

To provide an idea of scale, the middle class populations of China and India are growing and estimated at around 300 million and 250 million respectively. Japan’s middle class is relatively stable at around 110 million. Indonesia’s middle class is estimated at 50 million. These middle classes are sufficiently affluent to include high-value dairy products in their diets. However, of these 800-plus million consumers, not all consumption will be of New Zealand product and not all will be of high-value. A large component of dairy consumption in these key markets will be supplied domestically. Also, much will comprise liquid milk, or as commodity ingredients included in other foods, and will be manufactured and marketed by large consumer food companies using dairy ingredients but capturing the value within their own brands. The challenge is for New Zealand’s dairy exporters to carve out niches where it has a competitive advantage and can maintain a higher value.

The Riddett institute published a “call to action” in response to the Business Growth Agenda which argues that it equates to a ‘transformation’ of the food sector and will require the following strategies30:

1. Selectively and profitably increase the quantities and sales of the current range of agri-food products.

2. Profitably produce and market new, innovative, high value food and beverage products.

3. Develop value chains that enhance the integrity, value and delivery of New Zealand products and increase profits to producers, processors and exporters.

4. Become world leaders in sustainability and product integrity.

29World Dairy Situation, International Dairy Federation, Brussels, 2010
30A Call to Arms, Riddet Institute, June 2012
New Zealand Dairy Farming Competitiveness

New Zealand’s competitive advantage in dairy farming is evident in its growth to become New Zealand’s largest export sector with over $13 billion in exports per annum. New Zealand’s dairy industry is globally significant despite being less than three percent of global supply. New Zealand’s competitive advantage arises from a number of important factors both on- and off-farm:

- Resilient, low-cost dairy farming systems
- Skilled and motivated farm managers and staff
- Plentiful access to fresh water resources
- Export orientation
- Reputation for product integrity and reliability
- Growth and capital renewal

New Zealand’s competitive advantage is not a static quality. It is enhanced, or eroded, by changes at local and global levels. The table below highlights the key changes affecting New Zealand’s competitive position, and the drivers behind these.

<table>
<thead>
<tr>
<th>Historical competitive advantage</th>
<th>Key changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resilient, low-cost dairy farming systems</td>
<td>• Structural increases in both farm operating costs and also farm debt</td>
</tr>
<tr>
<td></td>
<td>• Strong New Zealand currency eroding international competitiveness</td>
</tr>
<tr>
<td>Progression system that developed experienced, motivated dairy farmers</td>
<td>• Farming system diversification</td>
</tr>
<tr>
<td></td>
<td>• Virtual loss of sharemilking career pathway for new entrants</td>
</tr>
<tr>
<td></td>
<td>• Insufficient agricultural graduates</td>
</tr>
<tr>
<td></td>
<td>• Poor functional literacy and numeracy</td>
</tr>
<tr>
<td>Plentiful access to fresh water resources</td>
<td>• Restrictions on water use for irrigation and the dairy shed</td>
</tr>
<tr>
<td></td>
<td>• Competition with other water users</td>
</tr>
<tr>
<td></td>
<td>• Key eastern agricultural regions forecast to spend more time in drought31</td>
</tr>
<tr>
<td>Export orientation</td>
<td>• Emergence of other nations targeting export markets where demand is outstripping supply</td>
</tr>
<tr>
<td>Reputations for product integrity and reliability</td>
<td>• Heightened sensitivity in export markets</td>
</tr>
<tr>
<td></td>
<td>• Exposure to risks of tampering or adulteration of product in-market</td>
</tr>
<tr>
<td></td>
<td>• Exposure to risks of pest and disease threats entering New Zealand</td>
</tr>
<tr>
<td></td>
<td>• Coordination challenges as a consequence of industry fragmentation</td>
</tr>
<tr>
<td>Growth and capital renewal</td>
<td>Slower industry growth, leading to less new investment across the value chain</td>
</tr>
</tbody>
</table>

Table 5: Competitive advantages

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31Scenarios of Regional Drought under Climate Change, NIWA 2011
The following sections outline most of the key areas relevant to New Zealand’s competitive advantage. Emerging competitors to New Zealand’s export orientation have already been covered in the preceding section. Access to water resources will be covered in a subsequent section under ‘responsibilities’.

**Competitive farm systems**

New Zealand dairy farming is traditionally based on extensive grazing of pastures. Pasture still provides the least expensive feed for dairy cows and remains the foundation of most farm systems. Even where significant supplements are used, this means that most milk production is seasonal according to pasture growth, with the season commencing in July/August and ending in April/May.

The advantage of the New Zealand system has been a relatively low farm operating cost structure and resilience to volatile farming, dairy market and currency market conditions. Historically, this was a matter of survival for the industry. In recent decades it has been a strategic advantage driving the growth of dairy farming and hence New Zealand’s dairy processing and export businesses.

The original 2002 Fonterra Strategy included “Lowest Cost Commodity Supplier” as its first theme recognising the importance of a low-cost position to the whole industry.

Despite significant changes, New Zealand dairy farming remained cost-competitive through to 2010. This is shown in the figure below, where New Zealand is lower-cost than major competing exporters of either the USA or European Union. The higher-cost nations tend to set the ceiling for international prices, creating greater margin opportunities for other exporters. However, Australia had moved to an apparently lower-cost position than New Zealand by 2010. It is also notable that the South American nations and the Ukraine remained unable to capitalise on their cost advantages and were relatively small dairy exporters.

Apart from changes in cost structure, one of the main threats to New Zealand’s cost competitiveness is currency appreciation. The earlier section of this report highlighted a 56 per cent increase in the New Zealand dollar relative to the US dollar as a consequence of competitive devaluation. Even since 2010, the New Zealand’s currency continued to increase. Hence the cost competitiveness outlined in the figure below has been eroded by this trend.

![Figure 7: 2009 to 2011 average dairy export volumes and cost of production](image)

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2²DairyNZ Economics Group, IFCN Data (for the 2009-2011 period, using the appropriate FX rates at that time)
2²Note: The milk cost calculation includes ‘expenses from the P&L (cash costs, depreciation, etc) and opportunity costs for farm-owned factors of production (family labour, own land, own capital)’. i.e. for unpaid family labour, “…the wage rate per hour for a qualified fulltime worker in the region multiplied by with the working time of a skilled worker was used”.
Dairy farming profitability
Dairy farm operating profits from year to year are highly dependent on the payout. Commodity market volatility increased considerably from 2007-08 leading to increased volatility in milk prices. This affected farm profitability as did variations in seasonal weather conditions. Record high milk prices in 2007-08 were followed by the particularly poor 2008-09 season in which the average dairy farm made a loss in terms of business profit after adjustments, off-farm income, rent and interest expenses. The average dairy farm then returned to positive business profits in the following seasons. Over this five year period average returns on dairy assets were above 4 percent.

The importance of efficiency
Dairy farms must be profitable and maintain a return on assets superior to alternative land use in order to be economically sustainable. Efficiency is a key factor in the profitability of dairy farming. For example, the ability to efficiently harvest pasture is one of the best determinants of profitability across all farm systems. This operational efficiency comes down to the skill of the farmer and farm staff. It is highly relevant to note that there is a wide range of profitability within each type of farm system, and that this range is similar across all farm systems. This highlights the extent of the opportunities for New Zealand dairy farming to improve profitability, whatever farm system is being considered.

Just as relevant as profitability is the resilience of farming systems. This means the capacity to cope with volatility in both markets and also physical conditions. A recent study into dairy farm resilience identifies that efficiency is also the key to resilience. This refers to both technical efficiencies (such as milk per hectare) and financial efficiencies (such as return on assets). The same study found that farming systems in the middle of the range, i.e. system three, were somewhat more resilient than either low-input or high-input pasture based systems, as they were able to achieve better short-term optimisation as well as long-term adaptability.

