2018 DIRA Review: Analysis of industry performance

A REPORT PREPARED FOR THE MINISTRY FOR PRIMARY INDUSTRIES

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2018 DIRA Review: Analysis of industry performance

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Executive summary

Frontier Economics is pleased to submit this report to the Ministry for Primary Industries (MPI), describing the performance of the New Zealand dairy sector since the introduction of the Dairy Industry Restructuring Act 2001 (DIRA).

This report, Report One, draws on reliable, publicly available data to assess the historical performance of the dairy sector in New Zealand in a number of dimensions (economic, environmental, consumer, social impact) since 2001. A companion report, Report Two, builds on the evidence base presented in this report to examine and identify the factors that have likely driven this performance.

Economic performance

The New Zealand dairy sector has provided, and continues to provide, substantial **economic benefit** to New Zealand.

- The **value** of the dairy sector in New Zealand grew significantly, by an average of 5.1% per annum, from NZ$7.9 billion in 2001 to NZ$16.6 billion in 2016. In comparison New Zealand's nominal gross domestic product (GDP) grew by 4.5% annually over the same period.
- **Milk production** has grown relatively consistently at around 3% per annum on average over the study period, from 12.9 billion litres in 2001 to 20.7 billion litres in 2017.
- The growth in the value of the sector has been driven by growth in **exports**, rather than growth in the domestic market.
  - New Zealand's dairy exports have grown at an average rate of around 7% per year between 2004 and 2017, more than doubling from NZ$6.1 billion to NZ$14.6 billion. Increased exports to China comprised approximately 40% of this export growth.
  - Whole milk powder was consistently the largest dairy export product by value (representing 31% of all dairy exports in 2004 and 36% in 2017), and has contributed the most (40%) to growth in dairy exports between 2004 and 2017.
- The prominence of **commodities** in New Zealand's dairy export portfolio exposes the industry to volatile returns.
- **Employment** in dairy farming and processing has increased relatively consistently at around 3% per annum from 24,840 employed in 2001 to 38,551 employed in 2017.

The dairy sector brings considerable benefit to New Zealand's **regional economy**, although the distribution of economic benefits varies by region:

- Data on the contribution of dairy farming and processing to New Zealand's GDP at a regional level are not available, but regional employment data can be used as a proxy for economic activity.
- Between 2001 and 2017, the largest increases regional employment associated with dairy farming and processing occurred in Canterbury, Waikato, Southland and Otago.

The **product mix** of exported dairy goods has not changed substantially over the period from 2004.

- Whole milk powder was consistently the largest dairy export product by value, representing 31% of all dairy exports in 2004 and 36% in 2017, contributing 40% of the growth in dairy exports between 2004 and 2017.
- The share of export value attributable to butter, AMF and cream has remained relatively constant over the period from 2004 to 2017, increasing from 18% to 19%.
- The share of export value from cheese has fallen from 17% in 2004 to 13% in 2017.
- Casein and protein products contribution to export value has also decreased from 16% to 12%.
- Skim and butter milk powder as a proportion of export value have fallen from 15% in 2004 to 9% in 2017.
- The share of export value derived from other products has increased from 3% in 2004 to 11% in 2017.

Whilst the mix of products has not changed significantly, the **value of exports** in all these product categories has increased very substantially. For example, between 2004 and 2017, the export value of:

- Whole milk powder increased from NZ$1.9 billion to NZ$5.3 billion (an increase of 283%);
- Butter, AMF and cream products from NZ$1.1 billion to NZ$2.8 billion (an increase of 260%);
- Cheese, and casein and protein products, from approximately NZ$1.0 billion to approximately NZ$1.8 billion (an increase of approximately 180%);
- Skim milk and butter milk powder from NZ$0.9 billion to NZ$1.4 billion (an increase of 150%); and
- Other dairy products from NZ$0.2 billion to NZ$1.6 billion (an increase of 683%). The growth in this category could indicate an expansion in variety of

products and/or growth in premium products, although the data are not sufficiently disaggregated to discern this definitively.

- Investment in R&D by New Zealand dairy processors has been modest by global standards over the study period:
- Fonterra has invested approximately $900 million in R&D over the past decade, or approximately 0.6% of its annual turnover. The largest food producers globally have, on average, invested approximately 1.1% of their annual turnover in R&D, over the past 10 years.
- Fonterra invests more annually on marketing, sales and distribution than it has invested over the past 10 years in R&D.
- The New Zealand Government has also invested in R&D in the dairy sector. For example, the Government has committed $170 million over seven years under the Transforming the Dairy Value Chain Primary Growth Partnership programme to boost innovation in and the productivity of the dairy sector. However, this remains very small fraction of the total investments made by Fonterra ($15.27 billion) and independent processors ($2.65 billion) between 2001 and 2017.

There has been a modest increase in **competition in dairy processing** in New Zealand since 2001:

- Fonterra's share of milk collected at the farmgate in New Zealand has fallen from 96% in 2001 to 82% in 2017 (although, as noted above, the total volume of milk produced in New Zealand has increased by approximately 60% since 2001). The extent of competition in dairy processing varies significantly at a regional level.
- Independent processors accounted for approximately 41% of the growth in raw milk solids collected since 2001; Fonterra accounted for 59% of growth in raw milk solids collected.
- Since 2001, four independent processors (Open Country Dairy, Synlait, Oceania, and Miraka) have entered the farmgate markets, and one processor (New Zealand Dairies) has entered and exited. Nutricia Danone and Yashili have also entered the processing sector, and Mataura Valley Milk has announced entry in 2018. All of these processors are significantly smaller than Fonterra (the next largest processor's 2016 turnover was just 5% of Fonterra's) and are primarily focussed on export markets.

Environmental performance

The rapid growth of the New Zealand dairy sector has resulted in environmental degradation:

- The **land used for dairy farming** has increased from approximately 1.4 million hectares in 2001 to 1.7 million hectares in 2017.

- Dairy farm **land-use intensity** has increased markedly in certain regions, such as North Canterbury and South Canterbury, with the conversion of land historically used for sheep and beef farming (particularly in the South Island) and in some regions planation forestry (particularly in Waikato) and, to a much lesser extent, scrub.
- **Nitrogen leaching** into New Zealand's waterways increased by from approximately 37 million kilograms in 2001 to nearly 50 million kilograms in 2012—an increase of approximately 3% per annum, in line with the growth in milk production. No data on nitrogen leaching is available beyond 2012.
- **Methane emissions** from dairy cattle in New Zealand have grown relatively slowly since 2001, at approximately 1% per annum. However, emissions from the agricultural sector (of which dairy is by far the largest contributor) accounts for nearly 50% of New Zealand's total greenhouse gas emissions annually. This is significantly larger than any other sector in New Zealand, and is also the largest proportion in the OECD.

Consumer outcomes

Consumers are concerned that the prices of dairy products in New Zealand are relatively expensive. This has been the subject of two major public inquiries:

- Our analysis of consumer outcomes focused on the **domestic market**, although the vast majority (around 95%) of the New Zealand's dairy sector's output is exported.
- There is some qualitative evidence that the **product range** available to domestic retail consumers has expanded since 2001.
- With the exception of butter, **changes in the domestic price of dairy products** have been roughly in line with movements in the consumer price index (CPI) and overall retail grocery price trends since 2007, increasing at less than 1% per annum in real terms.
- However, over the same period, global dairy prices have fallen in nominal terms by between 15% and 28% (depending on the dairy commodity index considered). It is unclear why the price of dairy products domestically has increased (in nominal terms) while global dairy commodity prices have declined over the same period.
- Retail milk prices in New Zealand **are relatively constant throughout the year**, despite the significant seasonality of milk production and the associated difference in the cost of production within the year.

Social performance

The social performance of the dairy sector in New Zealand reflects the public perception over economic performance, environmental performance and consumer outcomes. Specifically, there has been public concern that the economic benefits from the growth in the New Zealand dairy sector has come at the cost of:

- environmental harm and some loss of environmental amenity value; and
- economic detriment to domestic consumers through higher prices for staple dairy foods considered important to health and wellbeing of New Zealanders.

There may also be some concern that, whilst the economic benefits of the dairy sector have been felt most in particular regions where dairy farming activity has intensified since 2001, the spillover costs described above may be felt more widely by New Zealanders who have not benefited directly from this economic success.

1 Introduction

Frontier Economics is pleased to submit this report to the Ministry for Primary Industries (MPI), describing the performance of the New Zealand dairy sector since the introduction of the Dairy Industry Restructuring Act 2001 (DIRA).

1.1 Background

In May 2018 the Minister of Agriculture announced a review of the DIRA and its impact on the dairy industry (the Review).[1] The key objectives of the Review are to consider:

- Whether the regulatory regime enshrined in DIRA is operating in the interests of New Zealand's consumers, farmers, and society
- Any unintended consequences arising from DIRA
- Whether DIRA remains fit-for-purpose.

The key stages of the Review involve:

- Stage 1: Determining facts and building evidence
- Stage 2: Considering options for change through consultation and subsequent recommendations to the Government.
- Stage 3: Implementing the Review's findings.

In this context, MPI has commissioned Frontier Economics to assist in the first stage of the Review. In particular, Frontier Economics has been asked to describe the performance of the dairy sector in New Zealand since the introduction of DIRA, and consider the extent to which this performance is attributable to DIRA or other factors (such as Fonterra's business strategy, other regulation in New Zealand, or global drivers).

1.2 Role of this report

Frontier Economics is preparing two reports for MPI:

- This report, Report One, looks at how the dairy sector in New Zealand has performed in a number of dimensions (economic, environmental, consumer, social impact) since 2001. This report also examines how the dairy sector in other countries—Australia and Ireland—and the New Zealand tourism sector,

[1] Ministry for Primary Industries, *Terms of reference for the review of the Dairy Industry Restructuring Act 2001 and its impact on the dairy industry*, 9 May 2018.

have performed over the same period. These comparator sectors provide potentially useful reference points against which to measure the performance of the New Zealand dairy sector. When assessing the performance of the various sectors, we:[2]

- draw on reliable and publicly available, information from government and industry sources, and other information provided to us by MPI, that was able to be accessed within the relatively limited time period available to produce this report. We were assisted in data collection by MPI staff. The analysis of economic performance is more detailed and comprehensive than is the analysis of environmental, consumer and social performance. This does not in any way imply that environmental, consumer or social performance is less important or relevant than economic performance. The more comprehensive analysis of economic performance in this report simply reflects the availability of public information;
- consider a range of relevant parameters to describe performance (which are intended to be pertinent parameters, rather than exhaustive);
- present quantitative analysis including charts and tables, where possible, and qualitative analysis where quantitative information is unavailable;
- present data for the period 2001-2017, or where data are unavailable over this entire period, for the period available; and
- make clear where data is unavailable, or we have made assumptions to generate the data presented.

- A companion report, Report Two, builds on the evidence base presented in this report to examine and identify the factors that have driven the performance of the New Zealand dairy sector identified.

The two reports should be read in conjunction with one another.

1.3 Structure of this report

This report is structured as follows:

- Section 2 investigates the New Zealand dairy sector's **economic** performance since 2001;
- Section 3 investigates the New Zealand dairy sector's **environmental** performance since 2001;

[2] All financial data presented in this report are in nominal New Zealand dollars, unless specified otherwise.

- Section 4 investigates the New Zealand dairy sector's **consumer outcomes** since 2001;
- Section 5 investigates the New Zealand dairy sector's **social** performance since 2001;
- Section 6 summarises the findings from the **case studies**, presented in the Appendices to this report;
- Appendix 1 investigates the performance of the **Australian** dairy sector since 2001;
- Appendix 2 investigates the performance of the **Irish** dairy sector since 2001; and
- Appendix 3 investigates the performance of the New Zealand **tourism** sector since 2001.

2 Economic performance

2.1 Overview

Key findings:

- The value of dairy farming output increased from NZ$5.2 billion in 2001 to a peak of $14.9 billion in 2014. In 2016 (the latest year for which data were available, at the time of writing of this report), the total value of dairy farming output was NZ$8.0 billion (a 53% increase from the level in 2001).
- The value of dairy processing output increased from NZ$7.9 billion in 2001 to a peak of NZ$21.4 billion in 2014, before falling to NZ$16.6 billion in 2016 (a 111% increase between 2001 and 2016).
- The total volume of milk processed by the New Zealand dairy sector has grown from 12.9 billion litres in 2001 to 20.7 billion litres in 2017.
- Dairy exports have grown relatively consistently at around 7% per annum (on average) over the period since 2004, with the 2017 value of NZ$14.6 billion more than double the 2004 value. Exports to China comprised approximately 40% of this export growth. In 2017, whole milk powder was the main export product representing 36% of dairy export value.
- The New Zealand dollar has appreciated against the US dollar gradually between 2001 and 2017 at approximately 3% per annum.
- This volatility is reflected in the returns of both processors and farmers. Fonterra's return on assets (ROA) has varied between 3% and 10% over the past 15 years, with other New Zealand dairy processors having a similarly volatile, but generally higher (relative to Fonterra) ROA over the same time period.
- Between 2002 and 2017, the volume of milk solids collected by Fonterra increased by an average rate of approximately 2.1% per annum, from 1.1 billion kgMS in 2002 to 1.5 billion kgMS in 2017. Over the same period, Fonterra's share of milk collected from farmers in New Zealand fell from 96% to 82%, with the number and scale of competitors increasing significantly from a relatively small base.
- Employment in dairy farming and processing has increased relatively consistently at around 3% per annum over the period from 2001 to 2017. The regions that have experienced the greatest increase in employment in dairy farming have been Canterbury, Waikato, Southland and Otago.
- The most significant growth in dairy export receipts has been in whole milk powders, rather than high value added or innovative new products. Fonterra has made relatively modest investments in R&D, investing $900 million in R&D over the past decade. Fonterra typically spends more on marketing, sales and distribution annually than it has on spent on R&D over the past 10 years.
- On average, Fonterra's investment in R&D over this period was approximately 0.6% of its net sales. The median ratio of R&D to net sales of the largest food and beverage producers in the world, over the same period, was significantly higher – approximately 1.11%.
- Fonterra's ownership structure, gearing levels and relatively high dividend payout ratio suggest it may face constraints raising capital to fund investment.
- Dairy farm debt has increased at approximately 10% per annum between 2003 and 2016, significantly outpacing 5% growth in dairy farm output value over the same time period.

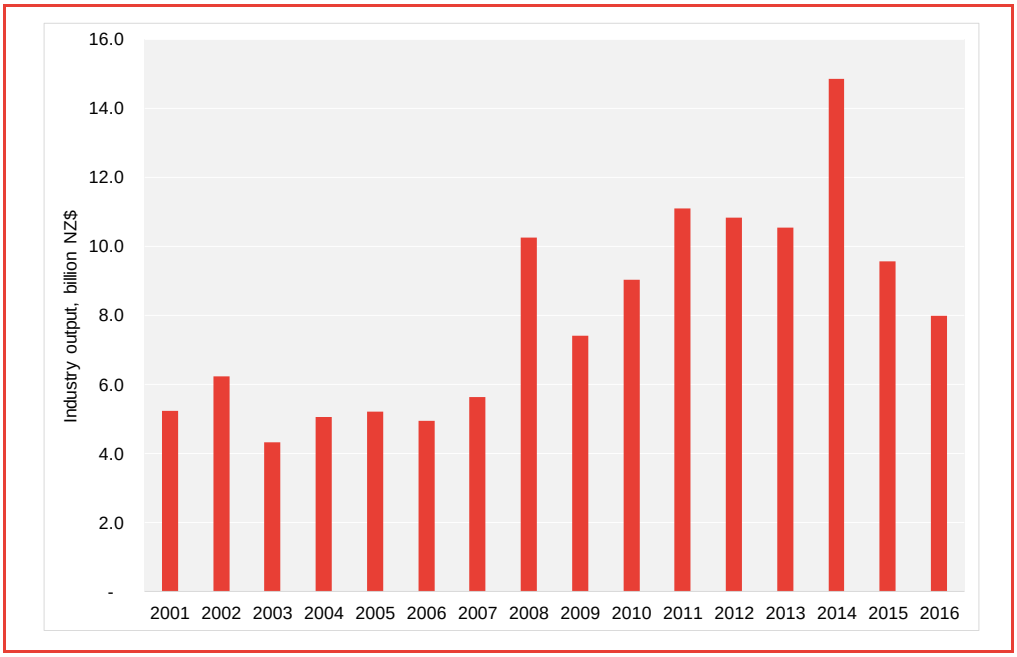
2.2 Value of sector

2.2.1 Industry output

As shown in Figure 1, the total value of output from dairy farming increased from NZ$5.2 billion in 2001 to a peak of NZ$14.9 billion in 2014, before falling to NZ$8.0 billion in 2016 (the latest year for which output data for dairy farming were available at the time of writing of this report). This represents a growth in output value of 53% between 2001 and 2016.

In 2016, dairy farming contributed to 1.7% of total New Zealand industry output. By contrast, the Australian dairy farming sector (the third largest agricultural industry behind beef and wheat), made up only 0.2% of total industry output in 2016/17 (dairy GDP contribution data is unavailable).

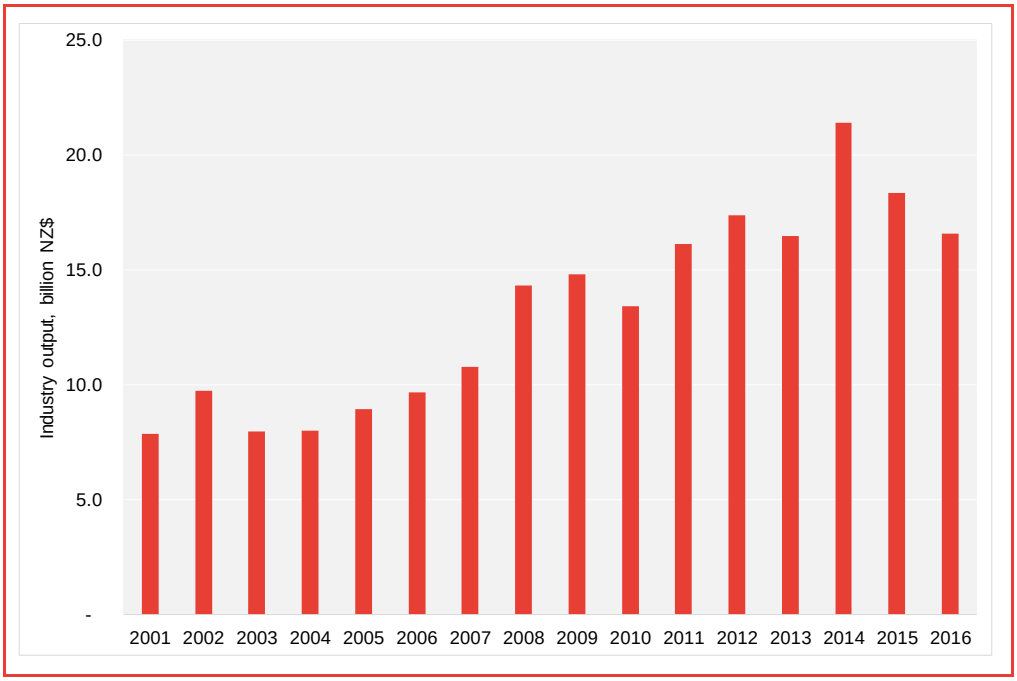
Figure 1: Industry output for dairy farming, NZ$ billion



Source: Stats NZ National accounts (industry production and investment)

Figure 2 below shows that the total value of output from dairy processing in New Zealand has increased from NZ$7.9 billion in 2001 to a peak of NZ$21.4 billion in 2014, before declining to NZ$16.6 billion in 2016. This represents a 111% increase in output value from 2001 to 2016.