DairyNZ has developed an overall measure of gains in efficiency called “Profit from Productivity” which is now reported annually for the industry. This was one of the key industry outcomes specified in the 2009 strategy. New Zealand dairy farming is continuing to make gains in profit through productivity, which essentially means efficiently producing more outputs relative to inputs. The average rate of gain since the 1999 season has been approximately $50 per hectare per year.

Changes in farm finances
New Zealand dairy farming is undergoing significant changes. These include marked increases in land value which is driving other transitions such as more highly geared financial structures, farm system change towards higher input systems, and an upwards shift in operating costs. These changes are relevant to the competitiveness and resilience of New Zealand dairy farming.

New Zealand dairy farming tends to rapidly capitalise actual and anticipated productivity gains into the value of land. This had the result of increasing land values significantly throughout much of the previous decade.

<table>
<thead>
<tr>
<th></th>
<th>2007-08</th>
<th>2008-09</th>
<th>2009-10</th>
<th>2010-11</th>
<th>2011-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Payout</td>
<td>7.67</td>
<td>5.14</td>
<td>6.37</td>
<td>7.89</td>
<td>6.40</td>
</tr>
<tr>
<td>Operating profit per hectare</td>
<td>$2,794</td>
<td>$737</td>
<td>$1,957</td>
<td>$2,810</td>
<td>$2,624</td>
</tr>
<tr>
<td>Business profit per hectare</td>
<td>$1,758</td>
<td>-$167</td>
<td>$711</td>
<td>$1,471</td>
<td>$1,386</td>
</tr>
<tr>
<td>Operating return on dairy assets</td>
<td>6.9%</td>
<td>1.6%</td>
<td>4.5%</td>
<td>6.5%</td>
<td>6.2%</td>
</tr>
</tbody>
</table>

Table 6: New Zealand dairy farm operating profit and returns

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34For example, the Waikato drought  
35New Zealand Dairy Statistics, LIC, 2011-12  
36DairyNZ Economic Survey 2011-12: Owner-Operators  
37DairyNZ analysis  
fuelled also by ready access to capital. However, there was a correction in 2009 in the wake of the global financial crisis when banks tightened their lending criteria. Despite this adjustment, land prices remain at historically high levels, with average 2011 land prices being 80% higher than in 2002.

The increase in land values has been accompanied by a significant increase in farm debt. New Zealand dairy farm debt per kilogram milksolids (kgMS) more than doubled from $9.26 per kgMS in the 2002 season to $21.65 per kgMS in the 2010 season. Strong milk prices and high profits in the 2011 season allowed some farms to make some principal repayments. This coupled with highly indebted farmers exiting (or selling a farm in their portfolio and applying the sale proceeds towards debt reduction) helped reduce term liabilities to $20.44 per kgMS. However, farm debt is again rising. In any case, assuming a conservative cost of debt of 7 percent p.a., the average dairy farm carries interest costs of about $1.40 per kgMS.

This level of debt servicing is approximately twice today what it was a decade ago.

The distribution of dairy farm debt is not uniform. Approximately 20 percent of farms have virtually no debt. Another 20 percent of farms carry 45 percent of the debt. These highly-indebted farms have accumulated debt of more than $30 per kgMS and are hence carrying more than $2 per kgMS in interest costs. Compounded by rising on-farm costs, these farms are highly vulnerable to a fall in milk prices, increase in interest rates, or a particularly poor year due to weather conditions such as drought.

### Table 7: NZ dairy farm sales 2002-2011

<table>
<thead>
<tr>
<th>Calendar year:</th>
<th>2002</th>
<th>2011</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farms sold</td>
<td>179</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td>Av $ sale</td>
<td>$14,512</td>
<td>$26,171</td>
<td>+80%</td>
</tr>
<tr>
<td>Price/Ha</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Quotable Value

**Figure 8:** NZ dairy land value in sales 2002-2011
Farm system change

The use of supplementary (i.e. not pasture) feed on New Zealand dairy farms has increased, including supplementary feeds imported from overseas. This is fundamentally changing the typical farm system. Over the last decade the proportion of both high input and medium input systems has doubled, while low input systems have nearly halved.

<table>
<thead>
<tr>
<th>Production System</th>
<th>Low-input</th>
<th>Medium-input</th>
<th>High-input</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-01</td>
<td>70%</td>
<td>17%</td>
<td>13%</td>
</tr>
<tr>
<td>2010-11</td>
<td>40%</td>
<td>35%</td>
<td>25%</td>
</tr>
<tr>
<td>Change</td>
<td>-30%</td>
<td>+18%</td>
<td>+12%</td>
</tr>
</tbody>
</table>

Table 8: Change in New Zealand dairy farm production Systems 2001-2011

Supplementary feeds are allowing dairy farmers to increase milk production beyond their capacity to grow pasture on their own farms. This is an understandable choice in the context of high land-prices. It is also reducing dairy farming’s exposure to uncertainty in on-farm feed production volumes. However, at the same time it has increased exposure to external price volatility in feed markets, and driven changes to the operating cost structure. In many cases, it also requires additional capital expenditure on items such as feed pads and in-shed feeding systems.

Related to the use of supplementary feeding, is the introduction of housed systems for dairy cattle. While only a handful of European-style free stall barns with cut-and-carry systems have been developed, there are an increasing number of other off-pasture systems. These facilities are capital intensive and tend to drive a greater focus on production per cow rather than production per hectare.

As New Zealand dairy farming transitions from a relatively ubiquitous pastoral farming approach to a diverse range of farming systems, the demands on management also become more diverse. This is relevant to the ability of farm managers and staff to readily progress between different farms and consistently achieve the same levels of performance. It also affects New Zealand’s image of pasture-based farming.

Increased operating costs

Average dairy farm operating expenses increased by $1.28 per kgMS in the high milk price year of 2007-08. A large proportion of the increased expenditure was from feed related costs such as increased supplementary feed use, grazing off and fertiliser use. These costs remained at

![NZ Farm Operating Expenses and Milk Price](image)

Figure 9: Rise in farm operating costs 2002-2011

Footnote: Low Input (systems 1 & 2) have less than 10% imported feed; Medium Input means 10% to 20% imported feed (system 3), and High input means more than 20% imported feed (Systems 4 and 5)
these levels, and instead of being around $3.50/kgMS, they now average around $4.50/kgMS. This has loaded an extra $1.18/kgMS costs onto dairy farms and coupled with the extra costs incurred to service the higher average debt levels (average $0.70 per kgMS), has largely eroded gains in milk pricing.

Nationally there have been key changes in dairy farm production, financial structure and performance between 2002 and 2012. Some of these key changes are:

- National milk production increased by 46 percent
- Net dairy cash income increase 81 percent (24 percent per kgMS)
- Term liabilities for the sector increased 300 percent (200 percent per kgMS)
- Dairy Operating Expenses (including rent) increased 90 percent (30 percent per kgMS)
- Average financial surplus decreased from $1.56 to $1.18 per kilogram of milksolids

Growth in farm operating expenses and debt servicing has exceeded growth in income despite substantial increases in payout. To understand this, New Zealand dairy farming in 2012 can be analysed in two parts comprising “zero milk growth from 2002” plus “marginal milk growth from 2002 to 2012”. The zero growth component experienced a change in operating costs arising from increases in the cost of farm inputs (no productivity improvements accrued to this part), but interest decreased with lower lending rates. Gross farm revenue also increased with higher payouts. This created a surplus of $1.57 per kilogram of milksolids. In comparison, marginal milk had lower operating expenses due to significant productivity improvements but interest costs increased owing to a significant increase in term liabilities (debt). Overall, despite the increase in gross farm revenue, the marginal milk made a net loss in 2012. This is represented on a ‘per kilogram of milk solids’ basis in the following figures, which demonstrate that the increase in dairy farm term liabilities since 2002 is the key factor in diluting profits from dairy farming in 2012.
Human capability

Skilled and motivated people have driven the success of dairy farming. However, dairy farming’s growth and diversification, as well as economic changes, have important implications for the availability of skilled and motivated people to operate New Zealand dairy farms in the future. Critically, historical systems of recruitment and development appear to be no longer adequate to meet the needs of the industry. At the same time, the complexity of managing dairy farms is increasing, with more demands in areas from staff management to environmental compliance.