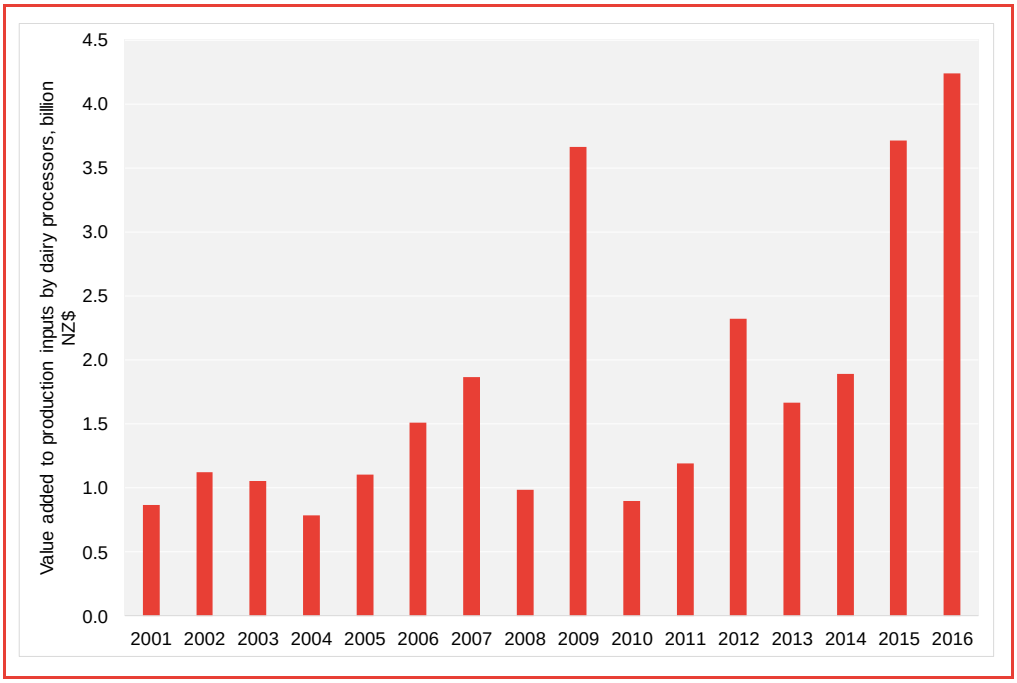
Figure 2: Industry output for dairy processing, NZ$ billion



Source: Stats NZ National accounts (industry production and investment)

We note that the total output value of dairy processors reported in Figure 2 reflects the value of all of the inputs to production to dairy processing, including the outputs from dairy farming. Figure 3 below presents the total value added to inputs to production by dairy processors. The data show that the total value added by dairy processors to production inputs has increased from $NZ0.9 billion in 2001 to NZ$4.2 billion in 2016 (an increase of nearly 470%).

Figure 3: Value added by dairy processors to inputs to production, NZ$ billion



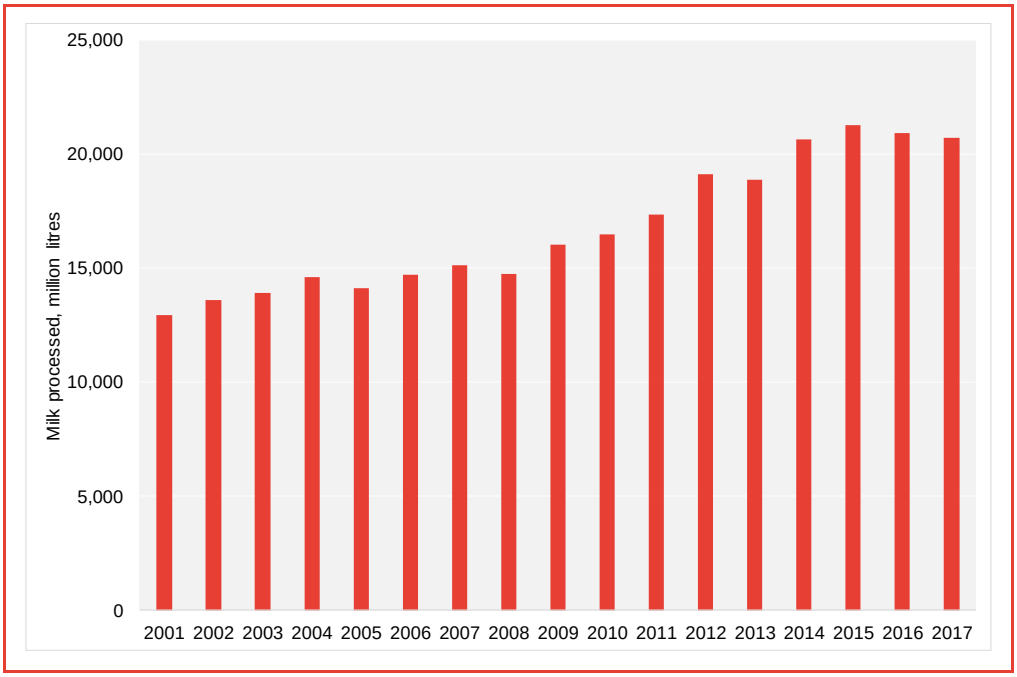
Source: Stats NZ National accounts (industry production and investment)

Figure 4 shows that the volume of milk processed by New Zealand processors has increased from 12.9 billion litres in 2001 to 20.7 billion litres in 2017 (an increase of approximately 60% over the period). By contrast, Australia's milk production has fallen by 20% over the period from 2001/02 to 9.0 billion litres in 2016/17.

As shown in Figure 5, the growth in the sector over this period can be attributed 56% to increased production volumes and 44% to higher prices.[3]

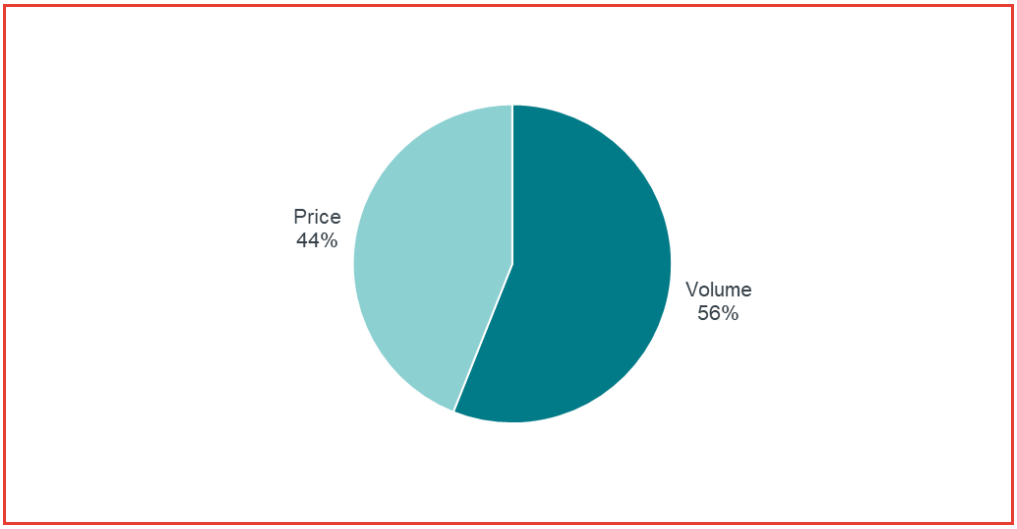
[3] In 2001, the sector generated 61 cents in value for every litre of milk produced. If this 61 cents had remained constant over time, then given the increase in volumes to 2016, the sector would have grown by $4.9 billion, or 56% of the $8.7 billion in growth achieved. In 2016, the average value per litre of milk had grown to 79 cents, thereby contributing $3.8 billion of growth, or 44% of the total sector growth.

Figure 4: Volume of milk processed in New Zealand from 2001 to 2017, million litres



Source: New Zealand Dairy Statistics 2016-17

Figure 5: Origin growth in dairy sector value

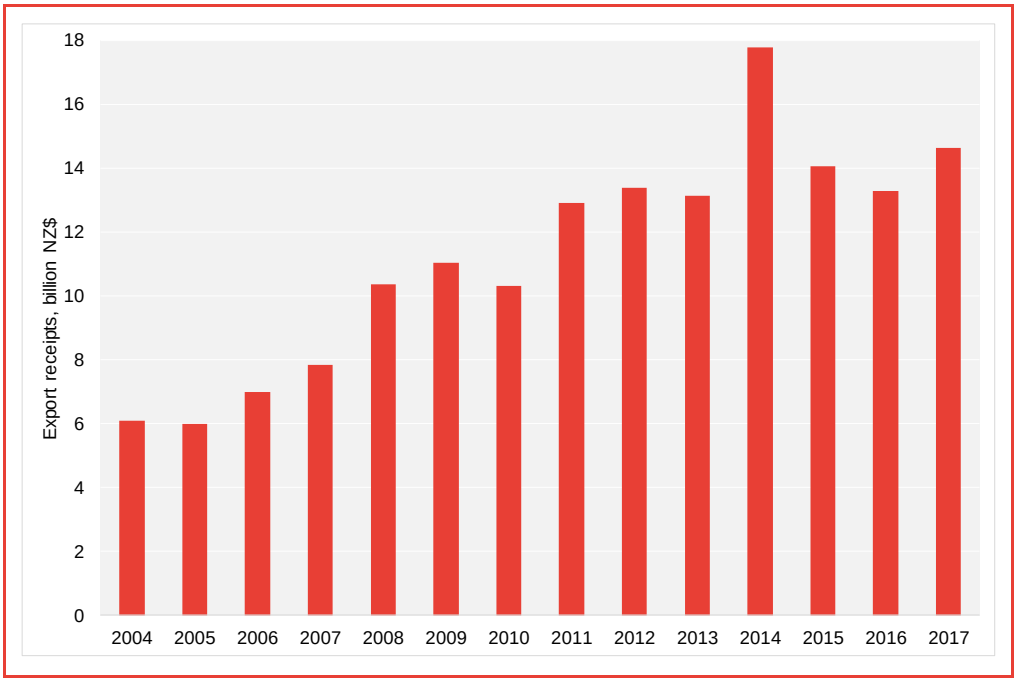


Source: DairyNZ; Stats NZ

The growth in New Zealand dairy processing output has been driven almost entirely by exports, given that domestic consumption only makes up approximately

5% of dairy demand.[4,5] The dairy industry is also the second largest export earner (behind tourism) in New Zealand.[6] As shown in Figure 6 below, exports grew from NZ$6.1 billion in 2004 (the earliest year for which we have information) to NZ$14.6 billion in 2017.[7]

Figure 6: Dairy export receipts from 2004 to 2017, nominal billion NZ$



Source: Stats NZ overseas merchandise trade

2.2.2 Seasonality of production

New Zealand milk production is very seasonal, relying on the warmer months to make up the bulk of production. Figure 7 shows the last three seasons of milk production, including the first few months of production in 2018. The winter months of June and July show a sharp drop in milk production, while production peaks during the spring months of October and November.

New Zealand's production seasonality does not appear to be declining. In contrast, in Victoria, the Australian state that produces the majority of Australia's dairy

4 TDB Advisory. Review of the Regulatory Environment for Domestic Dairy Products, p19. (Mar 2018). Commercial-in-Confidence

5 Dairy Companies Association of New Zealand. About the NZ Dairy Industry. Available at: https://www.dcanz.com/about-the-nz-dairy-industry/

6 NZ Herald. Tourism roars past dairy as NZ's biggest export earner. (Apr 2017). Available at: https://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=11847120

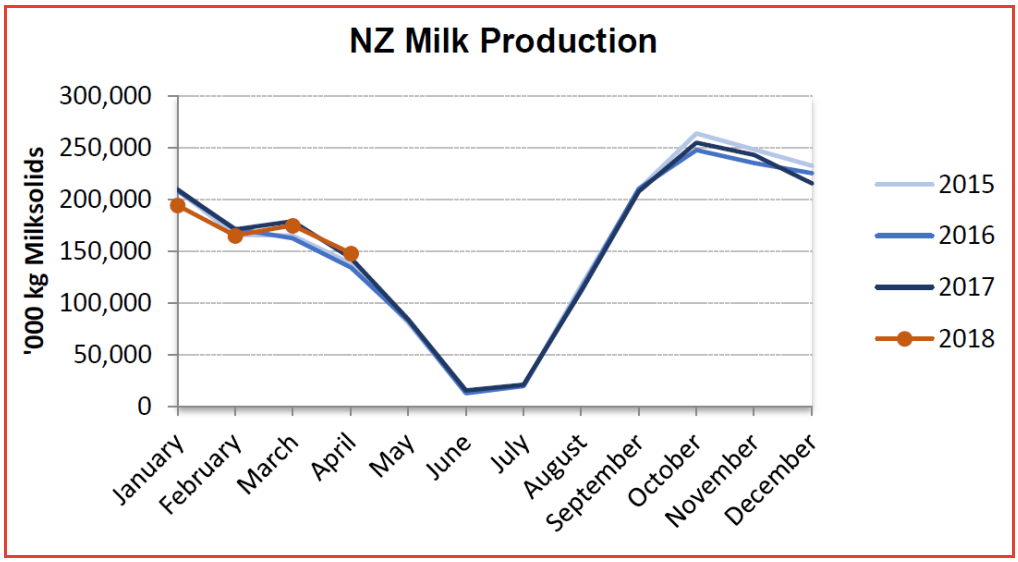
7 Data for the year ending June 2003 were provided by MPI, but was found to be incomplete and was therefore excluded.

output and exports, seasonality is declining in response to payment terms offered by processors. In Ireland, seasonality has increased in recent years as production has increased.

The highly seasonal nature of milk production is driven by the relatively low-cost method of farming—pasture grazing—favoured by farmers in New Zealand. Strong pasture growth in spring and summer provides an efficient method of feeding for dairy cattle by comparison to supplementary feed, which entails additional overheads. This choice gives New Zealand a comparative advantage over some other dairying nations that rely on supplementary feeding for milk production. Figure 8 shows how a lower cost of production can translate into a larger export share. However, the trade-off is that relative inefficiencies are introduced at the processing level of the supply chain, as processors must invest in and maintain excess processing capacity in order to manage peak season milk production.

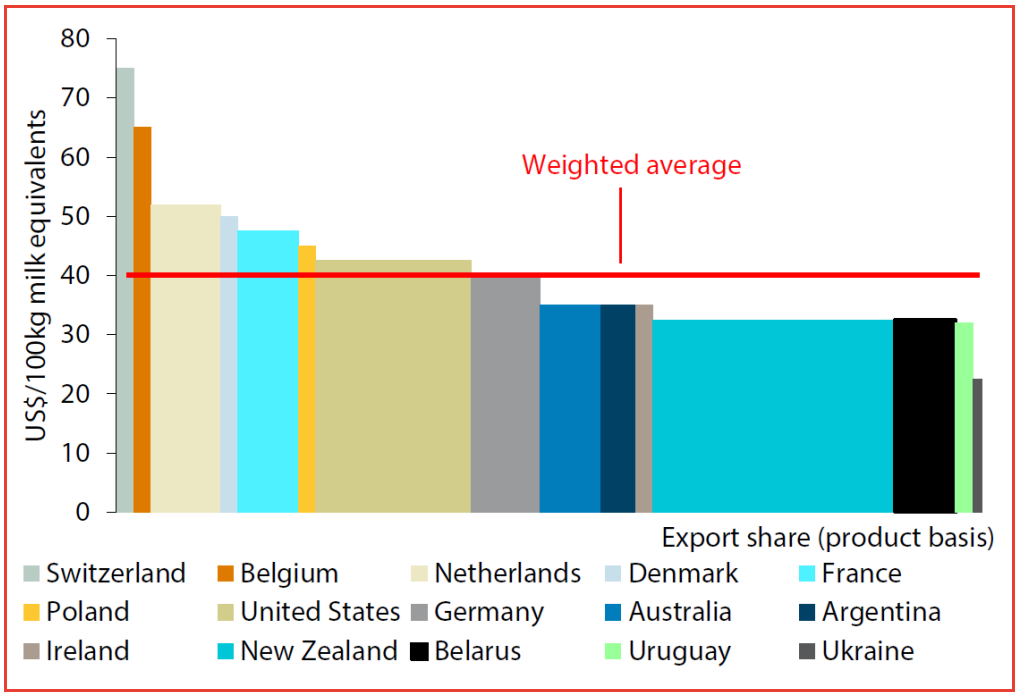
The extent to which these inefficiencies arise depends to an extent on the strategy adopted by the processors, discussed in more detail in Section 2.3. For example, for a large processor heavily invested in the production of milk powder such as Fonterra, this seasonality is likely to result in significant sunk costs and excess capacity at various times of the year. However, smaller processors with a different product mix may choose to commission a less peaky supply curve, increasing milk purchasing costs but reducing the investment in excess capacity.

Figure 7: New Zealand milk production by month



Source: Dairy Companies Association of New Zealand

Figure 8: Average cost of production for 15 top export countries



Source: ANZ, IFCN, Dairy NZ

2.2.3 Exports

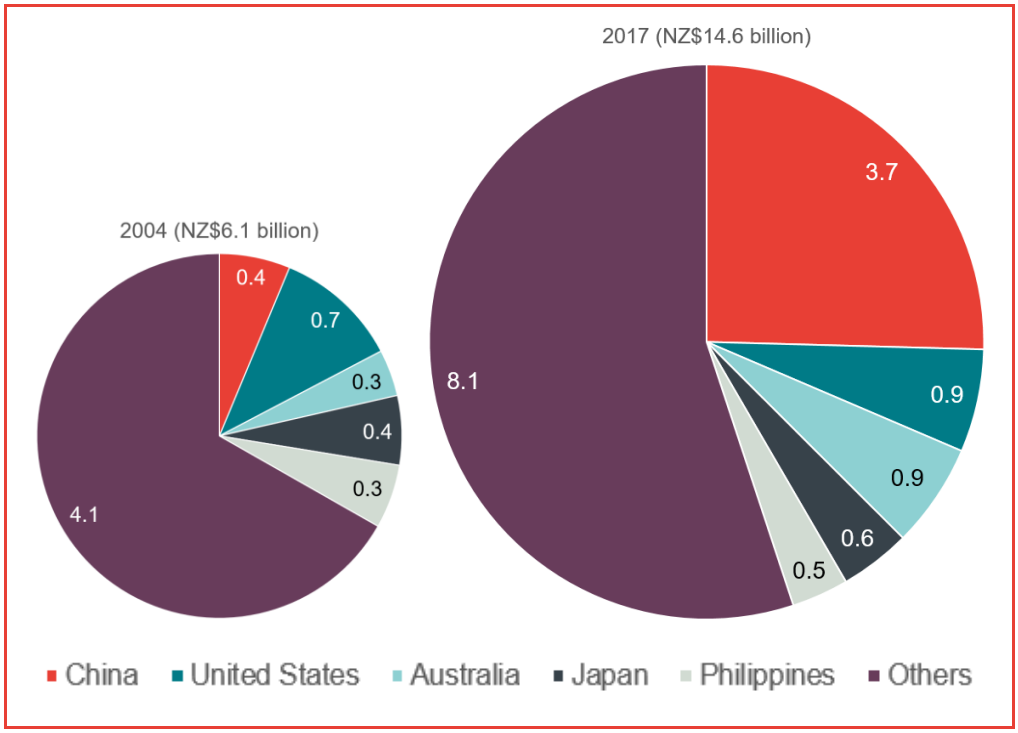
Dairy exports have grown at around 7% per annum (on average) over the period since 2004, with the 2017 value of $14.6 billion representing an increase of more than 2.4 times the 2004 value. At least in recent years, dairy remains the largest goods export sector for New Zealand.[8] From 2004 to 2017, dairy export growth to China contributed 39% of total dairy export growth; dairy export growth to China outstripped all other major export destinations in terms of absolute value ($3.3 billion) and growth rate (approximately 19% per annum). By way of comparison, around 37% of Australia's milk production is exported, with the value of exports falling by 6% over the period from 2000/01 to NZ$3.2 billion in 2016/17, with China becoming an increasingly important market for Australian dairy exports. Meanwhile, Ireland exports over 90% of its dairy production. Irish exports have increased significantly in recent years as the milk quota was removed – growing 19% in 2017 to $6.7 billion. Irish dairy exports to China grew by 50% between 2013 and 2017, and is now Ireland's second largest export market (after the European Union).

New Zealand dairy products are exported to 154 other countries, up from 143 in 2004. Dairy import demand from China has increased rapidly from a low base, to

8 New Zealand Institute of Economic Research. Dairy trade's economic contribution to New Zealand. (Feb 2017). Available at: https://nzier.org.nz/static/media/filer_public/29/33/29336237-3350-40ce-9933-a5a59d25bd31/dairy_economic_contribution_update_final_21_february_2017.pdf

comprise around 25% of New Zealand total dairy exports in 2017, as illustrated in Figure 9 below.

Figure 9: Dairy export value by destination country from 2004 to 2017 (year ending 30th June), nominal billion NZ$



Source: Stats NZ overseas merchandise trade

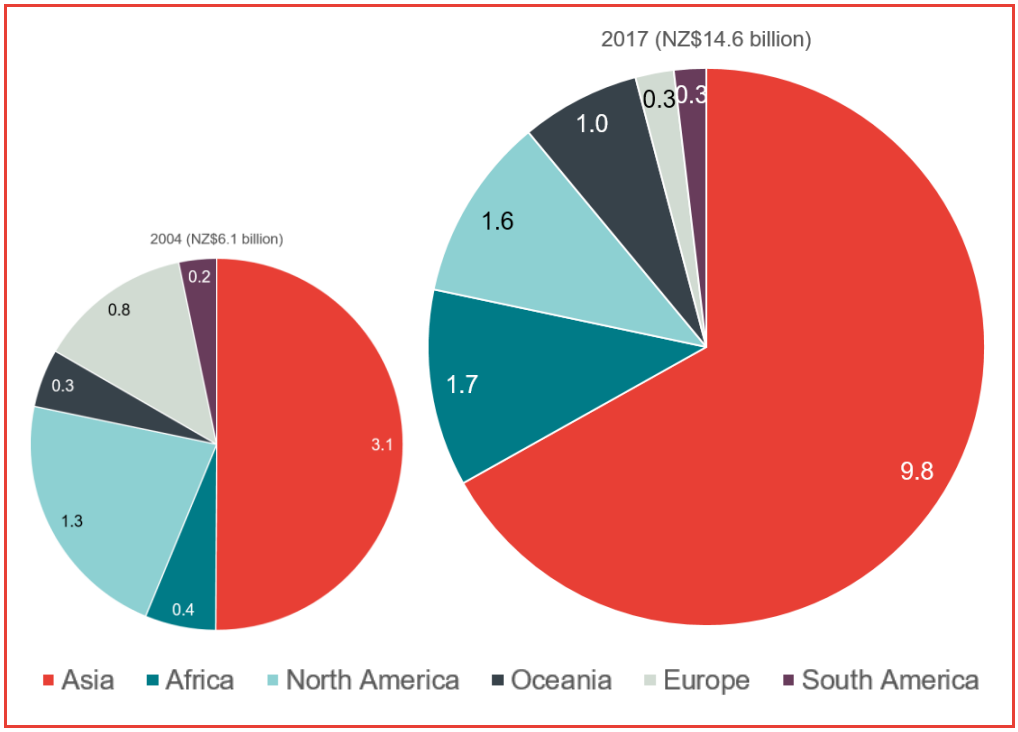
Figure 10 below shows dairy export value by destination continent, with strong growth in demand between 2004 and 2017 from Asia (9% per annum) and Africa (12% per annum). In terms of the dollar value of exports, Asia is today by far the largest market for New Zealand dairy products, with export receipts in 2017 to Asia just under NZ$10 billion.

Meanwhile, low growth in demand is observed for North America (1% per annum) and exports to Europe exhibited negative growth (-7% per annum). While these markets have potential high demand for premium products, they also face high trade barriers (e.g., tariffs outside of quotas). Negative growth in Europe may be a result of European milk quota being increased and then removed, thereby allowing for increased domestic production, which is likely to have crowded out imported dairy products.

The New Zealand dairy sector has not succeeded in significantly increasing market penetration into North America. By contrast, Irish exports to the US grew by 150% between 2013 and 2017, making the US Ireland's third largest export market (after the European Union and China). In large part, this is driven by Kerry's and Glanbia's nutrition exports as discussed in the Irish case study in section 8.3.3).

Similar to New Zealand, the vast majority of Australian dairy exports are to Asian countries.

Figure 10: Dairy export value by destination continent from 2004 to 2017 (year ending 30th June), nominal billion NZ$



Source: Stats NZ overseas merchandise trade

Figure 11 shows that between 2004 and 2017 there has been a significant increase in the value of exports across all product categories. Specifically, between 2004 and 2017 the export value of:

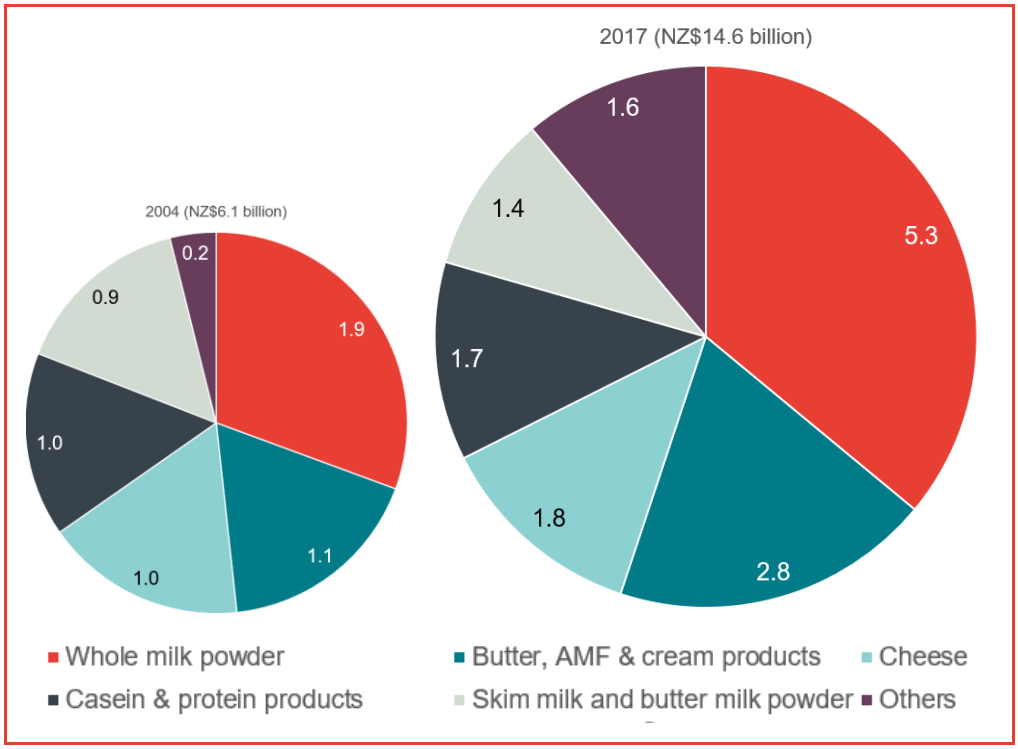
- Whole milk powder increased from NZ$1.9 billion to NZ$5.3 billion (an increase of 283%);
- Butter, AMF and cream products from NZ$1.1 billion to NZ$2.8 billion (an increase of 260%);
- Cheese, and casein and protein products, from approximately NZ$1.0 billion to approximately NZ$1.8 billion (an increase of approximately 180%);
- Skim milk and butter milk powder from NZ$0.9 billion to NZ$1.4 billion (an increase of 150%); and
- Other dairy products from NZ$0.2 billion to NZ$1.6 billion (an increase of 683%). The growth in this category could indicate an expansion in variety of products and/or growth in premium products, although the data are not sufficiently disaggregated to discern this definitively.

In terms of the share of export value derived from various products:

- The share of export value derived from whole milk powder has increased from 31% in 2004 to 36% in 2017.
- The share of export value attributable to butter, AMF and cream has remained relatively constant over the period from 2004 to 2017, increasing from 18% to 19%.
- The share of export value from cheese has fallen from 17% in 2004 to 13% in 2017.
- Casein and protein products' contribution to export value has also decreased from 16% to 12%.
- Skim and butter milk powder as a proportion of export value have fallen from 15% in 2004 to 9% in 2017.
- The share of export value derived from other products has increased from 4% in 2004 to 11% in 2017.

Whole milk powder was consistently the largest dairy export product by value and has contributed the most (40%) to growth in dairy exports between 2004 and 2017.

Figure 11: Historical dairy export value by product type from 2004 to 2017 (year ending 30th June), nominal billion NZ$

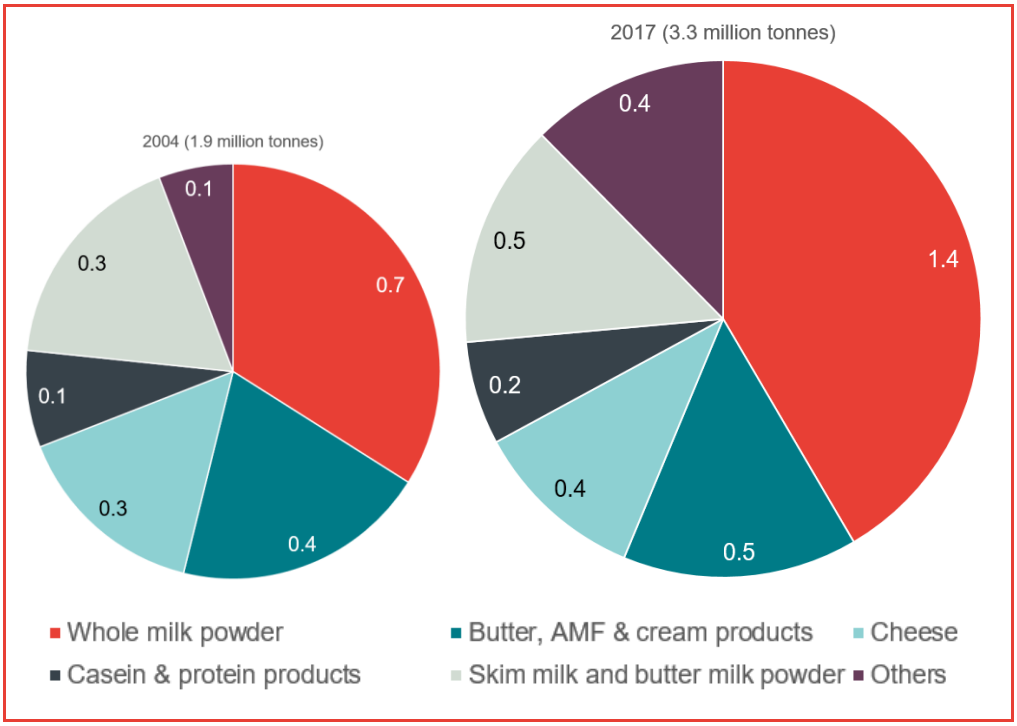


Source: Stats NZ overseas merchandise trade

Figure 12 shows that there has been a very significant increase in the volume of exports in all of the product categories shown in Figure 11. This suggests that

much of the increase in the export value of dairy products has been driven by a large expansion in export volumes. However, as Table 1 shows the increase in the value of exports between 2004 and 2017 has outpaced the change in volume of exports across all product categories. This could be due partly to fluctuations in exchange rates (as Figure 15 shows, the NZD/USD exchange rate appreciated by around 8% between 2004 and 2017). This could also be due, in part, to New Zealand dairy exporters being able to command a higher price for products sold overseas (e.g., due to an increase in quality and/or demand for those products).

Figure 12: Historical dairy export volume by product type from 2004 to 2017 (year ending 30th June), million tonnes



Source: Stats NZ overseas merchandise trade

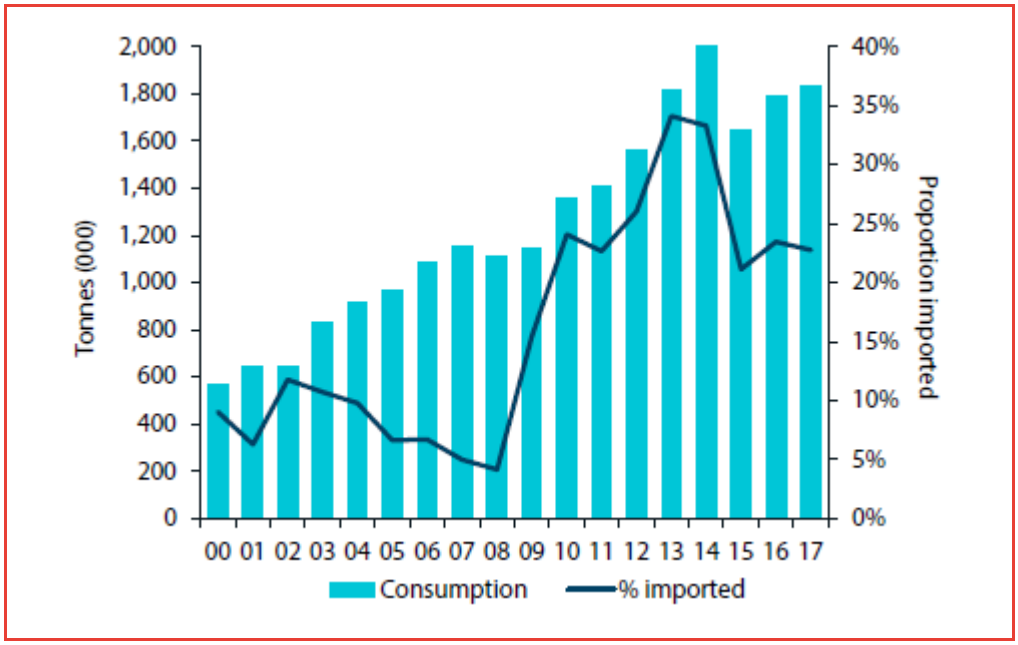
Table 1: Change in value and volume of exports between 2004 and 2017

Product category	Change in value	Change in volume
Whole milk powder	283%	205%
Butter, AMF & cream products	260%	124%
Cheese	177%	119%
Casein & protein products	182%	143%
Skim milk and butter milk powder	150%	134%
Others	683%	357%

Source: Stats NZ overseas merchandise trade

There is evidence of strong growth in demand for particular dairy products, such as whole milk powder, from countries like China (see Figure 13). In particular, a 2014 spike in export value occurred, largely due to China's temporary increase in demand for whole milk powder, following a series of food safety scares and supply concerns in China.[9]

Figure 13: China's consumption and imports of whole milk powder

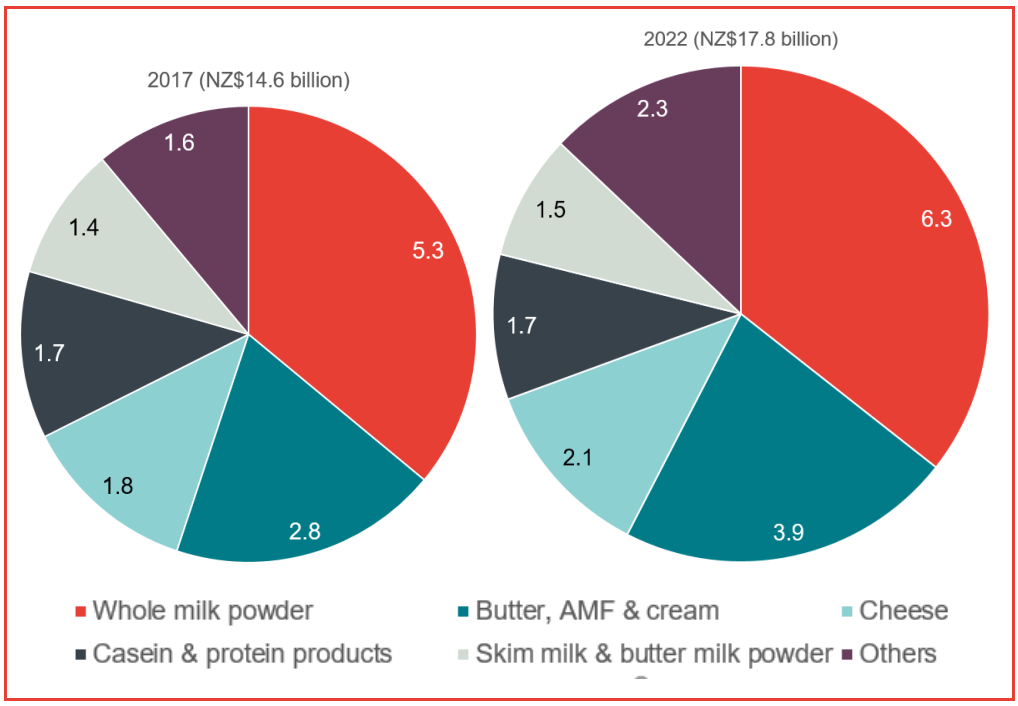


Source: ANZ AgriFocus, June 2018, Figure 13; OECD data

As illustrated in Figure 14, dairy exports are expected by MPI to only grow at a moderate rate of approximately 4% per annum between 2017 and 2022, in line with slowing economic growth and expected consumer demand in China.

9 Reuters. Milk prices sink as "white gold" floods even China demand. (Aug 2014). Available at: https://www.reuters.com/article/dairy-prices/milk-prices-sink-as-white-gold-floods-even-china-demand-idUSL4N0QC2JR20140806

Figure 14: Forecast dairy export value by product type from 2017 to 2022 (year ending 30th June), nominal billion NZ$

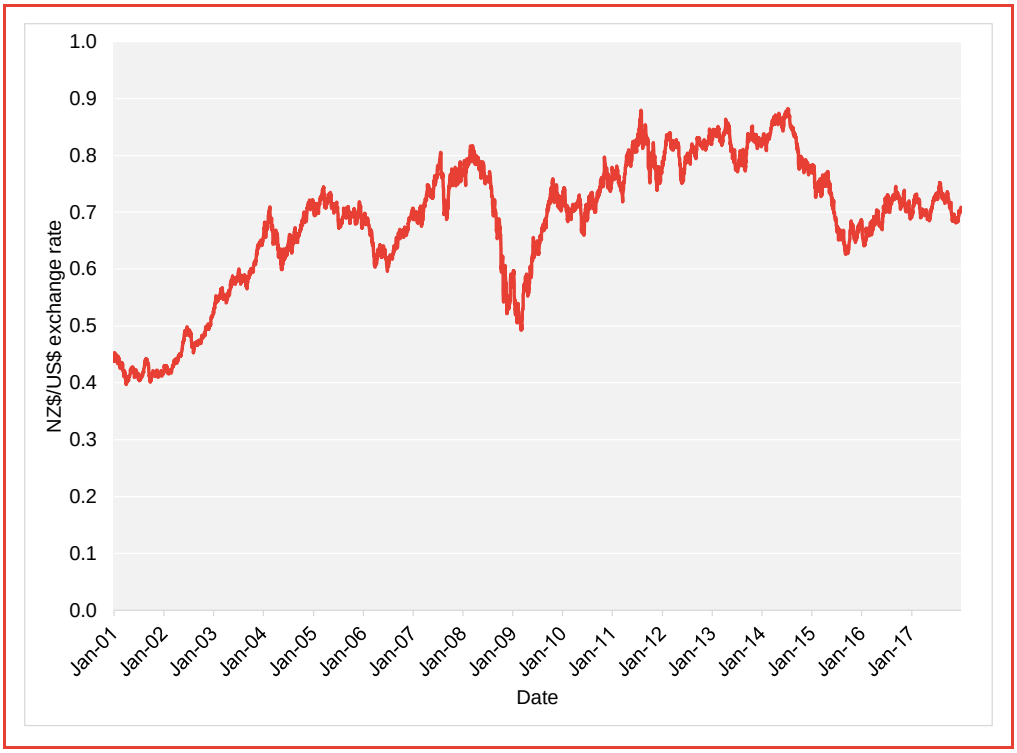


Source: Situation and Outlook for Primary Industries forecasts prepared by MPI

As the vast majority of dairy output is exported (approximately 95%), the value of the New Zealand dairy sector is highly exposed to exchange rate movements. As shown in Figure 15 below, the New Zealand dollar has appreciated against the US dollar gradually between 2001 and 2017 at approximately 3% per annum. This means that, over the period since 2001, New Zealand dairy exports have become more expensive to overseas buyers due to exchange rate movements. Given the global nature of trade in processed dairy products, and the focus of the New Zealand dairy sector on exports, the value of dairy sector to New Zealand is influenced heavily by exchange rate fluctuations.[10]

[10] It is also worth noting that, given the significant contribution of dairy exports to total trade in New Zealand merchandise, it is likely that the value of the New Zealand currency is influenced by global demand for New Zealand dairy products. Hence, exchange rate movements are unlikely to be completely exogenous to the New Zealand dairy sector.