The New Zealand dairy industry currently directly employs around 20,000 people on farm. 62 percent of these positions are for farm assistants, with farm managers comprising 13 percent.41 Approximately 3,000 new staff enter the industry each year to replace people leaving and to fill new positions created by industry growth. Also, as the average period of tenure for farm staff is only 1.6 years, this equates to 11,400 jobs being vacated and filled annually. The estimated cost of this turnover to the industry is $146 million, not including the loss of experience.

The key dairy growth regions in New Zealand coincide with relatively low unemployment rates,42 particularly in the South Island. These regions are considerably removed from the large urban centres. One solution has been found in immigrant labour, which now comprises 23 percent of dairy farm staff.43 More than a third of this group hails from the Philippines.

The sharemilking system of progression historically developed motivated and experienced people to operate dairy farms. This is evidenced by sharemilkers having a track record of higher production.44 That system worked particularly well when the industry was characterised by a large number of relatively small herds, and the value of the herd was sufficient to provide a bridge to farm ownership. The industry is now characterised by fewer, larger herds and a significant gap between the value of the herd and the value of land. In the 2010 season, just 35 percent of farms were managed by sharemilkers, of which only 20 percent were Herd Owning Sharemilkers (HOSM). Anecdotally, there are now fewer 50/50 sharemilking roles available. The increasing prevalence of farm ownership by corporates, syndicates and other off-farm entities has also driven an increase in the proportion of salaried farm managers and lower-order sharemilkers or equity-share arrangements.

Many new entrants to dairy farming no longer have expectations of owning a farm. In 1996 seventy per cent of sharemilkers intended to purchase their own farm once completing their sharemilking career. By 2011 this had reduced to 55 per cent. This shift in career expectations is changing the motivations for new entrants.

Dairy farming skills are developed through a combination of education and experience. A 2012 study found that less than 40 percent of Farm Managers have production and business qualifications at the target level.45 There is also evidence suggesting that farm owners ‘make do’ with the people available, and may not even be aware of skill gaps. For example, Farms and Operations managers would both be expected to be working to a financial budget and to understand the farm financial goals. However, nearly 60 percent of managers have no knowledge of their farm financial goals and 13 percent have no knowledge of the milksolids production goals either.

The growth of dairy farming, expansion of herds, and a relatively high rate of people exiting, has created further issues. In mid-level management roles, low staff tenure particularly for farm assistants (77 percent with three years or less experience) and herd managers (57 percent with three years or less experience) means a large proportion of farms simply cannot have the experienced staff necessary for good understanding and operation of the farm system. The diversity of farm systems is a compounding factor.

Many staff and managers in the dairy industry also have no formal academic qualifications. Although no recent

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41 An assessment of the balance in demand and supply of skilled employees in the on-farm workforce, DairyNZ, 2011
42 NZ Statistics - Household Labour Force Survey, September 2010
43 Survey, Tipples & Greenhalgh (2011)
44 Ensuring a viable progression path in the dairy industry, AgFirst and Federated Farmers, J. Allen et al, 2012
Currently, New Zealand law (Animal Products Act 1999) permits any exporter registered with MPI to export dairy products. These rules also apply to internet sales. The purpose of the Animal Products Act 1999 is to ensure that anyone involved in the production, processing, distribution and sale of animal products – including dairy products – understands their responsibilities to ensure product is fit for its intended purpose. The government issues a range of export certificates to meet the various requirements of importing countries, and has official assurance specifications and programs for the manufacture of dairy products.

The trust in New Zealand systems and assurances has positive spinoffs through favourable agreements negotiated with markets around the world. Recently arrangements with the European Union reduced border testing of most New Zealand food imports from 2 percent of imports to just 1%. This provides a cost advantage to New Zealand exporters.

Historically, the New Zealand Dairy Board had exclusive rights to exporting dairy products and worked closely with government to protect New Zealand’s reputation for product integrity. However, with increasing fragmentation of the dairy processing and marketing industry, these systems are proving more difficult to enforce beyond the large, established companies who are committed to food safety in any case. Part of the issue is that approved parties can provide products on a contract-manufacturing basis to other companies, and these may then be exported under any brand. Also, some smaller operators are simply purchasing product and exporting it without certificates. MPI is currently working with the New Zealand Customs Service to put a halt to these unlawful exports.

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46Declared by David Lange in 1987, this erroneous statement continued to haunt the industry
47New Zealand ranks first equal with Singapore and Denmark in Transparency International’s 2010 Corruption Perceptions Index
Also in China and other nations, counterfeit New Zealand infant formula products are a significant problem. Out of the 200 New Zealand infant formula brands sold in China, only 20 brands from six New Zealand infant formula producers are apparently genuine. These counterfeits can be difficult to police in foreign jurisdictions. While New Zealand ranks first equal for its low level of corruption in the public sector (score of 90) as measured by Transparency International, this is not the case elsewhere in the world. For example, China ranked 80th with a score of 39. Interference with products in the supply chain is also an increasing problem with incidents in the past year, including 165kg of cocaine found in a New Zealand shipping container of milk powder unloaded in Algeria.

New Zealand’s trade is vulnerable to foreign media. A series of exposés aired on Chinese state-owned television in May 2013 cast doubt on the safety of the New Zealand’s infant formula industry, drawing particular attention to perceived gaps in the assurance system, the existence of counterfeits, questionable practices in contract manufacturing, and unlawful traders. This is a major concern for New Zealand’s dairy industry, which exports more than $2 billion annually to China.

Aside from the multiple challenges around food safety, there is also a need for New Zealand’s dairy industry to focus more on product integrity rather than just food safety. This was highlighted by the 2012 discovery that some New Zealand milk was tainted with small amounts of a chemical used as a fertiliser and nitrate inhibitor on some farms. New Zealand officials and industry held the view that these levels were so small they did not present a health risk to consumers. However, the Chinese government and media did not treat the issue lightly, and were reportedly unimpressed by the New Zealand stance, especially delays in communication and no product recalls. China’s Government has now announced it will step up monitoring of foreign infant formula products and “nurture” Chinese-made baby milk brands.

Ultimately, the responsibility for product integrity falls to dairy manufacturers and exporters, and to government. As the manufacturing and exporting sector continues to fragment, increasingly with foreign-owned participants, the industry either needs strong self-governance to manage the risks involved, or greater government involvement. Dairy farmers must take an active interest in how the industry on which their livelihood depends is coordinated, and how the industry can enforce binding requirements on its members.

Beyond food safety, product integrity is concerned with how milk is produced. New Zealand’s reputation for being ‘clean and green’ is estimated to be worth hundreds of millions, if not billions, of dollars to the economy. However, this reputation has increasingly come under fire, not least through the statements of New Zealanders opposed to the environmental impacts of dairy farming. While the ‘clean green’ image is foremost, there is also an underlying assumption that New Zealand has integrity with regard to maintaining acceptable standards of animal welfare. Both of these aspects of reputation are vulnerable to reported instances of unsustainable farming practices and/or animal abuse. These instances do not even need to be representative of the industry in order for reputational damage to occur.

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48The New Zealand Infant Formula Exporters Association (NZIFEA), as reported in Global Times, April 2013
49Reported in NZ Herald, Oct 2012
50China boosts monitoring of foreign milk formula, NZ Herald, June 2013
51Valuing New Zealand’s Clean Green Image, Ministry for the Environment, 2001
52Broken Backbone: the truth about dairy farming in New Zealand, Mike Joy, August 2012.
Biosecurity

New Zealand’s is highly exposed to biosecurity risks as agricultural food exports are a major sector of the economy. New Zealand is fortunate in being an island nation, geographically isolated from other landmasses and thus sources of disease and pest incursion, but still must be vigilant. The Ministry for Primary Industries (MPI) is the agency charged with managing bio-security.