Figure 15: Daily NZ$ / US$ exchange rate from 2001 to 2017



Source: Thomson Reuters

According to ANZ's commodity price index, dairy prices in 2017 were 6% higher than dairy prices in 2001. Figure 16 shows that according to ANZ's commodity price index, dairy commodity prices rose significantly between 2002 and 2008, before dropping off and then peaking again at 2008 levels in 2013.

Comparing ANZ dairy prices to Global Dairy Trade (GDT) prices in Figure 16, the timing of peaks and troughs are similar, but GDT prices show even higher volatility. Furthermore, the ANZ dairy prices are roughly consistent with the trend of Fonterra farmgate milk pricing shown in Figure 17 (note the difference in year ending months). It is possible that the differences in the level of these indices reflects differences in the methodologies used to construct the indices, the product composition and weighting of products within the index, and exchange rates (GDT prices are in US dollars while ANZ prices are in New Zealand Dollars).

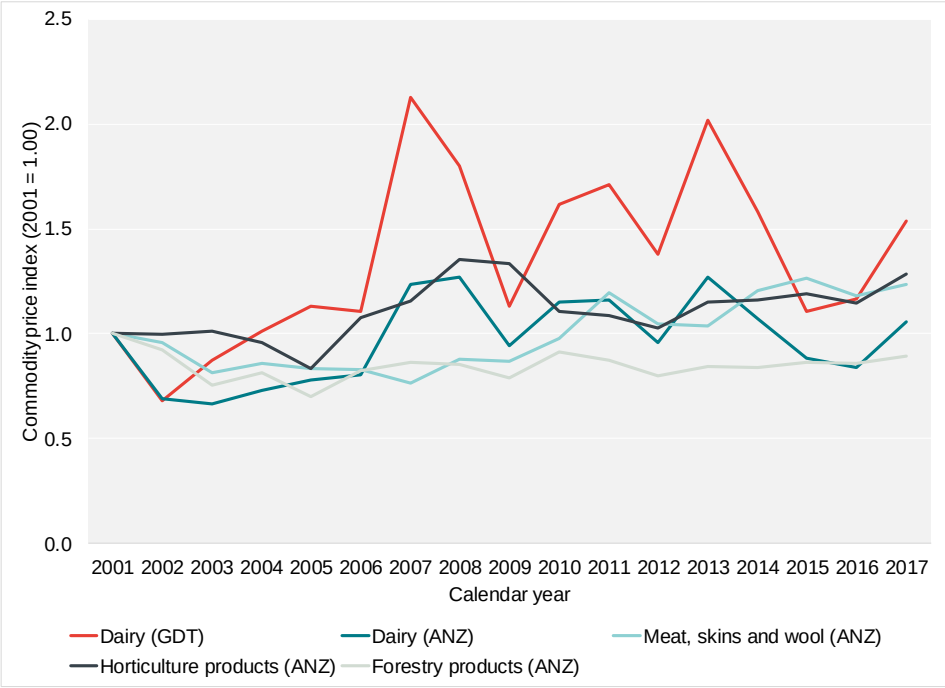
Comparing ANZ dairy prices with other land-based commodity prices, global prices for horticultural products and meat, skins and wool have risen by over 20% between 2001 and 2017. Global prices of forestry products have remained relatively flat over the past 15 years.

While dairy commodity price and exchange rate fluctuations have impacted the market value of the New Zealand dairy sector by introducing average price fluctuations from year to year, long term growth is probably mostly due to rising quantities. In other words, the significant growth in the value of the New Zealand

dairy sector since 2001 appears to have been driven largely by global demand for dairy products, rather than large and sustained increases in global dairy prices.

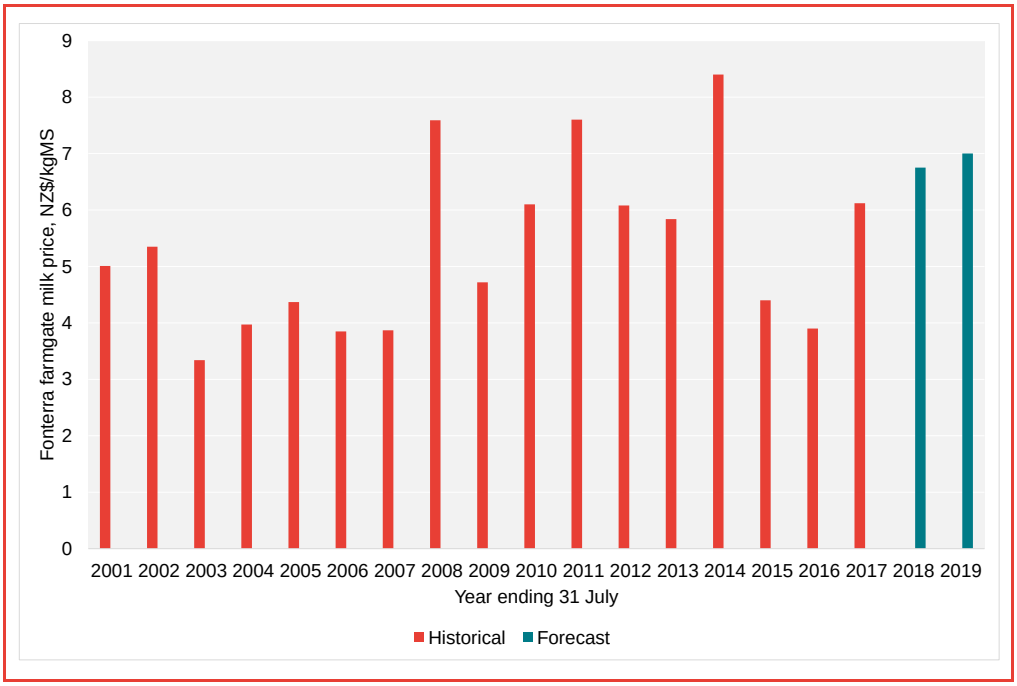
However, a sharp (albeit temporary) increase in global dairy prices did occur between 2002 and 2008, and may have encouraged participation in the sector (e.g., through conversion to dairy production from other land uses—see section 3.2). This may have positioned the sector to take advantage of the very substantial growth in demand from Asia that occurred since 2002.

Figure 16: Comparison of land-based commodity prices from 2001 to 2017



Source: ANZ Commodity Price Index, Global Dairy Trade

Figure 17: Fonterra farmgate milk price



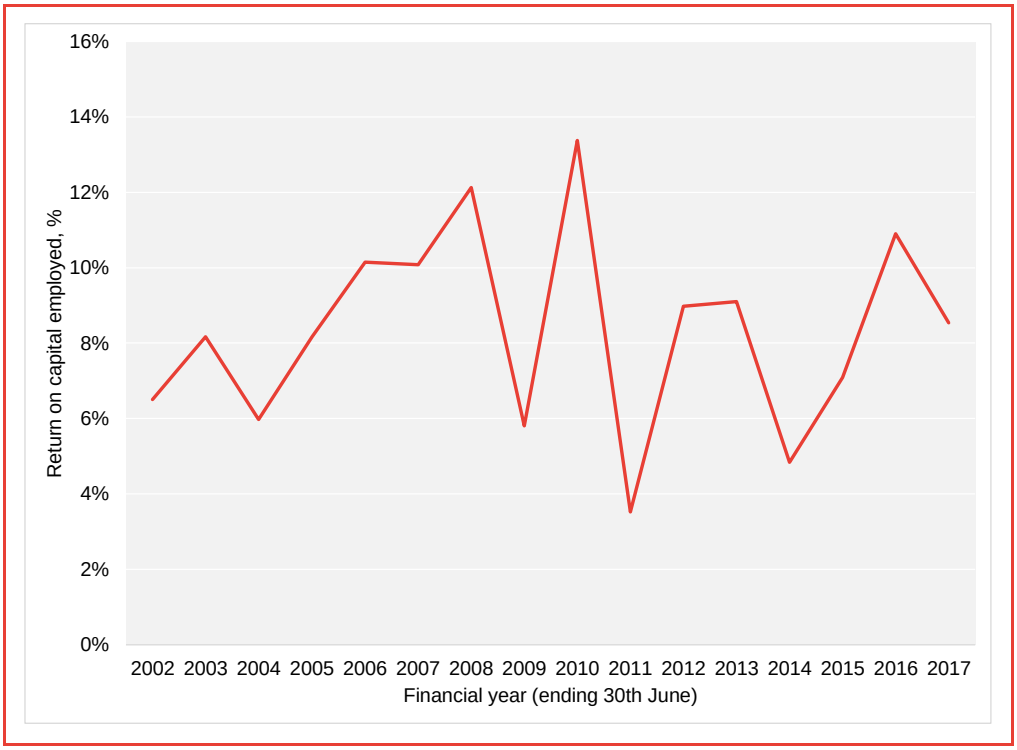
Source: Fonterra annual reports

2.2.4 Return on capital

As shown in Figure 18, Fonterra's return on capital employed[11] is volatile from year-to-year, ranging between 3% and 14% for the years 2002 to 2017, mostly due to volatility in Earnings Before Interest and Tax (EBIT).

[11] Return on capital employed = EBIT / (total assets – current liabilities). Total assets include intangible assets such as goodwill / brand value from advertising and marketing activities.

Figure 18: Return on capital employed for Fonterra from 2002 to 2017



Source: Fonterra financial statements, MPA provided data

Note: Return on capital employed = EBIT / (total assets – current liabilities). Total assets include intangible assets such as goodwill / brand value from advertising and marketing activities.

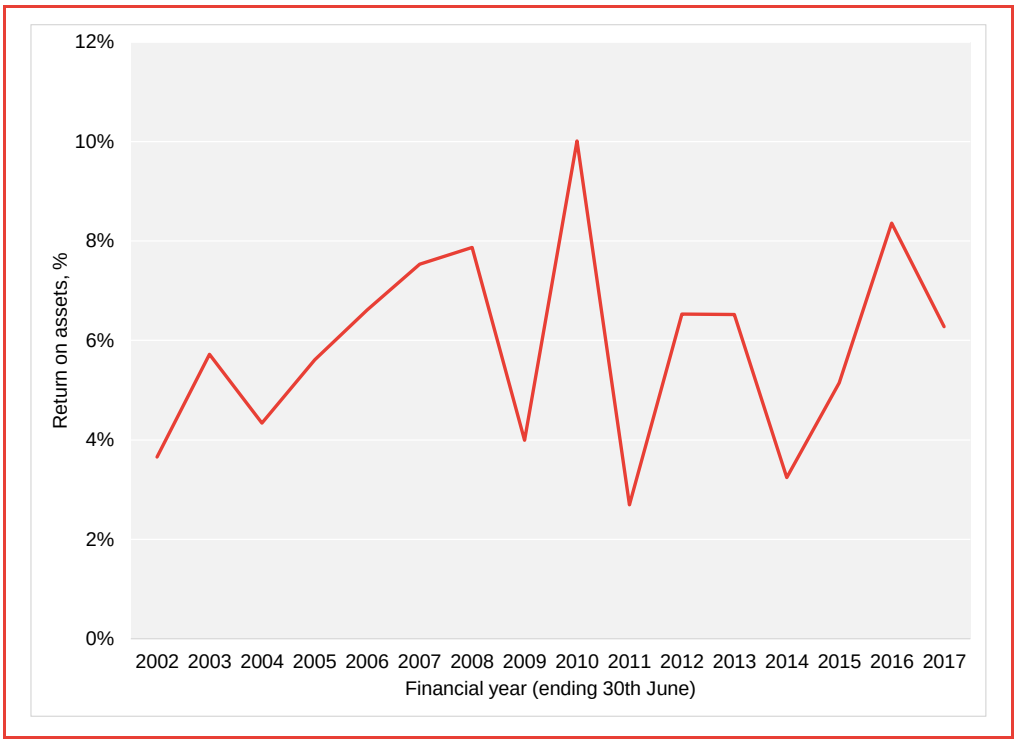
Fonterra's return on assets[12] (ROA) has ranged between 3% and 10% over the past 15 years (shown in Figure 19). There is no clear evidence of an upward trend in returns over this period.

Other dairy processors have had similarly volatile, but generally higher ROA (relative to Fonterra) over the years for which data are readily available. The ROA for Goodman Fielder, Open Country Dairy and Synlait, three of the largest dairy processors in New Zealand, are illustrated in Figure 20, Figure 21 and Figure 22, respectively.

By contrast, Ireland's two largest dairy companies – Kerry Foods and Glanbia – have earned less volatile returns over the last five years. Kerry Foods' returns have been between 9% and 11%, and Glanbia returns have ranged between 8% and 10% (see section 8.3).

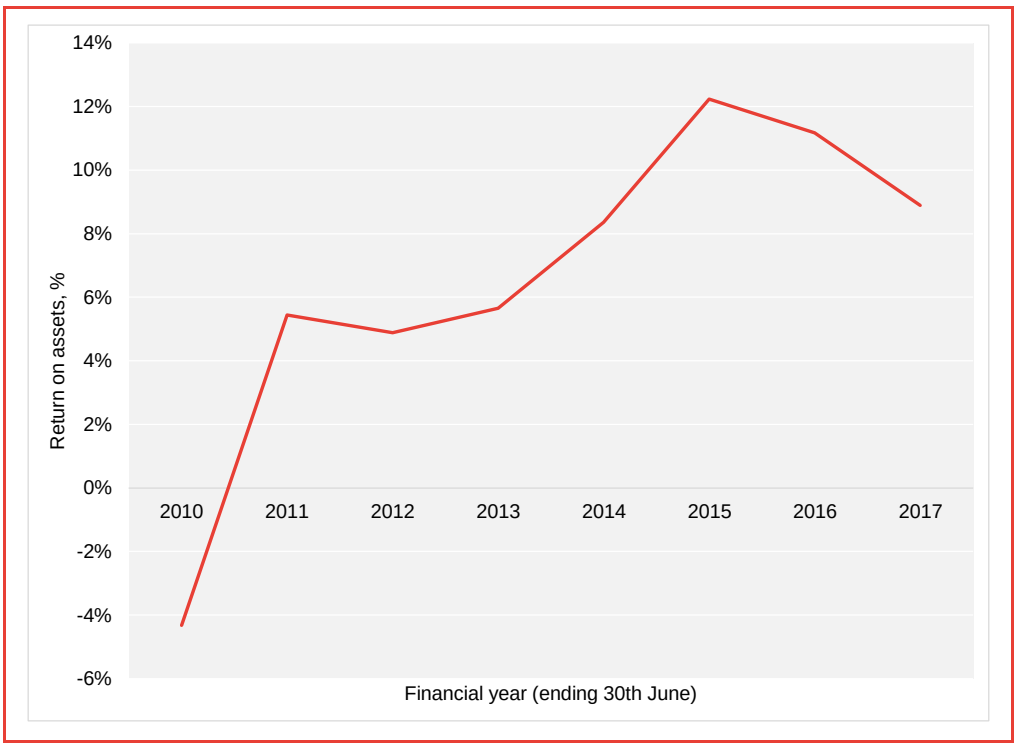
12 Return on assets = EBIT / total assets

Figure 19: Return on assets for Fonterra from 2002 to 2017



Source: Fonterra financial statements, MPI provided data

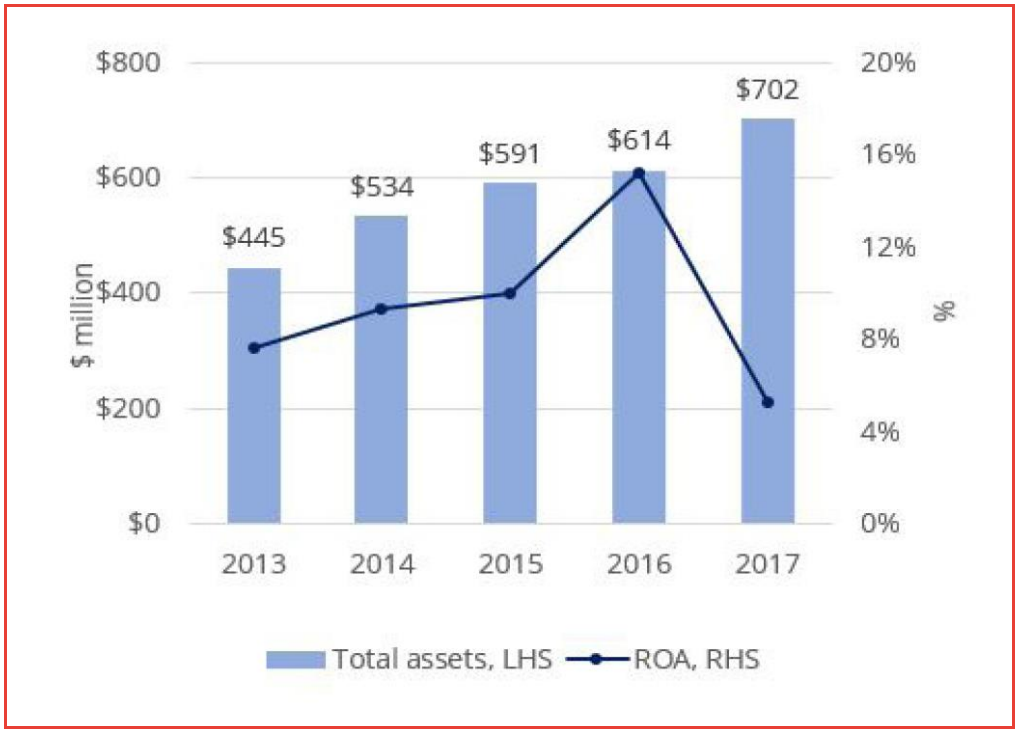
Figure 20: Return on assets for Goodman Fielder (including non-dairy products) from 2010 to 2017



Source: Goodman Fielder annual reports

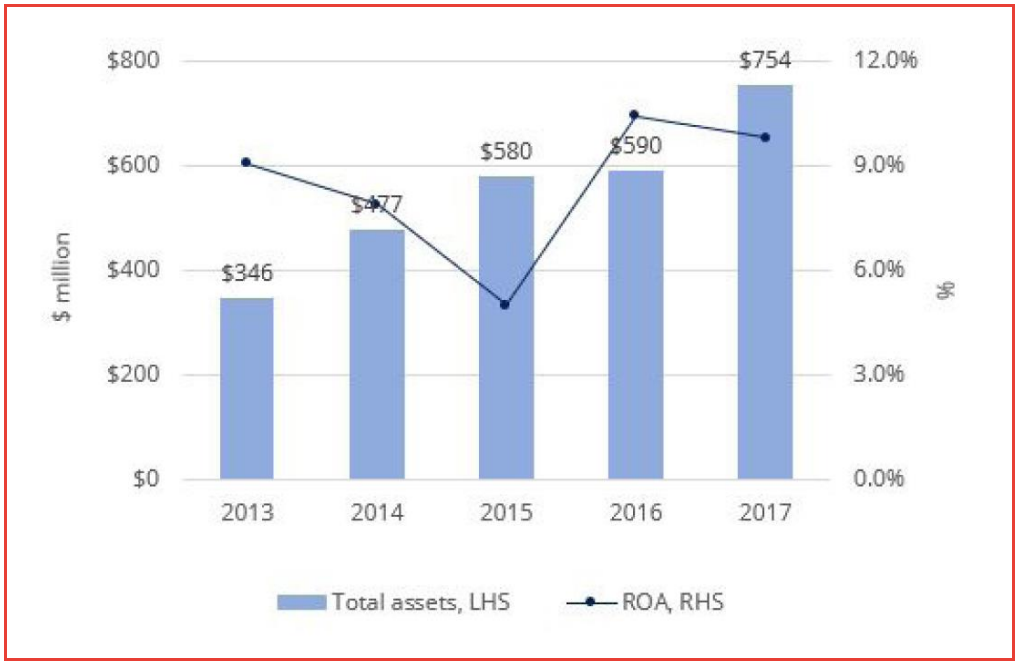
Note: 2015 ROA peak was due to asset sales, reducing the asset base while increasing EBIT

Figure 21: Return on assets for Open Country Dairy from 2013 to 2017



Source: TDB Advisory. New Zealand Dairy Companies Review (Apr 2018)

Figure 22: Return on assets for Synlait from 2013 to 2017



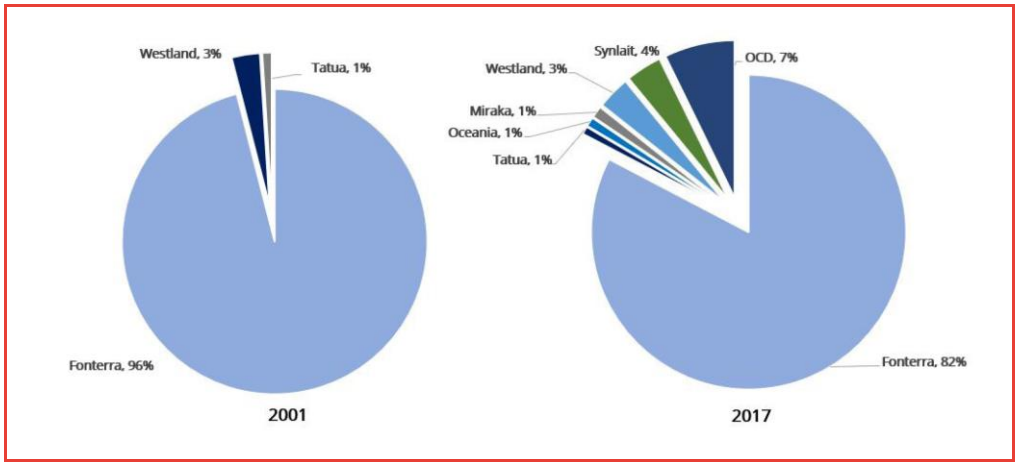
Source: TDB Advisory. New Zealand Dairy Companies Review (Apr 2018)

2.3 Market structure of processing industry

2.3.1 Structure of the farmgate milk market

Fonterra's share of milk collected at the farm gate in New Zealand has fallen from 96% in 2001 to 82% in 2017, as illustrated in Figure 23. The volume of milk processed has increased at a CAGR of 3% from 12.9 billion litres in 2001 to 20.7 billion litres in 2017. This means that even though Fonterra's share of the farmgate milk market may have declined, the total volume of milk it collects has increased substantially since 2001.

Figure 23: Dairy processors' volume-based market share

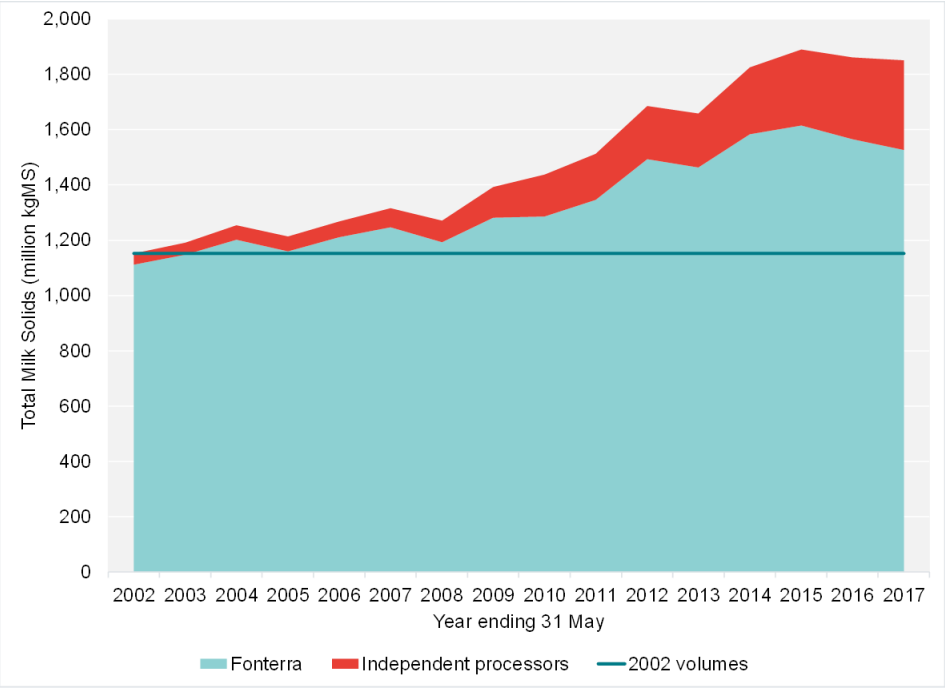


Source: TDB Advisory. New Zealand Dairy Companies Review (Apr 2018)

Note: The figure above is based on milk volume collections, and hence excludes Goodman Fielder (categorised under Fonterra)

As Figure 24 shows, independent processors account for approximately 41% of the increase in raw milk solids collected since 2001, while Fonterra accounts for 59% of growth in raw milk solids collected. Hence, independent processors have played a significant role in expansion of the sector since 2001.

Figure 24: Estimated volumes of milk solids collected by Fonterra and independent processors



Source: Fonterra, DairyNZ

Table 2 below presents a June 2015 snapshot for the regional market shares of Fonterra and major independent processors in New Zealand, while Figure 25 presents the geographic coverage of the major independent processors in New Zealand.

Table 2 shows that Fonterra was currently the only processor with truly national coverage, with 77% or more of the farmgate market in all major dairying regions—except the West Coast, which was served entirely by Westland in 2015. Of the independent processors, Open Country Dairy had the broadest coverage, operating in Auckland, Waikato, Bay of Plenty, Otago and Southland. The regions with the greatest number of processors were Canterbury, Auckland, Waikato and Bay of Plenty.

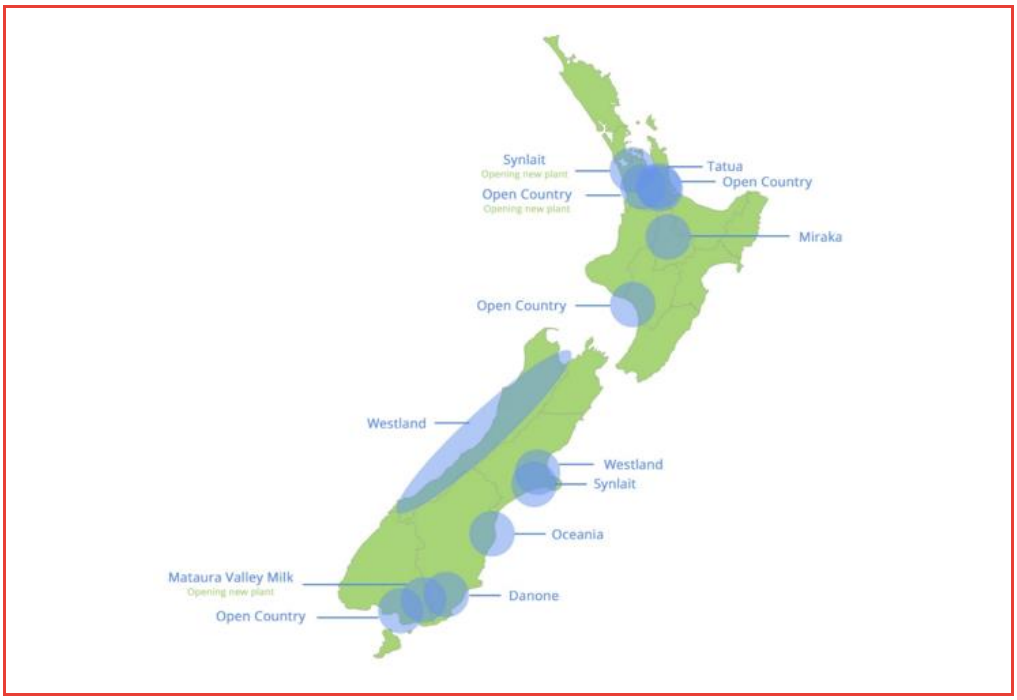
Table 2: Farmgate market share of total collections, 2014/15 dairy season

Company	Canterbury	Auckland / Waikato / Bay of Plenty	Otago / Southland	Taranaki	Northland	West Coast
Fonterra	76.9%	87.1%	89.2%	89.6%	99.0%	
Synlait	14.9%					

Company	Canterbury	Auckland / Waikato / Bay of Plenty	Otago / Southland	Taranaki	Northland	West Coast
Oceania	4.1%					
Westland	4.0%					100%
Open Country		7.1%	9.7%	10.4%		
Miraka		3.4%				
Tatua		2.4%				
Green Valley		0.1%				
Danone Nutricia			1.2%			
Fresha Valley					1.0%	

Source: Commerce Commission, 2016, *Review of the state of competition in the New Zealand dairy industry, Table 4.1; Footnote 15, p. 13*

Figure 25: Geographic coverage of major independent processors



Source: Westland, 2018, DIRA; Ensuring an effective and innovative industry presentation

There have also been numerous small-to-medium and niche participants enter to serve domestic demand, primarily providing premium products and/or servicing local consumers. A summary of processors focussed on domestic supply is provided in Table 3 below. The entry of these small processors is likely to have

increased consumer choice in domestic markets since the introduction of the DIRA – as discussed in Section 4.

Table 3: Dairy processors competing in New Zealand's domestic markets from pre-Fonterra period up to 2013

Independent processor	Year established	Products
Goodman Fielder	Pre-2001	UHT Milk, fresh milk and cream, cheddar cheese, yoghurt, other cultured products
Fresha Valley	Pre-2001	Fresh milk and cream, butter
Karikaas Natural Dairy Products	Pre-2001	Butter, Cheese
Evansdale Cheese	Pre-2001	Cheese
Barrys Bay Cheese	Pre-2001	Yoghurt
Serra Natual Foods	Pre-2001	Cheese
Talbot Forest Cheese	Pre-2001	Cheese
Whitestone Cheese	Pre-2001	Butter, cheese
Talleys Crème de la Crème	Pre-2001	Ice cream
Emerald Foods	Pre-2001	Ice cream
Waimata Cheese	Pre-2001	Cheese
Biofarm Products	Pre-2001	Fresh milk and cream, yoghurt
Zany Zeus	Pre-2001	Fresh milk and cream, cheese, yoghurt, other cultured products, ice cream
Mahoe Cheese	Pre-2001	Cheese
Meyer Cheese	Pre-2001	Cheese
Deep South Ice Cream	Pre-2001	Ice cream
Mercer Cheese	Pre-2001	Cheese
Rush Munro's	Pre-2001	Ice cream
Much Moore	Pre-2001	Ice cream
Clearwaters	2002	n/a
Green Valley Dairies	2003	Fresh milk and cream, butter, yoghurt
Grinning Gecko Cheese Company	2004	Cheese

Independent processor	Year established	Products
Neudorf Dairy	2004	Cheese, yoghurt
Gopals Sweets and Snacks	2005	Cheese, yoghurt
Kingsmeade Cheese	2006	Cheese
Mount Eliza Cheese	2007	Cheese
Retro Organics	2007	Fresh milk and cream, cheese, yoghurt
Over the Moon	2007	Cheese
Kohu Road	2007	Ice cream
Clevedon Buffalo	2009	Cheese, yoghurt
Epicurean Dairy	2009	Fresh milk and cream, cheese, other cultured products
Emilio's Cheese	2010	Cheese
Wooden Spoon Freezery	2011	Ice cream
Mt Grey Cheese	2012	Cheese
Blue River Dairy	2013	Cheese

Source: Data provided by MPI

There has been little significant entry into so-called factory gate markets—that is, markets in which processors wholesale raw milk to other processors.[13] Buyers in this market have instead relied on milk supplied by Fonterra under the Raw Milk Regulations Milk, although we understand that Danone has recently started purchasing factory gate milk from suppliers other than Fonterra, such as from Synlait.[14]

2.3.2 Ownership structure and degree of vertical integration of processors

As noted above, the largest processor in New Zealand is Fonterra. Fonterra's cooperative structure means that it is owned by farmer shareholders. Fonterra does not invest in ownership of farms in New Zealand. Instead dairy farmers invest in ownership of Fonterra. However, Fonterra has invested in dairy farms overseas

13 Commerce Commission, 2016, *Review of the state of competition in the New Zealand dairy industry*.

14 Dene Mackenzie, "Danone damages anger Fonterra", *Otago Daily Times*, 2 December 2017, Available at: https://www.odt.co.nz/business/danone-damages-anger-fonterra

(e.g. China[15]). In Australia, the historical cooperative ownership structure of processing has largely been replaced by investor ownership, with the six largest processors owned by foreign corporates. However, all new entrant processors in New Zealand have adopted investor ownership models, where equity is either privately held or raised through public listing (see Table 5 below).

Fonterra is fully vertically integrated across all activities at the processing level, including: collection of raw milk, primary processing, further processing, food production and marketing. With the notable exception of Goodman Fielder, independent processors tend to be vertically integrated (to varying extents) as well.

By comparison, in Ireland, some large cooperatives are fully vertically integrated at the processing level but others such as Abbot, Danone and Pfizer are not. The ability of processors in Ireland to specialise in certain levels of the supply chain (e.g., food manufacturing, or milk collection and primary processing, or secondary processing) appears to have freed up processors to innovate more and focus on developing a large variety of value-added products. If new entrant processors can only succeed in a market by providing a fully vertically integrated offering (from milk collection, through to food manufacturing), this could potentially act as a barrier to entry, expansion and innovation.

2.3.3 Overview of the largest dairy processors in New Zealand

While there are more than 100 dairy processing enterprises in New Zealand,[16] the largest three independent processors account for the majority of milk collected by independent processors. Table 4 below presents brief profiles of the 10 largest dairy processors by revenue.

With the exception of Goodman Fielder, the other top 10 processors are export-focused for dairy products.[17] While some of the major processors existed before Fonterra was formed in 2001 (e.g., Dairy Goat Co-Operative since 1984, Goodman Fielder since 1986, A2 since 2000), others have entered the market since 2001 (e.g., Open Country Dairy in 2004, Oceania in 2008, Miraka in 2009).

While half of the independent processors sourced milk from Fonterra up to 2015,[18] eligibility changes resulted in large processors to no longer have access to regulated milk supply from 2016 onwards.[19]

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15 Fonterra. About Fonterra China. Available at: https://www.fonterra.com/cn/en/about-fonterra-china.html

16 The Investor's Guide to the New Zealand Dairy Industry 2017, p66

17 MPI provided data (Market participants – overview.xlsx)

18 MPI provided data (Trend data – farm gate and factory gate.xlsx)

19 Rural News Group. Fonterra welcomes Raw Milk changes. (Nov 2012). Available at: https://ruralnewsgroup.co.nz/dairy-news/dairy-general-news/fonterra-welcomes-raw-milk-changes

Fonterra has over 10,500 farmer shareholder-suppliers. At its 33 manufacturing sites, Fonterra produces a variety of products, ranging from fresh milk and milk powder to cream and cheese. The majority of Fonterra's output is exported.

Table 4: Overview of major dairy processors

Company	FY16 turnover, NZ$ million	2017 processed milk volume, billion litres	Major products	Year formed
Fonterra	17,199	21.3	Milk powder, butter, cheese, yoghurt, formulas and other dairy products	2001
Goodman Fielder	871*	~0.2	Dairy, baking, sweet baking, pies, spreads and oils, mayonnaise and dressings	1986
Open Country Dairy	819	1.5	Milk powder, milk proteins, milk fats, cheese	2004
Westland	588	0.7	Butter, UHT products, infant and toddler nutrition ingredients, milk powders, proteins, bio actives, "EasiYo" powders	1937
Synlait	547	0.8	Infant and adult nutritional formulations, milk powders, functional food ingredients, specialised products	2005
A2	353	NA	Milk, infant formula, milk powder	2000
Tatua	289	0.2	Caseinate, hydrolysates, whey proteins, AMF, lactoferrin, peptones, dairy whip, cream, cheese sauce, natural dairy flavours	1914
Oceania	163	0.2	Milk powder	2008
Miraka	141	0.2	Ingredient milk powders, consumer powders, UHT products, branded products	2009

Company	FY16 turnover, NZ$ million	2017 processed milk volume, billion litres	Major products	Year formed
Yashili	0.7 (FY15)	NA	Infant formula, 25kg bulk base powder	2012
Mataura Valley Milk	NA	NA	Infant formula, milk powder	2008
Danone Nutricia	NA	NA	Infant formula	2007

Source: The Investor's Guide to the New Zealand Dairy Industry 2017, MPI provided data, TDB Advisory New Zealand Dairy Companies Review (April 2018), media search

Note(*): Goodman Fielder revenue shown is only for New Zealand, but covers dairy and non-dairy products

Goodman Fielder is a diversified food processor, with its product portfolio including bread, dairy products, sauces, poultry, and snacks. Its dairy business is focused primarily on the domestic market. Goodman Fielder has three dairy processing facilities in New Zealand, producing fresh milk, cream, many cheeses and processed products like dips, mousses and smoothies. Goodman Fielder does not purchase any farm gate milk directly. All of its raw milk is purchased from Fonterra under contracts backed by the Raw Milk Regulations. Goodman Fielder is also the only major independent processor remaining that has right of access to Fonterra's raw milk post-2016.[20] In 2005 Goodman Fielder acquired NZ Dairy Foods (NZDF), which was created to maintain competition in the supply of dairy products once Fonterra was formed.

Open Country Dairy is a processor owned by Talley's, an agribusiness group which also owns Talley's Crème de la Crème, another dairy processor focusing on producing ice cream. Open Country Dairy collects milk from its own farmer suppliers, and mostly provides processed products to the overseas market. Open Country Dairy mainly focuses on milk powders and cheddar cheese.

Another major exporting processor is Westland Milk Products, a domestically owned cooperative, which existed prior to the formation of Fonterra. Westland Milk Products has multiple processing sites throughout New Zealand's South Island, focusing mainly on the export industry. Westland produces mostly processed products like milk powder, milk protein, butter and yoghurt sachets.

Synlait is a newer processor that commenced production in 2008, which sources most of its milk from nearby farmers. Synlait has only one processing facility located on the South Island, producing mainly milk powder, milk protein and anhydrous milk fat. Synlait is expected to open a third dryer to produce infant milk

[20] Rural News Group. Fonterra welcomes Raw Milk changes. (Nov 2012). Available at: https://ruralnewsgroup.co.nz/dairy-news/dairy-general-news/fonterra-welcomes-raw-milk-changes

formula. While export focussed, Synlait is also establishing a small presence in the domestic milk market.

Tatua Co-operative Dairy is a domestically owned cooperative which was created prior to Fonterra. It sources almost all of its milk from its own suppliers, which lie within 12kms of the processing plant, and has not seen any significant growth in raw milk collected. Tatua mainly focuses on exporting its products, with 94% of its products sold overseas. Its products are varied but focus on high value speciality ingredients, including milk powder, sour cream, ice cream and anhydrous milk fat.

Oceania Dairy is a wholly owned subsidiary of Chinese company Inner Mongolia Yili Industrial Group. Yili is the largest dairy producer in China, with Oceania Dairy solely exporting to China. After opening in late 2014, it has only one processing plant but is seeking to expand through adding a UHT plant and second dryer. Oceania produces milk powder, milk protein and UHT milk, all of which can readily be exported to China.