MPI’s biosecurity approach covers three geographic zones: global, pathways and borders, and within New Zealand. It is aided in these responsibilities by other agencies, including New Zealand Customs, regional councils, Department of Conservation and also industry partners. Since 2009, a new policy has been developed calling for Government Industry Agreements on Biosecurity Readiness and Response (GIAs). Industries are being asked to commit to GIAs which provide for joint decision on biosecurity response and readiness measures, as well as ‘cost sharing to offset costs to both industry and the taxpayers of New Zealand’. Understandably, primary industries are proceeding cautiously as they perceive risks to themselves in the proposed cost-sharing.

New Zealand’s dairy industry already makes considerable investments to manage existing zoonotic diseases and other pests within New Zealand, and to avoid further biosecurity incursions that could cause massive financial and social harm to the industry. Even minor incursions can negatively impact profitability through production losses and cost imposts. Three critical zoonotic diseases for the dairy industry include:

- Bovine tuberculosis (TB) which arrived with the first cattle in New Zealand
- Johne’s Disease, also present in New Zealand
- Foot and Mouth Disease (FMD), which is not present in New Zealand

A 2000 New Zealand Treasury paper valued the likely annual losses attributable to trade bans on the dairy industry because of a relatively high TB infection rate (>1 percent) at NZ$347 million per annum, not including the costs of a recovery plan. Currently, the New Zealand dairy industry invests approximately $23 million per annum in the National Bovine Tuberculosis Pest Management Plan. Recent incidences of TB infection in Taranaki and Northland herds have highlighted the ongoing risks to the industry. The New Zealand dairy industry also invests directly in the Johnes Disease Research Consortium. This is a wasting disease affecting animals in all pastoral industries. A US study estimates that Johnes’s-positive dairy herds experience an economic loss of nearly US$100 per animal per annum due to reduced milk production and increased replacement costs. However, the economic impacts of a FMD outbreak in New Zealand would be significantly greater than any of these existing problems. A 2004 study estimated that the even a small FMD outbreak could cost the nation $10 billion over two years.

The greatest concern arises from a recent report by the Auditor General in February 2013. This audit found serious weaknesses in New Zealand’s bio-security. Plans for responding to potential incursions from some high-risk organisms were found to be not yet complete. For example, the plan for dealing with a FMD outbreak is inadequate. The audit also found workforce planning and capability development needs to be stronger, and information management needs to be more efficient. Most concerning is the lack of preparation in terms of capacity and contingencies for dealing with a major outbreak of a disease such as FMD. The report suggests that New Zealand’s current systems could be quickly overwhelmed, based on the experience of the UK FMD outbreak in 2001.

Aside from major zoonotic diseases, the dairy industry is also combating insect and plant pests which have an impact on the productivity and economic performance of dairy farming. Examples include black beetle and giant buttercup. Black beetle attacks ryegrass pastures, reducing production by as much as 20 percent in affected pastures in regions of the North Island. Giant buttercup is a toxic weed infesting dairy pastures and causing estimated losses of over $150 million per annum. There are many others.

53Herd-level economic losses associated with John’s disease on US dairy operations
54The macro-economic impact of a foot-and-mouth disease incursion in New Zealand, MAF, 2004
55Ministry for Primary Industries: Preparing for and responding to biosecurity incursions, Office of the Auditor-General
Growth and capital renewal

Some of the competitive advantages for New Zealand’s dairy industry have arisen out of its growth. Over the decade to 2010, this growth was approximately 3% per annum.56

Historically, dairy exports were primarily butter and cheese sold into the United Kingdom and Europe. Since the 1970s and 1980’s which saw progressively higher barriers to entry in those traditional markets, New Zealand diversified its products enormously to meet the demands of new markets. Milk powders overtook cheese and all other products as the primary export in around 2000, and in the last decade these have continued to be the main focus of export growth especially into Asia and developing markets. Protein powder products including whey protein concentrates (WPCs) and casein, as well as milk protein concentrates (MPCs) have been important higher-value additions to the export portfolio. New Zealand has derived a competitive advantage from this ability to adapt to new market requirements, seeking out opportunities and backing them up with production capability.

The shift in production focus required massive investment in new dairy processing equipment. The Edendale facility is a good example. This investment has been enabled and facilitated by the massive growth in milk production, itself founded on the economic success of dairy farming. Under the cooperative structure, farmers themselves have funded the new manufacturing investments on the back of their growth. Thus the shift in production has not required retirement or conversion of assets as it would have in a static environment.

Growth has also enabled new manufacturing capacity to be developed on an ambitious scale, with confidence that milk growth would quickly provide full utilisation of that capacity. Capital utilisation and efficiency is therefore also improved through growth of the industry.

The benefits of growth extend beyond manufacturing and marketing, throughout the supply chain and within the farm gate. Particularly on farms, there is a high proportion of relatively new farm dairies employing recent technology. There is also a sense of positivit in the industry that encourages participants, especially farmers, to look to the opportunities ahead of them. These attributes are all intimately linked with New Zealand dairy farming being a growth industry.

56New Zealand Dairy Statistics 2011-2012, LIC & DairyNZ
There is a fundamental shift in the expectations of farming which places greater responsibility on farmers for outcomes beyond the farm. This shifting of goal posts is partly a consequence of dairy farming’s own success and growth such that it has significant impacts within New Zealand. It is also due to a growing public awareness of the long-term consequences of unsustainable behaviour.

Taking responsibility for the wider outcomes of dairy farming implies more than simply meeting some minimum standard of behaviour specified in regulation. Acting responsibly requires dairy farmers to make deliberate choices that provide greater benefits for stakeholders even where that is not required by regulation. Dairy farmers must lead the way, working with officials and stakeholders to enable positive change.

The following table identifies the four key areas of responsibility close to the farm, and lists issues that dairy farming acknowledges and must deal with. These issues are outlined in greater depth in the supplementary attachment to the strategy.

There is a fifth responsibility for dairy farming in New Zealand, which is outside the farm gate. It is a responsibility that comes with dairy farming contributing substantially to New Zealand’s economic welfare, and being a key part of the nation’s business growth agenda. Dairy farmers have a responsibility to plan for sustainable growth, improve the value of milk produced in New Zealand, and increase the value of exported dairy products, to the benefit of all New Zealanders.

<table>
<thead>
<tr>
<th>Areas of responsibility</th>
<th>Key issues / challenges</th>
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<tbody>
<tr>
<td>A duty of care to manage natural resources sustainably, particularly water</td>
<td>• Environmental footprint of dairy farming</td>
</tr>
<tr>
<td></td>
<td>• Catchment capacity to absorb nutrients entering waterways and ground-water</td>
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<td></td>
<td>• Attribution of water quality to land-use</td>
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<td></td>
<td>• Allocation of resources to competing uses, and under different value systems</td>
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<tr>
<td>A duty of care for farmed animals</td>
<td>• Increased awareness of welfare of farmed animals</td>
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<td>• Changing perceptions of welfare</td>
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<td>• Less tolerance for animals bearing the consequences of human failures</td>
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<td>A duty of care for people employed on and around dairy farms</td>
<td>• Highly demanding farm work environment and long hours, particularly during calving</td>
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<td></td>
<td>• Health and safety issues arising from physical nature of the work</td>
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<td></td>
<td>• Farming attitudes and work culture</td>
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<tr>
<td>Role in local communities</td>
<td>• A highly mobile workforce, with individuals changing farms and districts on regular basis</td>
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<td></td>
<td>• Pressure on rural community resources and infrastructure</td>
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Table 9: Responsibilities close to the farm
Management of natural resources on dairy farms

The growth of dairy farming in New Zealand has been facilitated by landowners’ historical ability to convert from other land use to dairying, and to obtain resource consents as needed. This in turn has provided economic advantages to both the land-owner and the country as a whole. In most instances, dairy land has been converted from dry-stock farming (i.e. beef cattle or sheep) and hence the landscape was already altered from the ‘natural’ environment. However, dairying often involves more intensive farming practices and a higher environmental footprint. More recently, dairy conversions from exotic forests have been developed, especially in the central North Island.