Miraka is a Maori owned dairy processor which entered in 2011, with a 23% interest from Vietnam. Miraka sources its own milk from its own farmers typically located within 80kms of its processing facilities. Miraka focuses on producing milk powder and UHT milk for the export market, shipping to over 20 countries including USA, Canada, India, Malaysia, China and the Philippines.

Figure 26 below shows that Fonterra has, since 2001, invested nearly 5.8 times more capital than have all other independent processors operating in New Zealand. However, this simply reflects the global scale of Fonterra's operations – Fonterra's FY16 turnover is approximately six times that of the large independent processors.[21] As Figure 27 shows, the largest independent processors have each invested quite significant sums.

[21] TDB Advisory. New Zealand Dairy Companies Review (Apr 2018)

Figure 26: Invested capital between 2001 and 2017 for Fonterra vs independent processors, billion NZ$

Source: TDB Advisory. New Zealand Dairy Companies Review (Apr 2018)

Figure 27: Invested capital between 2001 and 2017 for independent processors, million NZ$

Source: TDB Advisory. New Zealand Dairy Companies Review (Apr 2018)

2.3.4 Fonterra's strategy

We discuss Fonterra's strategy by considering in turn its:

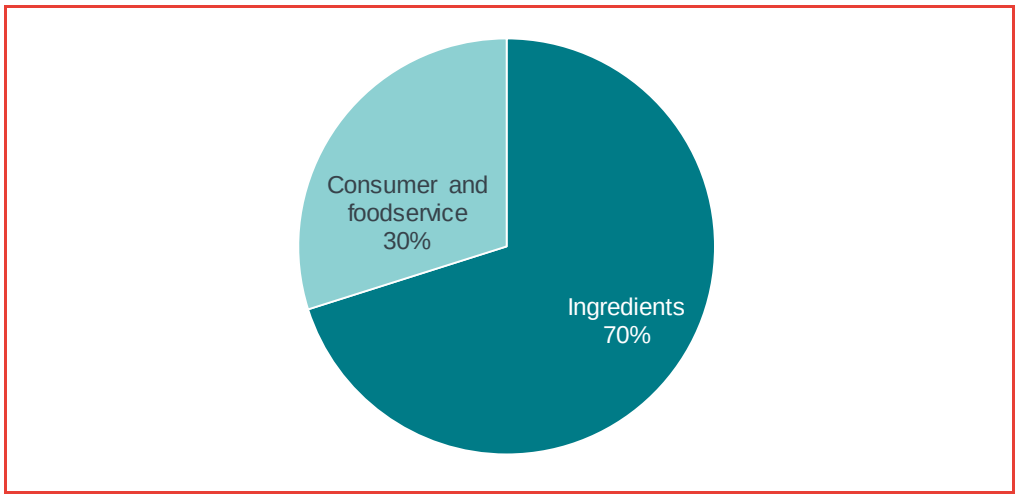
- key business segments; and
- stated business strategy.

Business segments

Fonterra reports its revenue in terms of two "strategic platforms": Ingredients, and Consumer and Foodservice.[22] The ingredients segment consists of Fonterra's core milk production operations in New Zealand, Australia and Latin America, as well as the production of typical dairy products such as butter, cream and mozzarella. It produced a volume of 21.3 billion LME (litre milk equivalents) in 2017, the majority of which were produced in New Zealand, alongside a nascent Chinese production infrastructure (which yielded 335 million LME in 2017). The Consumer and Foodservice segment contains Fonterra's more specific and higher value-added products, such as infant formula, UHT milk, yoghurts and desserts.

The Ingredients operation is the larger of the two segments, accounting for 70% of Fonterra's revenue in 2017, as can be seen in Figure 28. The trajectory of this segmental split over time is available in Figure 33. A second distinction between the two segments is their relative profitability, as measured by the fraction of revenue that is converted into EBIT. As is evident in Figure 29, the Consumer and Foodservice business traditionally operates at a higher EBIT margin. Although increases in operating costs, interest rates and tax bills coinciding with a revenue spike in 2014 saw margins collapse across the group, Consumer and Foodservice has since restored its position as the higher-margin business segment.[23] A comparison of the return on capital employed (ROCE), available in Figure 30, across the two segments is consistent with this analysis.

Figure 28: Fonterra revenue composition by business segment in 2017

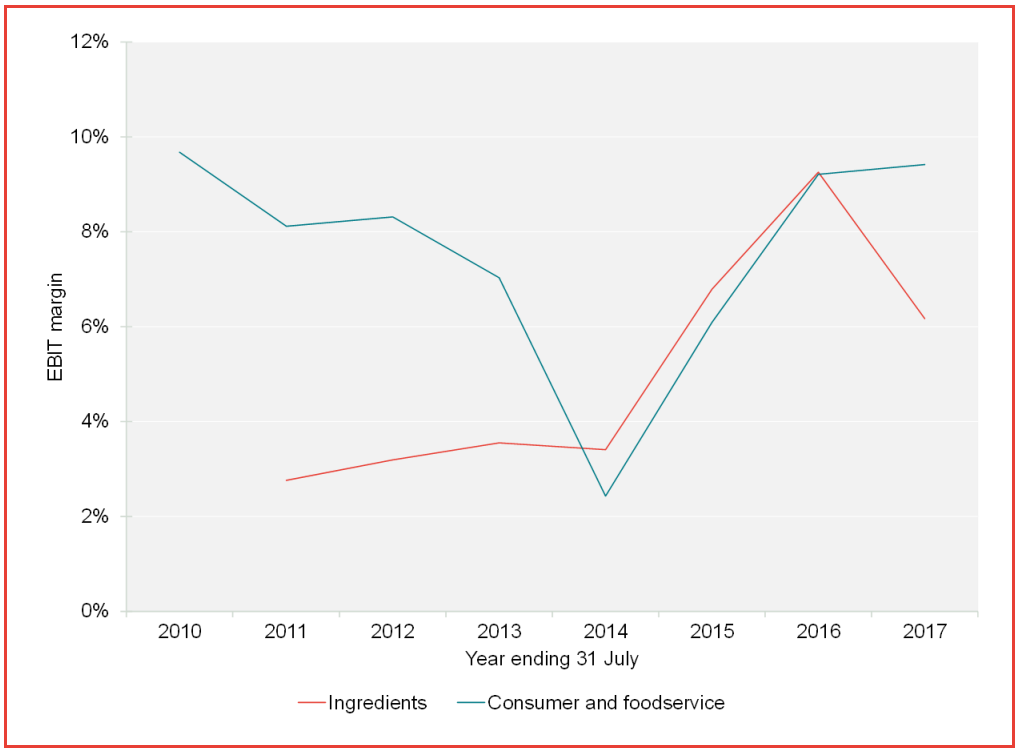


Source: Fonterra annual report

22 For example, Fonterra Annual Review, 2017, p. 92.

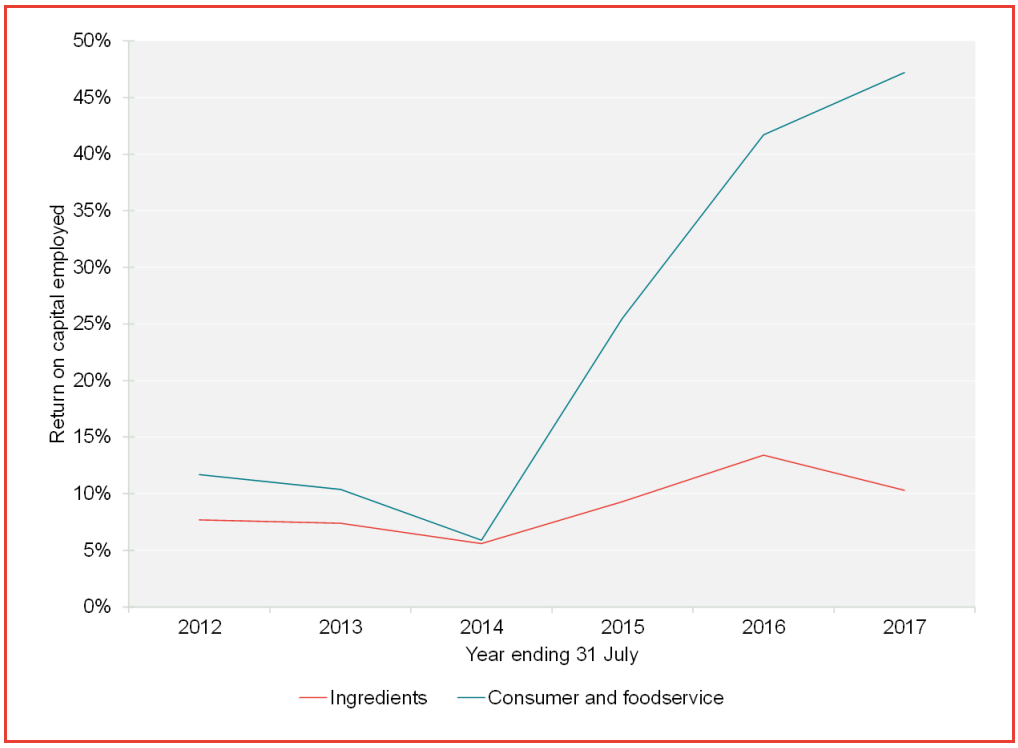
23 We emphasise that the increase in the Consumer & Foodservice EBIT margin since 2014 is the result of a normalisation of revenue after the 2014 increase, rather than a structural improvement in the Consumer & Foodservice operation.

Figure 29: Fonterra EBIT margin by business segment



Source: Fonterra Annual Reports

Figure 30: Fonterra ROCE by business segment



Source: Fonterra Annual Reports

Business strategy

The growth strategy at Fonterra is referred to by management as "Volume and Value".[24] As stated by management, Fonterra's strategy revolves around increasing volume sales across all products, and at the same time encourage a migration into higher-value products in its Consumer and Foodservice segment.

In the context of this attempt to move into products higher up the value chain, Fonterra has innovated by adding medical grade lactose to its product mix which now accounts for 19% of its external sales volume.[25] In New Zealand, the group has released eight different flavours of one of its ice cream brands alongside organic fresh white milk and cream. More product launches include a range of high protein milk, yoghurts and smoothie boosters, aimed at the growing health food industry, and an extended UHT range, mostly consisting of new, innovative flavours. This shift to a more sophisticated product base reflects Fonterra's attempt to shift into the higher value products, and the group has recently been investing in plants capable of producing such products – see Figure 31 below. These include investments in a new mozzarella plant, protein concentrate plant and AMF plant. Furthermore, Fonterra is currently expanding a lactoferrin plant to double its production, in an attempt to increase its market share in medical grade dairy products.

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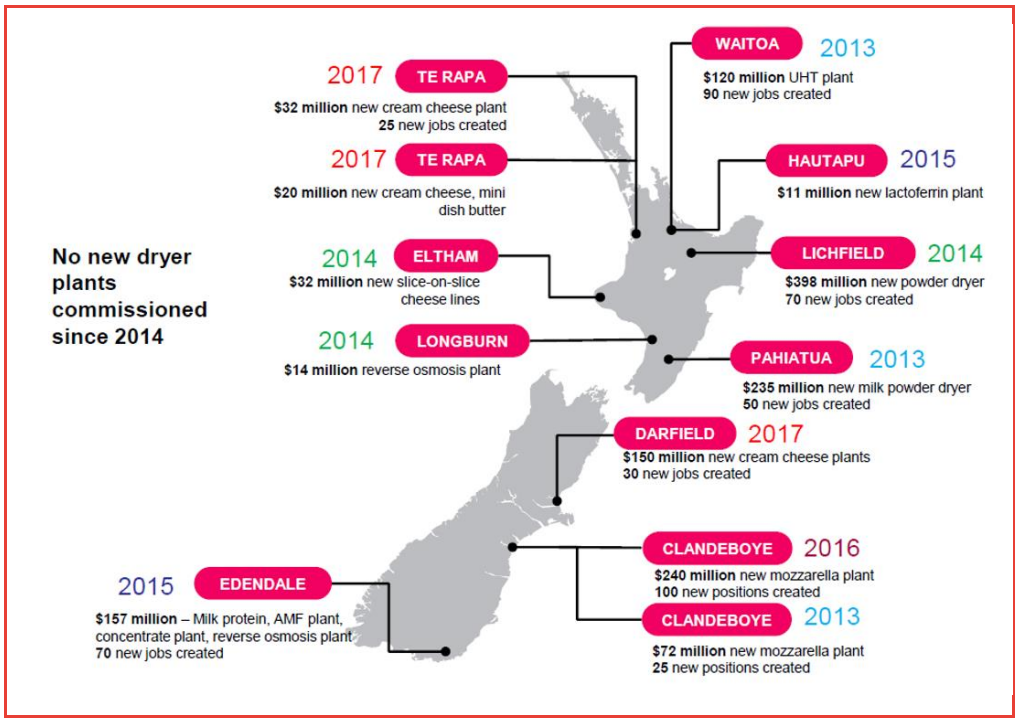
24 Fonterra. Fonterra announces 2013 financial results media release. (Sep 2013). Available at: https://www.fonterra.com/content/dam/fonterra-public-website/phase-2/new-zealand/pdfs-docs-infographics/pdfs-and-documents/financial-results/pdf-annual-results-media-release-2013.pdf

25 Fonterra Annual Report 2017, p. 40.

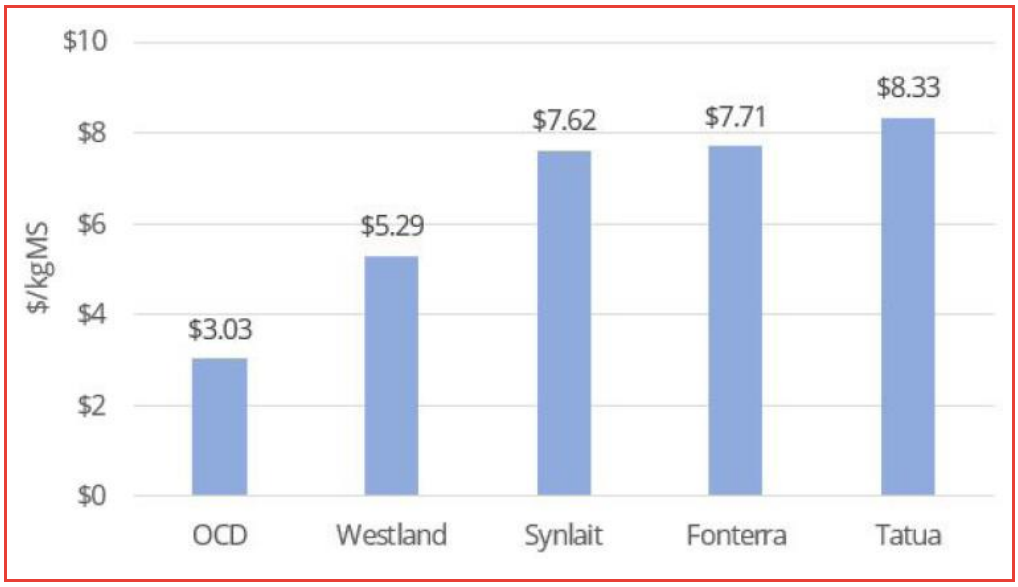
Figure 31: Fonterra plant investment in New Zealand between 2013 and 2017



Source: NZIER, 2018, Assessing Fonterra's performance

Figure 32 shows Fonterra has a large asset value per kilograms of milk solids produced of $7.71per kgMS, in line with Synlait and notably higher than Open Country Dairy and Westland, but lower than Tatua.

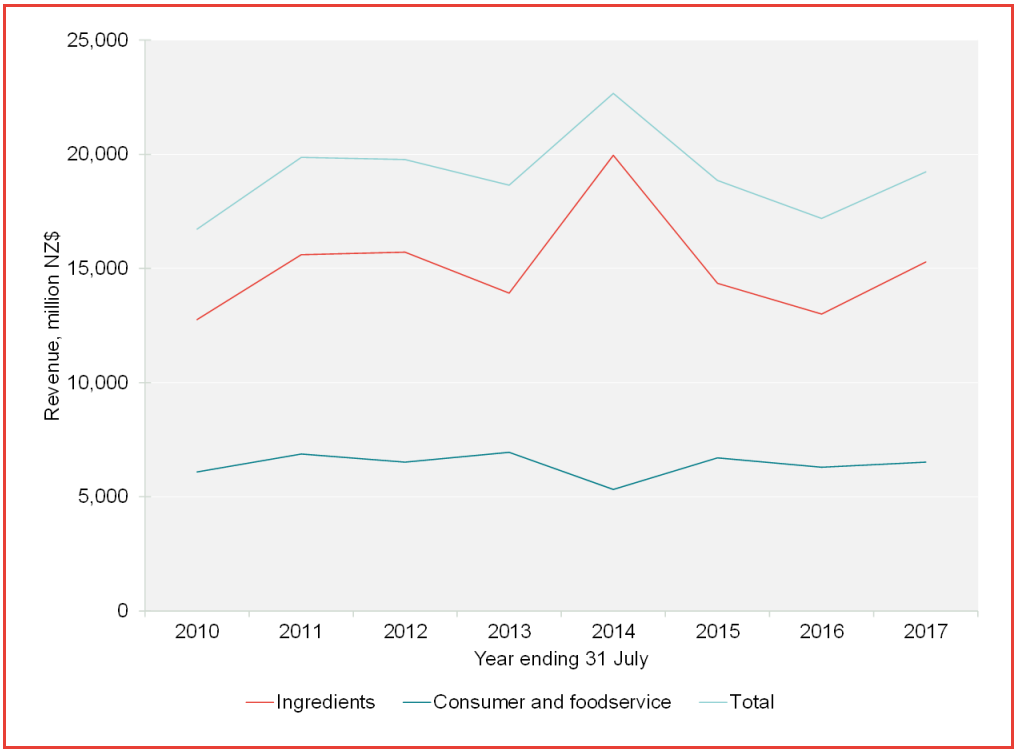
Figure 32: Fixed assets per kgMS



Source: TDB Dairy Company Review 2018, p. 18

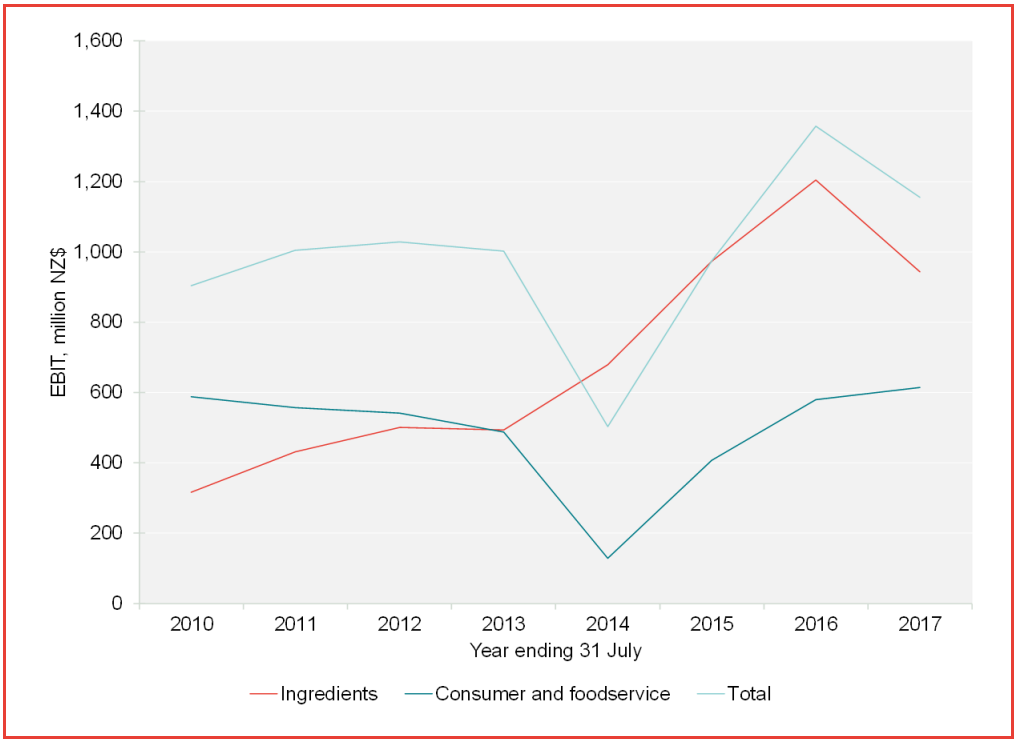
As a rough gauge of its progress across the Volume and Value dimensions in each product category, Fonterra uses revenue and EBIT, respectively, which are available in Figure 33 and Figure 34. As can be seen, the majority of Fonterra's revenue derives from its Ingredients business, with the Consumer and Foodservice revenue being relatively flat between 2007 and 2017. In relation to EBIT, Fonterra's EBIT on ingredients has grown significantly since 2013 (which could be a combination of basic and advanced ingredients), while its consumer and food service EBIT in 2017 was unchanged since 2010.

Figure 33: Fonterra revenue series, by business segment



Source: Fonterra Annual Reports

Figure 34: Fonterra EBIT series, by business segment



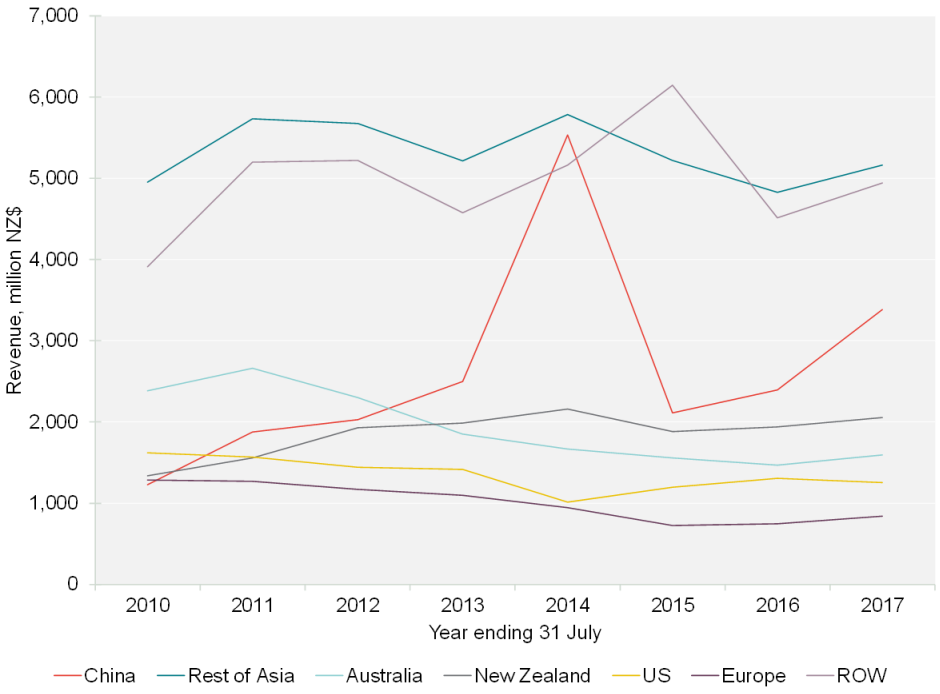
Source: Fonterra Annual Reports
Notes: The fact that Ingredients and Consumer foodservices revenue and EBIT numbers do not sum to the corresponding "Total" values is due to the inclusion of eliminations in the calculation of the Total values, but not the EBIT or revenue values.

Figure 35 shows Fonterra's group revenue by origin. The Figure shows that there has been significant revenue growth in some key markets. China and the rest of Asia account for 44% of Fonterra's revenue. However, most of this growth has been driven by lower value products like milk powder. Fonterra was also able to take advantage of the high growth sector of infant formula in China. A subsequent introduction of stricter food safety regulation in this market led to a decline in export returns. However, Fonterra has received regulatory approval for a number of new products for supply into China. Latin America has grown to be 11% of revenues, as Fonterra has expanded its operations into that region, for instance with the relaunch of its brand in Chile. The importance of other markets likely to demand a greater proportion of value added products (due to the relatively high purchasing power and preferences of consumers in those markets) has decreased. For example, Europe accounted for 8% of revenues in 2010, and 4% in 2017. Similarly, revenues from the US declined from 10% to 7% over the same period.

Consistent with these observations are the fact that Fonterra's business performance since its capital restructuring, along the two dimensions by which it measures its performance, has been modest. Returns from the group's higher-value business segment – Consumer and Foodservice – were fairly flat over the eight-year period analysed here. It registered CAGRs of 1% in revenue (Volume) and 0.62% in EBIT (Value). Instead, most of the growth that Fonterra did achieve was

in its traditional Ingredients business, which registered CAGRs of 2.62% and 16.9% in revenue and EBIT, respectively, between 2010 and 2017.

Figure 35: Group revenue, by geographic origin



Source: Fonterra Annual Reports

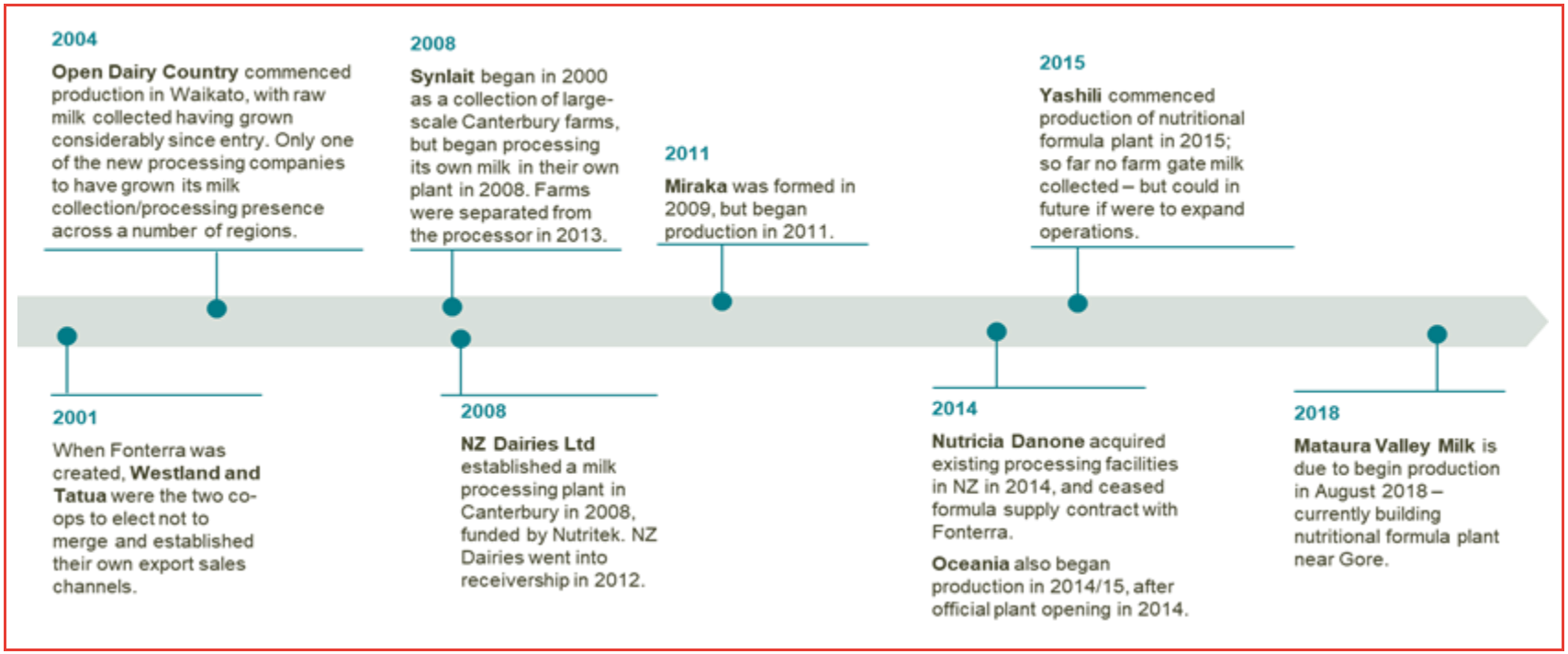
2.3.5 Independent processors' published strategy and business model

As noted in Section 2.3.1, independent processors have been a significant component of the sector growth since 2001. We therefore consider independent processors' business models and strategies as potential drivers of the observed outcomes in the dairy sector. Significant entrants into the dairy processing sector are summarised in the timeline presented in Figure 36 below.

Table 5 below summarises the business models and key strategies of the major independent processors in New Zealand. Each of these processors have different strategies and capital constraints that bind their decision making. Many are part owned by overseas investors, allowing a greater access to capital and market penetration into overseas markets. Two of the companies examined, Yashili and Oceania, are owned completely by Chinese milk companies. A number of these processors, such as Synlait and Oceania, have announced expansion plans.[26]

26 TDB Advisory, (2017) New Zealand Dairy Companies Review

Figure 36: Timeline of significant entry and exit by New Zealand independent processors



Source: Frontier Economics analysis of MPI information

Table 5: Business models and key strategies of large independent processors in New Zealand

No.	Company	Strategy	Corporate structure	Pricing strategy	Vertical integration	Capital access	R&D / capital investment
1	Goodman Fielder	Been recently working on product differentiation – e.g. Goodman Fielder's permeate free milk is a new attempt at this. Also, Goodman Fielder re-orienting its marketing in response to rapid consumer cycles – outcome/volume focused[27] The company has led pricing in the market in the past, in the Australian Baking Division particularly	Public (Singapore Wilmar 50%; Hong Kong First Pacific 50%)	Does not purchase farm gate milk – purchases all its 230-250m litres raw milk requirements from Fonterra under its contract that is backed by Raw Milk Regulations.	Wilmar & First Pacific 100% takeover for A$1.3b in 2015 now manufactures markets, and distributes dairy baking and grocery products in NZ/Australia/ and Asia-Pacific	Company still trying to renegotiate its contract with Fonterra – Goodman Fielder wants to get their own supply, and uncertainty about future contractual terms and conditions is inhibiting investment	Rebranded Meadow Fresh milk, Ernest Adams in 2016; announced restructure of baking business in AU in Jan 2017, part of $650m investment across all markets from 2016-2019

[27] WARC, (2017) *Goodman Fielder adapts to retail changes*

No.	Company	Strategy	Corporate structure	Pricing strategy	Vertical integration	Capital access	R&D / capital investment
2	Open Country Dairy	Pulled back its investment in property, plant and equipment by 44% between 2016 and 2017. In recent times has ramped up production of higher value products other than just its original production of whole milk powder[28]. High-growth processor that focusses on sales of commodities supported by low capital and operating costs.[29] Focus on supplying major customers with high quality higher value food ingredients.	Private (NZ), Public (Singapore). Second largest dairy processor in NZ; second largest WMP exporter globally. 76% owned by agribusiness Talley's group and 15% owned by Olam International[30]	Contracts with farmers for supply. Currently pays its farmer suppliers about $6 per kg of milk solids.	After partial takeover by the Talley family in 2007, OCD expanded with powder plants in Southland and Taranaki.[31]	17% revenue growth in a difficult trading environment. They have used debt and retained profits to fund expansion. Debt peaked in recent years to 24% of total assets.	$260m invested at Open Country Dairy in 2015, mostly in building capacity. Open Country Dairy capital costs are typically under the rest of industry and it uses its returns to invest in new plants[32]

[28] New Zealand Herald,(2017) *Open Country delivers record profit, sees greater stability ahead*

[29] TDB Advisory, (2017) New Zealand Dairy Companies Review

[30] Ministry of Business, Innovation & Employment, (2017) *Investor's Guide to the New Zealand Dairy Industry*

[31] TDB Advisory, (2017) New Zealand Dairy Companies Review

[32] TDB Advisory, (2017) New Zealand Dairy Companies Review

No.	Company	Strategy	Corporate structure	Pricing strategy	Vertical integration	Capital access	R&D / capital investment
3	Westland	Chose to be independent in 2001 to maintain processing on the West Coast. Invested in value added product lines; new CEO in 2016 and board restructuring leading to a new open minded focus on nourishment rather than just marketing traditional commodity products[33]. Focus on improving product mix compared with a commodity product mix[34]	Co-operative based on West Coast and in Canterbury, 430 farmers - Southern Pastures has signed a deal with Westland to make it the largest shareholder in the co-op	Westland has announced a drop in its farmgate payout prediction for 2017-2018, to a range of $6.20-$6.50 per kgMS (previously $6.40 to $6.80)[35]	40% joint venture with largest nutritional powders customer Ausnutria to blend and can nutritional products at Rolleston in 2016	As a co-op, Westland has a limited base of equity from its shareholders and has used debt to fund fixed asset investment.	New infant nutrition plant in Hokitika of $114m; new $40m UHT facility in 2015. Westland has a 3% share of milk collection. The co-op has established a sales and marketing office in Shanghai and recruited local specialists to drive infant formula and packaged UHT milk into branded markets[36]

[33] NZ Farmer, (2018) *Southern Pastures moves from Fonterra to be Westland Milk's largest shareholder*

[34] TDB Advisory, (2017) New Zealand Dairy Companies Review

[35] NZ Farmer, (2018) *Southern Pastures moves from Fonterra to be Westland Milk's largest shareholder*

[36] Westland Milk Products, (2014) *Westland's added value strategy will benefit shareholders says chairman*

No.	Company	Strategy	Corporate structure	Pricing strategy	Vertical integration	Capital access	R&D / capital investment
4	Synlait	Currently a supplier of mainly infant formula products - in future may consider establishment of branded positions. They have slowly shifted more volume into specialty ingredients, infant formula base powders, canned infant formulas and cream. Strategy is to partner with companies that have access to consumers[37]	Public, also part owned by a2 Milk Co (Public AU), and Mitsui & Co (Public Japan)	Total milk price for Synlait Milk suppliers at year end 2017 per kgMS is 6.30. Synlait pays competitive base milk prices but additionally pays premiums for compliance with special milk programmes like Lead With Pride, which is focused on best environmental and social practices. Further premiums are paid for a2 Milk and Grass Fed programmes.	Supply relationship with Munchkin Inc announced in 2015; supply agreement with a2 announced in 2016[38]	Added debt to the $75m of IPO capital in 2013 as it invested in increased capacity. Publicly owned and listed. Debt peaked in 2015, but fell significantly in 2016 with strong free cash flows[39]. September 2016 capital raising and announcement of $300m capital expansion project.	$133m 3rd dryer and $11.5m onsite quality testing lab brought online in 2016; investment of $34m in second wet mix kitchen in 2017. Investment in R&D growing from $2.25m in FY16 to $4.75m in FY17. Investing $52m in a new state of the art blending and consumer packaging line in Auckland[40].

37 Synlait, (2017) Annual Report

38 a2. The a2 Milk Company extends supply agreement with Synlait Milk. Available at: https://thea2milkcompany.com/newsroom/market-announcements/a2-milk-company-extends-supply-agreement-synlait-milk/

39 TDB Advisory, (2017) New Zealand Dairy Companies Review

40 Ministry of Business, Innovation & Employment, (2017) *Investor's Guide to the New Zealand Dairy Industry*

No.	Company	Strategy	Corporate structure	Pricing strategy	Vertical integration	Capital access	R&D / capital investment
5	Tatua	Strategy is both for volume and value growth. Specialised products have been the focus of investment recently – these are typically batch processed from dry ingredients	New Zealand co-operative (113 farms), specialist dairy ingredients and food products manufacturer, exports 94% of its products to over 60 countries. Sales (subsidiaries) offices in Japan, US and China.	Payout to shareholders of $7.10 per kg of milk solids supplied, and retained 50 cents per kg of milk solids before tax to support capital investment programme	Farmer owned co-operative	As a co-op, a limited base of equity exists and they have typically used debt to help fund fixed asset investment[41]	Commissioned new specialty products drier in 2015. Sustainability initiatives are now one of the main priorities – working with supplier shareholders on improving on farm sustainability. This year is one of modest capital investment – there is already potential within existing plant and product mix for volume and value growth.

41 Tatua, (2018) End of Year Financial Statement

No.	Company	Strategy	Corporate structure	Pricing strategy	Vertical integration	Capital access	R&D / capital investment
6	Oceania	Focus on development of new products – and increase in volume of products. The company had a target of tripling Oceania's capacity in 2017, allowing it to process 630m litres of milk per year	Public (China), manufacturer of milk powder which exports to China	Estimated milk price of $6.10 a kg of milk solids in 2017 – which was based on Fonterra's announced price plus a 10% premium[42]	Yili, China's largest dairy company, purchased the assets of Oceania Dairy in early 2013. Yili produces and distributes dairy products and mixed feedstuffs, and distributes its products primarily in China	Largely unprofitable in early years, having to invest in large-scale assets without committed milk supply or end customers. They also have a significant offshore distribution channel, as they are 100% owned by Yili[43]	Construction on $200m Glenavy Processing Factory begun in April 2013, once stage 3 completed in 2017, factory will handle over 630m litres of milk annually. This project will add capacity to output a wide range of additional products from the factory

42 AgriHQ, (2017) *Oceania Dairy posts record sales*

43 TDB Advisory, (2017) New Zealand Dairy Companies Review

No.	Company	Strategy	Corporate structure	Pricing strategy	Vertical integration	Capital access	R&D / capital investment
7	Miraka	As part of the growth strategy in wanting to move into more value added products, Miraka expanded its processing plant in July 2013 to include an Ultra Heat Treatment milk production plant. Next phase of growth strategy reflects innovation in consumer packs of nutritional powder products. Produces with a very low carbon footprint[44].	Owned by Iwi (private) in NZ and is Public in Vietnam (23%).	Volumes collected from own farmer suppliers have grown significantly since entry. Paid a $6.22 per kg of milk solids farmgate milk price in 2016/2017.[45]Making "farming excellence" payments of up to 20c kgMS above base milk price.	Owned by 29 Maori incorporations. Vinamilk is a dairy products enterprise in Vietnam and has a 21% stake.	In early years, had to invest large-scale assets without committed milk supply or end customers. However, Vinamilk (Vietnam) increased share in 2015, investing US $3.5m. Miraka does not require suppliers to take up shares in the company – it has allowed suppliers the opportunity to reduce debt and/or invest in further infrastructural development.[46]	New $25m UHT plant built to process Shanghai Pengxin milk. In 2016, granted $1m for 3 year AgResearch project developing products that minimize allergies in children. Launched direct to consumer products in 2017. Received Matariki Te Tupu-A-Nuku Award for Maori Business and Innovation in 2016.

44 Miraka, *Manufacture* https://www.miraka.co.nz/page/416175

45 *NZ Herald, (2017) Maori dairy company Miraka moving into consumer brands*

46 Miraka, *Milk Supply* https://www.miraka.co.nz/milk-supply.html

No.	Company	Strategy	Corporate structure	Pricing strategy	Vertical integration	Capital access	R&D / capital investment
8	Yashili	Strategy of innovation and globalisation – for example launch of Super a-Golden stage formula is a step towards this and is part of its long-term strategy through Pokeno investment[47].	A local unit of the Chinese-owned Yashili International holdings.	Yashili does not collect any milk directly from farmers, it purchases ingredients from other processors and then manufactures infant powders[48]	A joint venture between Yashili and Mengniu established in 2012. Yashili NZ invested $220m in a dairy plant in Pokeno, as part of a wider deal for Yashili to buy Danone's Dumex infant formula business	Accesses capital through their corporate owner, Yashili Group in China – significant offshore distribution channel. Still in start-up phase where plant capacity utilisation low.	Super a-Golden Stage formula launched in NZ in 2016. In a deal where Danone acquired a quarter stake in Yashili in 2014, it included tech and production improvements. $220m plant opened in Nov 15. Agreement to supply up to $18.7m base powder dairy products to Danone in 2016.[49]

47 Yashili NZ, https://yashili.co.nz/yashilis-super-%CE%B1-golden-stage-formula-launches-in-new-zealand-market/

48 TDB Advisory, (2017) New Zealand Dairy Companies Review

49 Ministry of Business, Innovation & Employment, (2017) *Investor's Guide to the New Zealand Dairy Industry*

No.	Company	Strategy	Corporate structure	Pricing strategy	Vertical integration	Capital access	R&D / capital investment
9	Danone Nutricia	Volume increase strategy- Have supply contract with corporate group of 18 farms whose owners used to part own and supply dryer before acquisition by Danone in 2007. Expanded portfolio of consumer-trusted brands, acceleration in product innovation and activation and maximizing efficiency.	Subsidiary of Danone Group, French based company – became part of the group in 2007.	Purchases from Synlait.	Bought two New Zealand dairy processing companies last year (Sutton Group and Gardians).	Danone Nutricia ended its supply contract with Fonterra after August 2013 botulism scare, and now sources from Synlait milk	In September 2013, Nutricia Research (R&D subsidy of Danone) with a focus on early life and medical nutrition, established a new innovation centre in Utrecht – this centre now performs 80% of the company's global medical nutrition R&D activities along with 50% of its early life nutrition R&D. Also research centres for early life nutrition in Shanghai and a research satellite centre in Singapore.