Key elements of the environmental footprint for dairy farming include:

- Greenhouse gas emissions (GHGs)
- Water abstraction
- Impacts on surface and ground water quality
  - Nitrates
  - Sediment
  - Faecal contamination

The footprints of dairy farms is only part of the picture. Generally, a few dairy farms would have minimal impact on a catchment. However, in those catchments where there are many dairy farms, the cumulative effect can be significant. This has become problematic as dairying as grown to become a major land-use, and expanded into areas where it was previously absent.

There is a public perception in some regions that dairy farming is harmful to the environment. A survey of Cantabrians conducted in 2009 found that half the respondents thought dairy farming had either a “bad” or “very bad” impact on the environment. The dairy industry’s own research has found that Cantabrians are generally less favourable than for example residents in the Waikato or Auckland, and this is likely to be a consequence of the rapid and extensive land use change towards dairying in regions such as Canterbury over the past two decades.

The perception of dairy farmers is different. The majority of dairy farmers work hard to leave the farm they own in better condition than when they took it on. They hold a strong sense of pride in their land and the improvements they have made to its natural capital. Many dairy farms are investing in reducing the footprint of their own dairy farms through better nutrient and effluent management. They have also extensively planted less productive parts of their farms in native vegetation and/or enhanced planting to protect sensitive waterways and wetlands. They also contribute to the conservation and use of New Zealand’s natural environment through assisting in developing scenic parks, reserves and recreational trails throughout the country.

The subsequent sections focus on GHGs as the main global concern, and water as the main domestic concern. Other environmental issues around soil and biodiversity are acknowledged, but not dealt with in detail in this report.

Greenhouse gas emissions

Global warming and GHG emissions are a global concern of the highest priority in international circles. Global warming has gained credibility in the past decade, with predicted consequences including sea levels rising a metre by 2100, increased frequency and severity of major weather events, climate change affecting agriculture and leading to crop failures, and species extinctions. As a likely future scenario, the main risks arise from failure to adapt to these changes. There remains some debate over the causes of global warming, but scientific consensus attributes it (at least partly) to human activity, particularly burning fossil fuels, deforestation (removing carbon sinks) and emissions of greenhouse gases (GHGs) such as methane and nitrous oxide from agricultural activities. Ceasing or mitigating the effects of these activities is deemed highly urgent and important, as the extent of global warming is thought to depend on how far GHGs emissions rise.

Agriculture has been identified as a major contributor, primarily through emissions of methane from ruminant animals as a natural, biological process. New Zealand dairy farming’s contribution (excluding nitrogen fertiliser) to GHG emissions was estimated to be 12.6 million tonnes in 2007, rising to 16.8 million tonnes by 2020. This is approximately 40 percent of total agricultural emissions.

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57 Estimating values of environmental impacts of dairy farming in New Zealand, Baskaran et al, 2009
58 Ministry for the Environment, 2009
New Zealand dairy farming is relatively carbon efficient. For example, one study found that the UK had 34 percent more emissions per kilogram of milksolids and 30 per cent more per hectare than New Zealand for dairy production even including the shipping to the United Kingdom.

and 21 percent of total New Zealand emissions, which makes dairy farming one of the nation’s biggest emitters. It also creates a significant potential liability. Under the current price of carbon, this is only $50 million per annum which is insignificant in the scheme of the whole industry. However, at a price of $25 per tonne the carbon liability would rise to $420 million per annum, or approximately $40,000 per dairy farm.

New Zealand dairy farming’s actual liability is limited by the delayed timetable for agriculture’s entry to the Emissions Trading Scheme (ETS). The New Zealand ETS for Agriculture is scheduled to commence in 2015, but farmers will initially only be liable for 10 percent of their carbon emissions with the rest gradually phasing in from 2016. The main reason for this delay is that other nations have not included agriculture in their emissions trading schemes. Leading the introduction of an ETS for agriculture would thus disadvantage New Zealand dairy farmers in the global marketplace.

The ETS is also problematic for dairy farming generally insofar as there is no effective means to alter the biological process of ruminant digestion. Resource-efficient dairy farming can reduce emissions, but only to a certain level. Beyond that, reducing dairying’s GHG emissions comes down to reducing activity on dairy farms by an equal amount. That is in direct conflict with New Zealand’s national objectives of the business growth agenda, the personal interests of individual dairy farmers and the changing appetites of developing nations. Internationally a stalemate exists due to conflicts of interests with developing countries intent on growing agriculture and there is increasing international pressure to move to a ‘carbon efficient’ and ‘mitigation’ focus instead.

New Zealand dairy farming is relatively carbon efficient. For example, one study found that the UK had 34 percent more emissions per kilogram of milksolids and 30 per cent more per hectare than New Zealand for dairy production even including the shipping to the United Kingdom. Hence an ETS could tend to shift production to less carbon-efficient nations without an ETS. That would be counter-productive to the goal of reducing net global carbon emissions. An ETS for agriculture would also reduce the economic surplus available to the industry to fund research into effective mitigation approaches.

In terms of positive contributions, The Pastoral Greenhouse Gas Research Consortium (PGgRc) is a research partnership between New Zealand pastoral industry groups including dairy, crown research institutes and commercial companies. It is engaged in a programme of work devised in 2003 to reduce pastoral farming GHG emissions. Combined private and public funding is in the order of $7 million per annum (2010). This is part of a global research effort, coordinated through the ‘Livestock Emissions & Abatement Research Network’.

Through Fonterra, and its membership of Global Dairy Platform60, New Zealand is also one of the signatories to the ‘Global Dairy Agenda for Action on Climate Change’ (GDA) which was created in 2009. It represents the global dairy industry and ‘is committed to providing consumers with the nutritious dairy products they want, in a way that is economically viable, environmentally sound and socially

60An international dairy organisation also including Friesland Campina, DFA, Arla, and IDF
The organisation makes five commitments:

- Promote the development of a standard methodology framework for assessing the carbon footprint of milk and dairy products based on robust science
- Promote adoption of the world’s best practices within the global dairy sector
- Seek to advance the establishment of tools to facilitate measurement and monitoring of emissions both on farm and in dairy manufacturing
- Promote improved farmer understanding of agricultural emissions and opportunities to reduce GHG emissions on the farm
- Support sharing information and aligning research efforts to develop cost effective mitigation technologies for both on farm and manufacturing application.

Water availability, allocation and efficiency

New Zealand has an abundance of fresh water by international standards, being ranked fourth out of 30 OECD countries for the size of its renewable freshwater resource on a per capita basis. New Zealand’s allocated water comprises less than 5 percent of its renewable freshwater resource. New Zealand also has the third lowest water withdrawal as a share of total water available out of 29 countries in the OECD, despite ranking second in water abstraction per person. This result reflects New Zealand’s low population, plentiful water resource available and relatively high use of consented water for agricultural irrigation.

Nationally, water allocation increased by approximately 50 percent between 1999 and 2006. Allocations increased by more than 50 percent in the Bay of Plenty, Southland, Waikato, Gisborne, Greater Wellington, Manawatu–Wanganui, Marlborough and Tasman. The key dairy regions of Canterbury, Otago, and Taranaki saw lower increases overall, although the highest levels of water allocation (as a percentage of mean flow) already occur in Canterbury and Otago.

Water allocation does not equate with actual use. There is a need for better reporting and knowledge of actual water abstraction and use within New Zealand in order to make better resource allocation decisions. For example, while the Horizons Regional Council reported that between 1997 and 2009 consented groundwater takes almost doubled, and consented surface water takes more than doubled, this ‘growth’ was largely an artefact of a rule change requiring consents for water. Actual growth in dairy farming and associated water use was considerably less.

One of the consequences of New Zealand’s abundance of fresh water resources has been very few limits placed on its use, and minimal economic value placed on the water itself. There has been little economic imperative for water use efficiency in New Zealand. This is changing. Domestically, competing interests for water are now grappling with issues of water allocation. The arguments include economic, ecological and cultural values. In the future, these conflicts will only increase as the likely future climate scenario for New Zealand is for time spent in drought to increase 10 percent by the middle of this century for key eastern agricultural regions.

Water is tremendously valuable in dairy farming, particularly where rainfall is scarce or uncertain. Irrigated farmland can generate up to three times the production of an equivalent area farmed under dry-land systems. In 2002/03, only 4 percent of NZ farmland was irrigated, but produced 12 percent of agriculture’s contribution to GDP at the farm gate ($1billion net per annum). Irrigated land also produces high quality feed for dairy cows, as evidenced in Canterbury. Equally, the absence of water is economically damaging. The 2008 and 2013 seasons each delivered severe droughts, with impacts on dairy production in affected areas. The 2008 drought caused economic losses of NZ$1 billion. The 2013 drought has been particularly severe as it affects most regions in the North Island, whereas 2008 was more limited in scope. Regions such as the Waikato with a heavy reliance on rainfall and only limited irrigation were particularly affected. This is an argument for further investment in infrastructure to better capture and manage water. Also, despite the obvious economic value, there has been minimal debate over preferences in water allocation.

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62. OECD Factbook 2010
63. Scenarios of Regional Drought under Climate Change, NIWA, 2011
64. Irrigation New Zealand
Ecological values

Ecological values are also impacting strongly on water allocations in New Zealand. These are evident in the management of the Waikato region. ‘Variation 6’ in the Waikato Regional Plan is premised on the view that areas of the Waikato are ‘already over-allocated in terms of preserving ecological values’. Its stated aim is to ensure there is enough water to protect aquatic life and provide for recreation, while meeting domestic, municipal, agricultural, cultural and industrial needs as far as possible. Under Variation 6, any dairy farm must apply for consent if they are using more than 15 cubic metres of water per day for dairy shed wash down and milk cooling (i.e. more than 215 cows), or are in an over-allocated catchment and have increased their water use since it was deemed over-allocated. As the average dairy farm in the Waikato now comprises 312 cows, therefore, about 3,500 dairy farms will be required to seek consent at their own cost. Also in context, the total allocation of 70 litres per dairy cow in the Waikato represents just 0.66% of the minimum flow for the Waikato River. Further, the water required for a dairy shed is less than one percent of what is required to irrigate a property of equivalent size to a depth of three millimetres. Logic suggests that the water necessary for washing down dairy sheds has very little impact on ecological values compared to other uses. Despite these logical inconsistencies inherent in Variation 6, it nonetheless provides a clear signal for dairy farming to improve water use efficiency.

Water policy

Cultural and social values are being given great importance in water policy considerations, at least on equal footing with scientific knowledge. The 2011 National Policy Statement for Freshwater (NPSFW) sets out objectives and policies that direct local government to manage water in an integrated and sustainable way, while providing for economic growth within set water quantity and quality limits. The objectives comprehensively include water quality, quantity, integrated management, tangata whenua roles and interests, and a progressive implementation programme. Maori involvement in decision making is given special consideration. Critically, arrangements established through Treaty settlement processes prevail over the NPSFW. As a case in point, the Waikato River Authority’s Vision and Strategy has the status of a National Policy Statement (NPS) and prevails over any inconsistent provisions in other NPSs. One of its principle objectives is for “The restoration and protection of the relationship of Waikato-Tainui with the Waikato River, including their economic, social, cultural, and spiritual relationships”. Specifically what this means for agriculture, and especially dairy farmers in the region, is yet to be determined.

The importance of providing certainty for the future is recognised in the third and final report of The Land and Water Forum (LAWF). That is a sentiment that dairy farmers can identify with. The report recommends planning at a catchment level, and sets out tools and proposals for communities to collaborate in identifying the specific issues in each catchment, set objectives and limits, and decide on solutions. Importantly, it recommends managing fresh water in a dynamic and adaptive way to allow users and managers to respond to changes in knowledge, expectations, environmental and economic conditions, and to allow for new entrants. Dairy farming must engage with communities to develop these catchment plans.
The issues surrounding water allocation and use are not just domestic. Internationally, fresh water is increasingly recognised as a scarce resource. A key concept is the ‘embedded water’ in food production, meaning the amount of water used in the entire process of producing, retailing and consuming a product. For example, a litre of milk is estimated to require 1000 litres of water to produce. Consistent with this, a recent study of New Zealand dairy farm water footprints indicated a range of 945 to 1,084 litres of water per kilogram of fat-and-protein adjusted milk. Such measures could potentially develop as a standard similar to food-miles, and impact international trade and consumer perceptions. New Zealand dairy farming interests must be represented in any developments that affect dairy trade, particularly to ensure that New Zealand’s relative abundance of freshwater does not become a disadvantage.

Water quality

The 2011 National Policy Statement for Fresh Water (NPSFW) sets out objectives and policies directing local government to manage water in an integrated and sustainable way, while providing for economic growth within set water quantity and quality limits. This is viewed as a fundamental step to achieving environmental outcomes and creating the necessary incentives to use fresh water efficiently, while providing certainty for investment. The objectives in the NPSFW require the overall quality of fresh water within a region to be maintained or improved, allocations to be efficient and over-allocations phased out, water use efficiency to improve, and the whole management of water to be integrated with the use and development of other resources including land and ecosystems. Involvement of Maori must be provided for in the process also.

There is need for debate over what water quality means. The term ‘water quality’ is widely used, but in most cases refers to changes in specific parameters such as nitrate concentrations or turbidity. This focus on parameters does not by itself provide an understanding of water quality. It is equally important to understand the limiting factors. For example, where a waterway has low levels of some essential nutrients it can have a higher capacity to carry other nutrients. Each body of water has its own specific characteristics that determine its capacity.

There are indications that water quality in New Zealand has declined in some catchments and lakes on the basis of measured parameters:

- A 2009 report on groundwater found that New Zealand’s groundwater quality is stable or changing slowly (probably due to natural processes) across most sites. Approximately one third of sites showed significant changes in nitrate levels between 1995 and 2008, and more were found to have increasing (deteriorating) trends than decreasing (improving) trends. The sites recording poor nitrate levels (>11.3mg/L) are largely clustered around Canterbury and Waikato regions with others mainly scattered between coastal Taranaki, and east coast lower North Island.

- A 2010 report on freshwater found that “between 1998 and 2007 national water quality deteriorated for clarity, total phosphorus, total nitrogen, oxidised nitrogen and conductivity in rivers with catchments dominated by pastoral land cover”. The areas where river water quality was found to have significantly deteriorated include lowland areas of Northland, Auckland, Waikato, the east coast of the North Island, Taranaki, Manawatu-Wanganui, Canterbury and Southland.

- Another 2010 report found that of the 4,000 lakes in New Zealand over 1 hectare in size, 43 per cent are likely to have very good or excellent water quality (very low levels of nutrients), and 32 per cent are likely to have poor or very poor water quality (are nutrient enriched). The lakes with the poorest water quality and ecological condition tend to be surrounded by pastoral land cover. Between 2005 and 2009, 12 per cent of the 68 lakes assessed showed an improvement in water quality and 28 per cent deteriorated.

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68Waterwise, reported by IGD a research and education charity for the food and consumer goods industry
69Water Footprint of New Zealand Dairy Farming, AgResearch, 2011
70Our Water: Groundwater Quality, MFE, 2009
71Analysis of national river water quality data for the period 1998–2007, NIWA, 2010
72Lake water quality in New Zealand 2010: Status and trends, NIWA, 2010
Dairy farming has a role in water quality outcomes, and has been associated with elevated nitrate levels\(^{73}\) and effluent entering waterways. Dairy farming is now taking the initiative to address this through the Sustainable Dairying: Water Accord. The Accord is a proactive commitment by the New Zealand dairy industry to enhance the overall performance of dairy farming as it affects freshwater through continuous improvement and partnership. Dairy farmers and the companies they supply have agreed to improve on-farm practices nationwide, and also adopt comprehensive standards for all new dairy farms. The five key areas for improvement are

- stock exclusion from waterways;
- nutrient management;
- effluent management;
- water use; and
- riparian management

Considerable advances have been made in these areas already. In accordance with the original Clean Streams Accord, dairy cattle are now excluded from 87 percent of streams, rivers and lakes. Ninety-nine percent of race crossings now have bridges or culverts. Ninety-nine percent of dairy farms have Nutrient Budgets in place, and 56 percent have Nutrient Management Plans. Also, a warrant-of-fitness system for dairy effluent management systems has been developed, with training and accreditation systems for rural professionals to support farmers’ management of dairy effluent, and dairy farm effluent non-compliance is less than 10 percent nationally.

However, a key issue for dairy farming remains in the way that regional plans will deal with dairy farming and other activities in a region in order to meet water quality objectives. For example, Horizon’s One Plan maximum nitrate leaching limits were specified at 30 units of nitrogen for land use class I (LUC I), 27 units for LUC 2, with these reducing for every other land class use to only 8 units for LUC VII and only 2 units for LUC VIII. The effect of reducing nitrate leaching to these limits will be to reduce the economic returns on many of those dairy farms (and other agricultural activity) to the extent they are not viable. The concern of the dairy industry is that these measures will cause economic hardship while not achieving the water quality objectives because they deal with land use in a piecemeal fashion, do not address total catchment loadings and largely ignore specific catchments. They are not based on an understanding of the mix of land uses within a catchment, and exclude some sources of nutrient loading.

From a dairy industry perspective, assuming dairy farms are all compliant with the provisions of the Water Accord, it is more sensible to have an optimal number of dairy farms permitted to operate at an optimal level in a catchment, rather than a maximum number being sub-optimal or even unviable under some limit at the lowest common denominator. The National Policy Statement for Fresh Water recognises this in requiring “the ability to transfer entitlements between users so that the value obtained from water is maximised”. However, achieving the best outcome requires a new way of thinking about regional plans for water management, potentially as a series of meaningful catchment plans that deal with the specific environments and all the activities leading to water quality outcomes. It is vital for the dairy industry to engage in developing such an approach in partnership with regional councils and other stakeholders.

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\(^{73}\)River water quality trends and increased dairying in Southland, New Zealand, Hamill & McBride, 2003
Animal welfare

New Zealand dairy farmers take great pride in their animals, and understand that managing them well is essential to achieving high levels of productivity. Good animal husbandry is constantly evolving in response to changes in farming systems as well as public expectation. Because dairy farming systems have adapted across a diverse range of New Zealand environments, so too have the skills needed to manage dairy cows in these environments and systems.

Animal welfare is emerging as a critical focus for the dairy industry. In the European context, it is already at least as important as environmental outcomes. It is likely that it will also achieve greater prominence in New Zealand. It is vital for the dairy industry to understand these expectations, and to manage its conduct accordingly.

The New Zealand Animal Welfare Code (2010) for dairy cattle was established under the Animal Welfare Act 1999. It supports the Act by providing detail on fundamental obligations with regard to the care of animals, setting out comprehensive minimum standards and recommendations. The dairy industry itself has also established supporting systems for identifying at-risk situations and addressing these before they become animal welfare cases. This is vital because often poor animal welfare outcomes stem from some breakdown in the farm system, including illness or financial hardship, and not through any malicious intent.

The Animal Welfare sector is now evolving quickly. A New Zealand Animal Welfare Strategy was published by MPI in May 2013. This seeks to achieve two outcomes:

1. Care of Animals: We meet the needs of our animals and avoid causing unreasonable or unnecessary harm to animals through our actions
2. Reputation for Integrity: New Zealand's animal welfare practices add value to our exports and contribute to our reputation as a responsible agricultural producer

Aligned with this strategy, there is now an Animal Welfare Act review underway which will potentially strengthen the minimum standards in the Code. MPI is also leading a joint initiative with the dairy industry ‘Safeguarding our Animals, Safeguarding our Reputation’ to address areas where the current Animal Welfare Code is silent. At present this is focused on humane slaughter practices and off-pasture systems. There are also formal submissions underway as part of a consultation to amend the Code and develop these for long term dairy housing.

Internationally, there are a number of developments which affect the New Zealand dairy industry. It is vital for New Zealand that any international codes and standards are compatible with the New Zealand approach, and not designed solely around Northern Hemisphere systems. The current initiatives include:

- An ISO proposal to develop an animal welfare standard (S-SAFE). ISO is working with some of the major multi-national food manufacturing organisations (e.g. Nestle, Unilever) and are proposing taking the OIE (World Organisation for Animal Health) guidelines and using them as enforceable ISO standards as a condition of product supply (S-Safe program). This is a considerable risk to the New Zealand industry as the ISO approach arises from manufacturing standards and is not a natural fit when applied to animal welfare. The implication is a thick layer of compliance which is unlikely to result in improved animal welfare, and is hence being opposed by New Zealand and European countries.

- EU Welfare Quality Programs and labelling are increasing in European countries. German and Dutch interests are particularly focussed on welfare labelling. There is also a new EU regulation relating to Animal Welfare going through the EU Parliament in 2013, although its content, scope and implications are largely unknown. It is important for New Zealand to understand how these EU regulations might affect international trade and market access.

- The Sustainable Agriculture Initiative (SAI) involves a group of large multi-nationals including Fonterra and Nestle developing global standards and benchmarks to be able to compare measures of sustainability across different countries, and production systems. This is focussed at the national level in the first instance but could be extended to herd level over time. A number of areas that could be used as Animal Welfare benchmarks have been identified, including: longevity, lifetime yield, mastitis incidence (SCC), lameness, mortality rates, and body condition score (BCS).

The on-farm work environment

New Zealand dairy farming is increasingly dependent on employed managers and staff. This dependency is a function of industry growth over the past two decades to
2012, most notably in the South Island. Canterbury saw the greatest growth with annual increases of nearly 10 percent, followed by Southland with 7 percent. There was also a dramatic demographic change in farm size, with herds rising from 394 cows to 596 in the South Island (+51 percent) and from 246 to 327 (+32 percent) in the North Island. As the industry has grown and herd sizes have increased, so too have the number of staff required on farms increased. This means dairy farmers now need to be skilled in managing people. Just as challenging, dairy farmers must confront some of the cultural norms that still pervade the industry but are no longer accepted employment practices.

Dairy farming in New Zealand has a stoic tradition of hard work and long hours. In 1938, dairy farmers were reported working an average of 70 hours per week in busy periods, while permanent employees worked 65 hours per week. The percentage of people on dairy farms working over 70 hours per week peaked in 2001 at 32 percent, but was lower again at 27 percent in 2006. This compares to a standard 40 hour week for employees in most industries. Working hours on dairy farms are also complex, with seasonal demands as well as a wide range of rosters and work practices affecting the overall conditions for employees. This may exacerbate the social isolation that can come with living on a farm. The key facets of dairy working hours are outlined here:

- The most common rosters involve ‘12 days on, 2 days off’ (29 percent) or ‘11 days on, 3 days off’ (20 percent). It is relatively common for rosters to require 13 or more consecutive days, particularly in the North Island. i.e. more than half the rosters in the Waikato. The unhappiness of employees with their roster is directly related to the number of consecutive days on.
- The average working week during calving is 64 hours (11.2 hours per day), although this is lower during summer (58 hours) and winter (45 hours). These hours are typically longer in the North Island.
- Farm managers have the most demanding roles, working an average of 70 hours per week during calving. There is a direct relationship between increased responsibility and longer hours.

Dairy farming’s traditions also include the third worst accident rate in terms of injuries per person employed. This included 35 fatalities in the period 2005-2010. Dairy farming is associated with approximately 1,200 ACC entitlement claims per annum. On the basis of 30,000 persons working in dairy farming (i.e. their major source of employment), this suggests an injury rate of four percent, almost three times the average rate across all New Zealand industries. Overall, New Zealand has a workplace fatality rate 50 percent higher than Australia, and six times that of the UK. It is not just employed staff on dairy farms that are at risk. Dairy farmers themselves suffer serious physical injuries and stress-related conditions.

Anecdotally, some dairy farmers accept these hardships as part of a career that delivers significant economic rewards later on. However, as outlined in the previous section under competitiveness and human capability, many of those now employed in dairy farming no longer have expectations of farm ownership. It is likely that the relatively high rate of people who change jobs and/or leave their career in dairy farming altogether is related to these factors, i.e. tolerating the workplace conditions now is not justified by lower expectations of future reward.

Also anecdotally, the farms with larger herds and more staff have made the most progress towards reasonable rosters and improved work environments. This is a matter of necessity in terms of attracting and retaining people to work on farms, and not losing investment in their training.

Financial rewards are an important factor, especially in attracting new entrants without rural backgrounds. The average for total package value (TPV) for dairy assistants (the least position) was approximately $40,000 per annum in the 2013 season. Dairy farm managers (the highest salaried position) had an average TPV of approximately $70,000. According to the long hours worked, these represent average TPVs per hour of $17.02 and $25.09 respectively, although there was a wide spread between the upper and lower quartiles.
While this compares favourably with the minimum adult wage in New Zealand of $13.75 per hour, it is instructive to also compare dairy farm remuneration with urban jobs such as sales and marketing. The lowest sales position, an ‘internal sales representative’ working in a call centre, requires no formal tertiary education and receives an average salary of $55,000 per annum\textsuperscript{80} in Auckland. On the basis of a 45 hour week (40 hours is standard), this translates to $27.80 per hour. A Key Account Manager, the highest non-managerial sales role, earns an average salary of $95,000 per annum. Although the cost of living on a farm is likely to be lower, and many other factors may also weigh on the decision, dairy farm careers are not currently positioned to be more attractive in terms of salaries.

Dairy farming in New Zealand aspires to attract, develop and retain talented and motivated people. This aspiration will be best achieved with quality work environments as the foundation. One of the challenges for the industry is to understand what this means. With that aim, the ‘Investors in People’ Standard\textsuperscript{81} has been adapted for use on New Zealand dairy farms. This comprehensively assesses the work environment from Business Strategy through to Continuous Improvement.

**Local communities**

Dairy farming has a big impact on local communities. In established dairy farming areas, many people in the community either work on dairy farms or work in service industries related to dairy farming. Where dry-land farming has been converted to dairying, it has increased the local population and brought in new people often with young families. Thus dairy farming can help a community to fill school rolls and keep services viable, making communities more vibrant.

Many dairy farmers are also heavily involved in their communities; from local volunteer fire brigades, school trust boards, health entity boards, regional councils, water boards, service clubs, sports clubs, to conservation projects. The ‘Farmy Army’ response to the Christchurch earthquake comprised many of the region’s dairy farmers donating their time and resources in a time of crisis. Few New Zealanders understand what dairy farmers are contributing socially, environmentally and financially to their communities. This is due to the fact that many contributions are made by individual dairy farmers who are not seeking any recognition for their actions.

The dairy industry is conscious that having strong communities with good local schools and services is essential to attract and retain people to work on dairy farms. Yet, as dairy farming transitions from a population of owner-managers and sharemilkers to a more corporate-owned, paid employee approach, there are threats to this contribution towards strong communities. Owners may live off the farm, and farm employees can have rosters which make community participation nearly impossible. The high turnover of dairy farm employees (18 months is the average tenure) can also prevent them or their families from becoming part of the community. Dairy farm owners must take responsibility, treating employees as a valuable resource and as part of the community.

Immigrant workers on dairy farms also present unique challenges. Children for whom English is a second language (ESL students) can overburden the resources of local schools. The parents themselves may find it difficult to participate in the community, at least initially. This can be a source of frustration or resentment from others in the community. It is vital for dairy farm employers to be proactive in the induction of immigrant workers, and to provide support so that they are able to contribute to the community.

It is also vital for the wider dairy industry to be active in building strong local communities. Many dairy farmers develop leadership and governance skills that translate well from dairy industry roles to community roles. This can be assisted through dairy company-led initiatives. The Westland Schools Initiative is a good example. The dairy industry also has influence and resources to assist with rural infrastructure and services.

At a national level, dairy companies can contribute directly to local communities through corporate responsibility programmes such as Fonterra’s Milk for Schools program. This raises the positive profile of the dairy industry, and awareness of the contributions that dairy farmers make.

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\textsuperscript{80}2012 Hayes Salary Guide

\textsuperscript{81}The Investors in People standard is an international quality standard, based on a business improvement framework
Economic welfare

New Zealand ranks as the fifth most prosperous country in the world according to the Legatum Prosperity Index. This ranking is derived from eight key indices, and New Zealand performs best in the areas of education, personal freedoms, governance and social capital. The economy ranks somewhat lower due to poor economic growth. However, without a relatively wealthy economy, New Zealand would almost certainly slip to lower rankings on other indices.

For many years dairy farming has been a key driver of the New Zealand economy, contributing to more than 25 percent of export earnings. This is outlined in preceding sections. The importance of dairying to the national economy is widely recognised by New Zealanders, although many struggle to see how these export earnings directly benefit their day-to-day lives.

Growth in the value of New Zealand’s dairy exports is necessary to achieve the standard of living to which New Zealand aspires. The key question is how this growth should be achieved so that it contributes to New Zealand’s prosperity. The previous section highlights that ecological and social values such as water quality must also be preserved. Thus the solution must be consistent with sustainable development, meaning “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

New Zealand has the capacity to sustainably increase the volume of milk production in some areas and catchments, but not in all areas. The dairy industry has a responsibility to ensure that this sustainable growth potential is realised within regional plans, and also that dairy assets are not stranded in catchments where growth is not sustainable. This is a duty towards all New Zealanders, as well as to dairy farmers themselves.

Local communities are becoming more involved in determining and achieving their social, economic and environmental aspirations. Implementation of the National Policy Statement on Freshwater Management is a prime example. The dairy industry is fully committed to participating openly and constructively in these proceedings and to ensuring it honours all obligations resulting from them.

While sustainable growth in milk production will contribute towards New Zealand’s prosperity, it is also important for the value of dairy exports to be increased. Value-added processing located within New Zealand could be an important contributor, but accountability for this sits outside the farm gate and often outside our borders. New Zealand’s export business still comprises a high proportion of bulk dairy ingredients sold to international consumer food companies. These companies often elect to manufacture the finished product within the region or country where it will be consumed. Even New Zealand companies have developed significant manufacturing assets offshore, because it is not feasible to manufacture and export all finished products from New Zealand.

Another potential source of higher value exports comes from the recognition and development of differentiated milk produced in New Zealand. New Zealand has a reputation for sound farming practices and New Zealand dairy farmers are continually investing in and improving these practices. New Zealand also has the lowest level of corruption in the world, providing an inherent guarantee of product integrity. However, the industry risks undervaluing the provenance of New Zealand milk and allowing that value to be either lost or captured within the ‘brand’ of whoever purchases the raw milk for processing.

It is in the interests of dairy farming and New Zealand for this ‘provenance dividend’ to be accounted for in the value of raw milk. Going one step further, once the provenance of New Zealand milk is attributed to dairy farmers, there will be greater incentives to further differentiate its production. Making the right choices in this regard requires good knowledge of customer values, and having market strategies to capitalise on these.

Individually, dairy farmers are constrained in their ability to respond to the challenges of value-added processing and capturing the provenance dividend. However, collectively, dairy farming has a powerful voice through cooperative ownership of dairy companies comprising more than 90 percent of dairy processing and export business. It is important that dairy farmers engage at this level, not only to benefit New Zealand through higher value exports but also as it has a direct bearing on sustaining the returns they receive from the sale of raw milk.

82Brundtland Commission of the United Nations on March 20, 1987