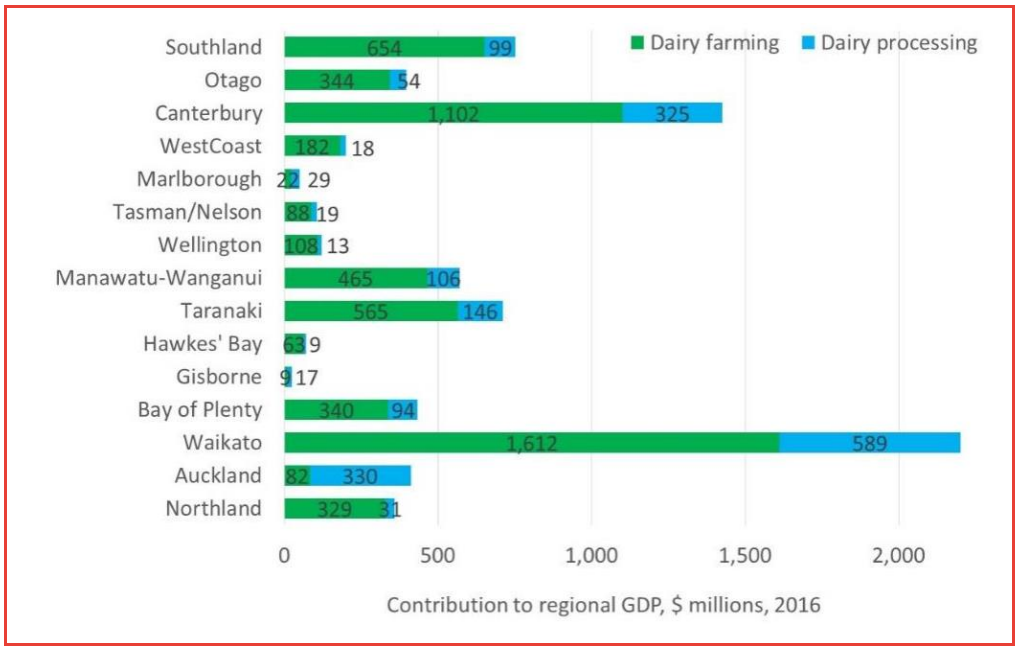
Source: Company websites, press search, and various other sources as cited

2.4 Economic contribution to New Zealand

2.4.1 Contribution to regional GDP

Whilst the dairy sector has since 2001 been a significant contributor to national GDP, information on the contribution of the dairy sector to the GDP of individual regions is limited. Figure 37 below shows the 2016 contribution to GDP in each region due to dairy farming and dairy processing. Waikato, Canterbury and Southland have the largest dairy industries, mostly comprising dairy farming rather than dairy processing.

Figure 37: Dairy's contribution to regional GDP in 2016 (calendar year), million NZ$



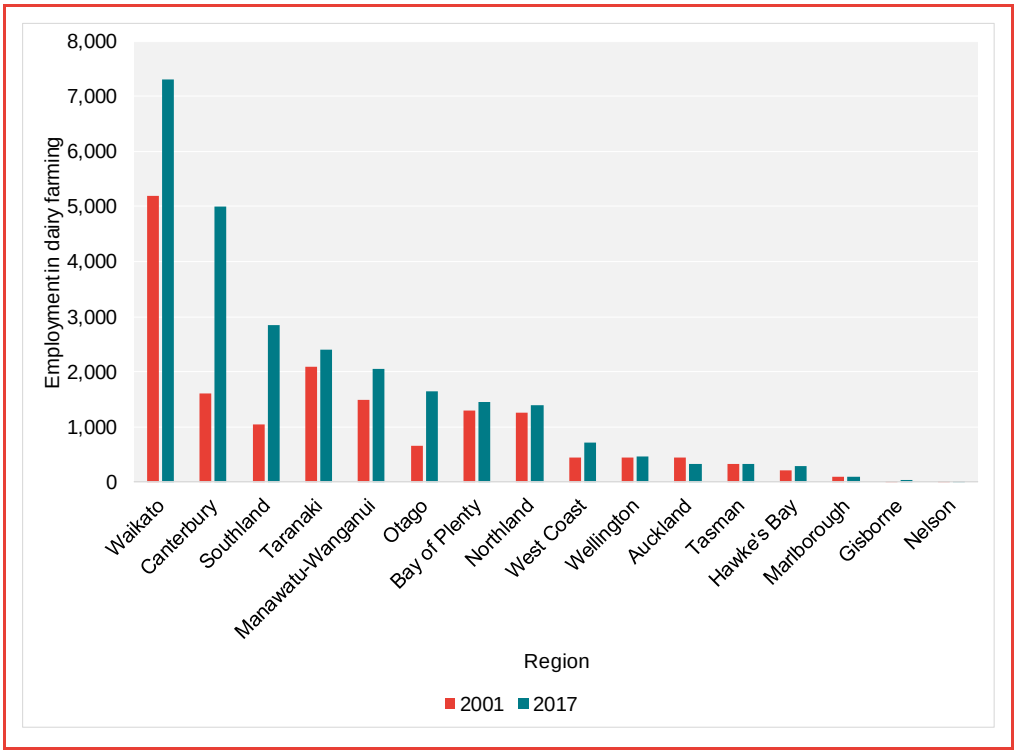
Source: New Zealand Institute of Economic Research. Dairy trade's economic contribution to New Zealand. (Feb 2017). Available at: https://nzier.org.nz/static/media/filer_public/29/33/29336237-3350-40ce-9933-a5a59d25bd31/dairy_economic_contribution_update_final_21_february_2017.pdf

While there is limited publicly available data on the contribution of dairy farming to regional GDP, employment provides an indicator of the extent of regional economic activity associated with dairy farming and processing, as we discuss in the next section.

2.4.2 Regional employment

While the dairy sector contributed over 3% to national GDP in 2016, it contributed only around 1.5% to national employment in 2016.[50] Employment in the dairy sector has increased at about 3% per annum – including both dairy farming and processing –over the period from 2001 to 2017, as shown in Figure 38 and Figure 39 below. While a large proportion of dairy farming and processing employment by region is in Waikato and Canterbury, there is sizable employment in dairy processing in Auckland. The increase in employment (in dairy farming and processing) has been greatest in Canterbury (4,590 workers), Waikato (4,200 workers), Southland (1,950 workers) and Otago (1,050 workers).

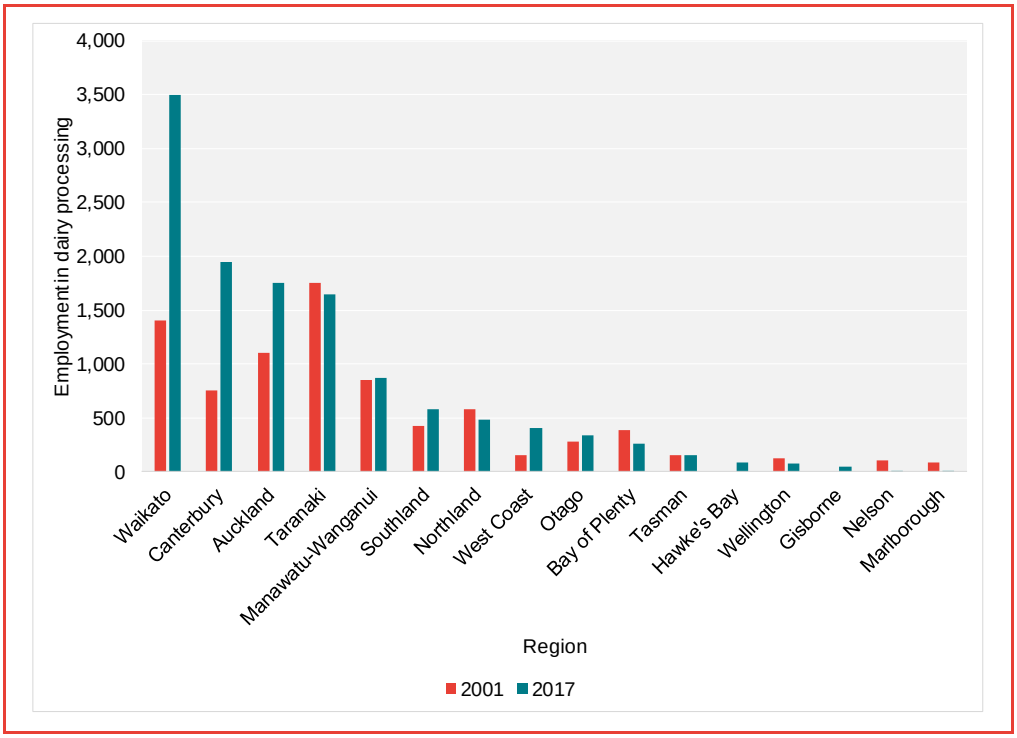
Figure 38: Dairy farming employment by region by calendar year



Source: MPI provided data

50 Stats NZ. Labour market statistics: March 2018 quarter. (May 2018). Available at: https://www.stats.govt.nz/information-releases/labour-market-statistics-march-2018-quarter

Figure 39: Dairy processing employment by region by calendar year



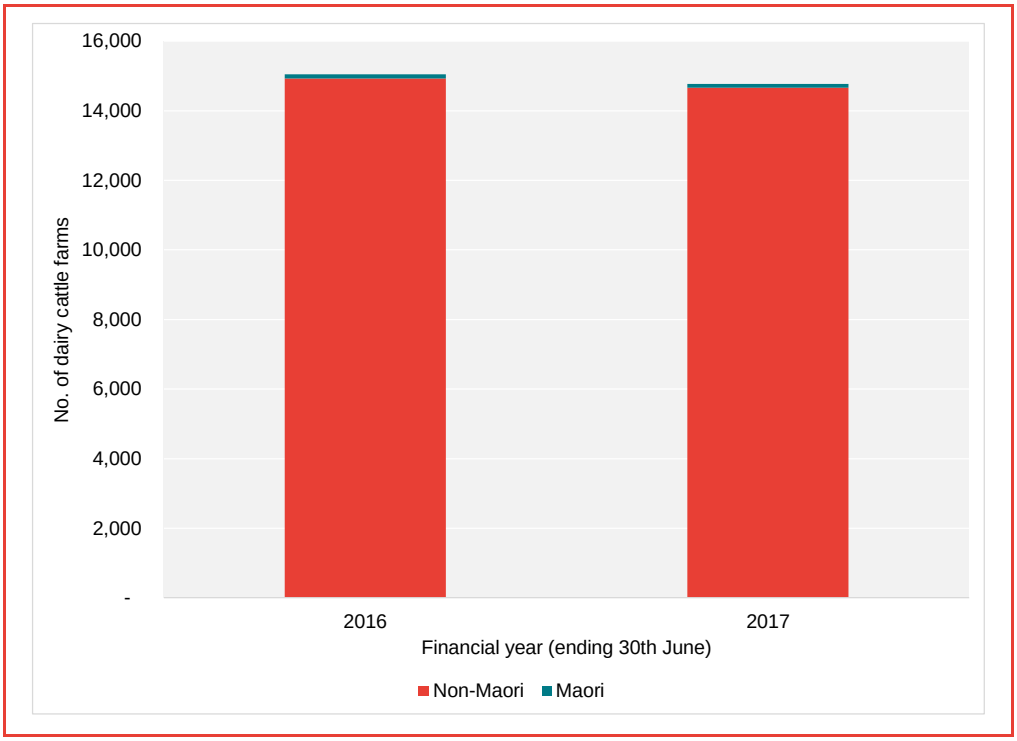
Source: MPI provided data

2.4.3 Maori participation in the dairy sector

While approximately 15% of people in New Zealand identify as Maori,[51] less than 1% of dairy farms are owned by Maori, as shown in Figure 40. Due to Maori-owned farms having above average herd size, dairy cattle population on Maori-owned farms is approximately 1.5% of New Zealand's dairy cattle population, as shown in Figure 41.

51 Stats NZ. Maori Population Estimates: At 30 June 2017. Available at: http://archive.stats.govt.nz/browse_for_stats/population/estimates_and_projections/MaoriPopulationEstimates_HOTPAt30Jun17.aspx

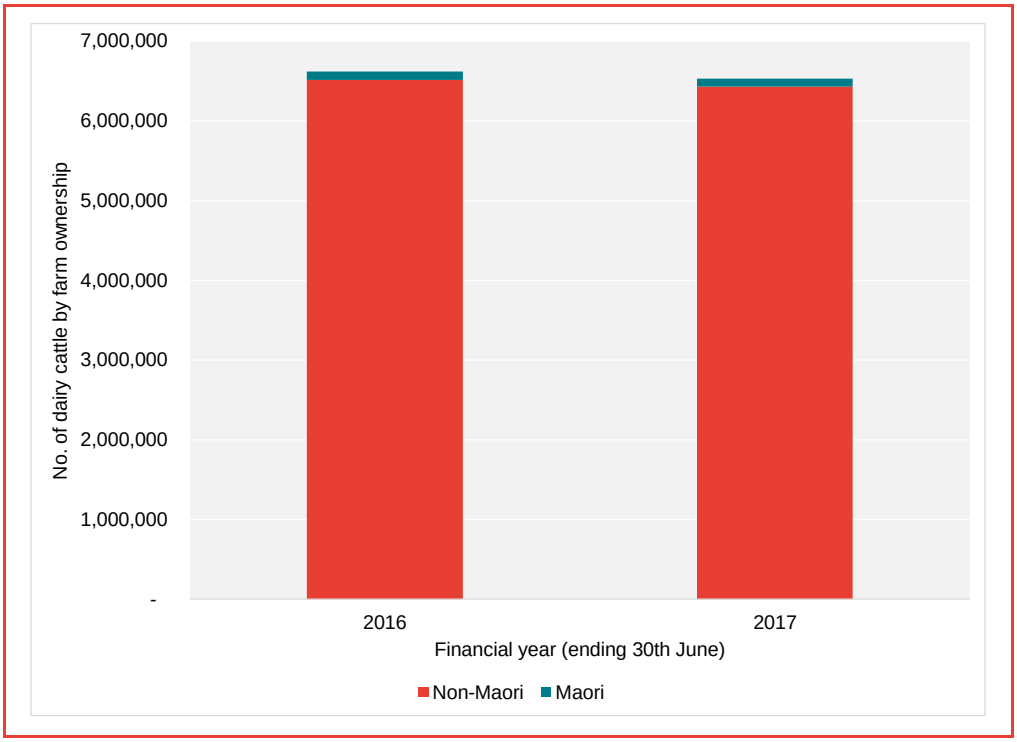
Figure 40: Number of Maori dairy cattle farms in 2016 and 2017



Source: Stats NZ

Note: Equivalent data pre-2016 is only for Federation of Maori Authorities farms, rather than all Maori farms. Also, we have yet to obtain data on Maori ownership of dairy processors and Maori employment in the dairy sector.

Figure 41: Dairy cattle population on Maori-owned dairy farms in 2016 and 2017



Source: Stats NZ

Note: Equivalent data pre-2016 is only for Federation of Maori Authorities farms, rather than all Maori farms. Also, we have yet to obtain data on Maori ownership of dairy processors and Maori employment in the dairy sector.

The most prominent example of Maori participation at the processing level of the supply chain is Miraka, a joint venture between several Maori trusts and one Maori-owned farm.[52] Miraka's strategic partners include: Te Awahohonu Forest Trust Limited; Vinamilk, a leading milk manufacturer and dairy products enterprise in Vietnam; and Global Dairy Network, who assist in the marketing and sales of Miraka's products overseas.

No data are currently available on the level of Maori employment in the dairy sector, either at the milk production or processing levels of the supply chain.

2.5 Innovation and value add

2.5.1 Investment in research and development

An important policy objective for the Government when the DIRA was introduced was that the New Zealand dairy sector should innovate and move towards more high-value products, thereby maximising returns and economic

52 These owners include: Wairarapa Moana Incorporation; Tuaropaki Trust; Waipapa 9 Trust; Hauhungaroa Partnership; Tauhara Moana Trust; and Huiarau Farms.

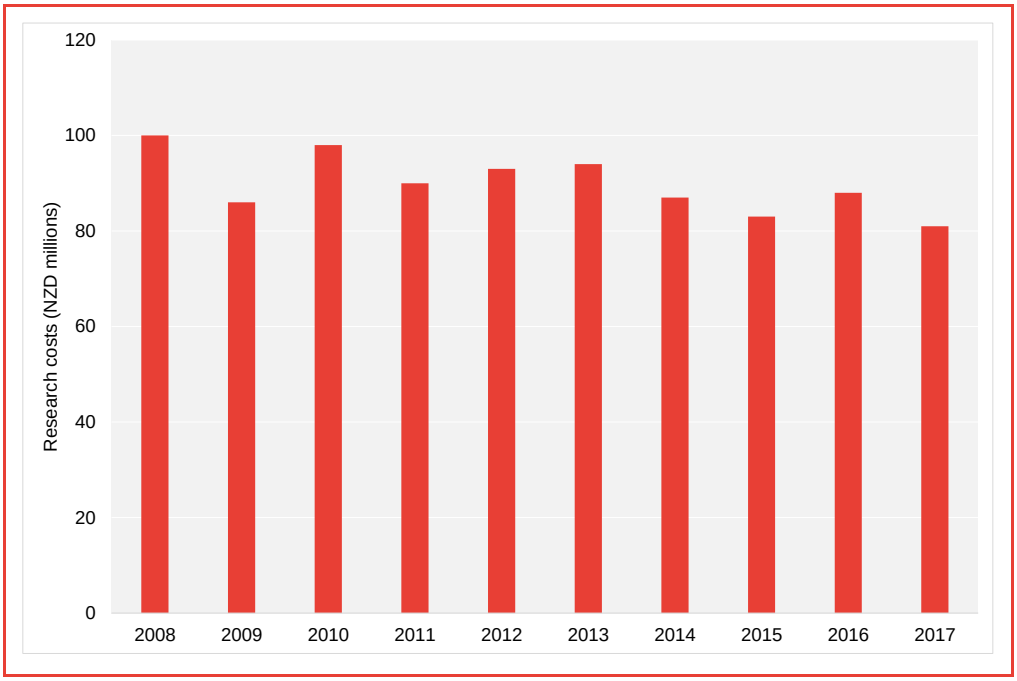
benefits to New Zealand. Whilst the economic value of the sector has undoubtedly increased materially since 2001 (Section 2.2), it is unclear to what extent the sector has been successful moving large amounts of volumes into new, innovative premium dairy products and creating large scale demand for those products growth markets overseas. For example, the data show that the most significant growth in dairy export receipts has been in whole milk powders (see Section 2.2.3), which arguably lies at the low-value commodity (rather than premium product) end of the spectrum.

Private investment

One indicator of innovation would be total spend on research and development (R&D) on new products or investment in capital plant to produce high value, premium products. Figure 42 presents data on Fonterra's total spend on R&D over the past 10 years. The data show that Fonterra's investment in R&D has declined over the last decade. On average, Fonterra has invested approximately $90 million per annum in R&D, or $900 million in total over the last 10 years.

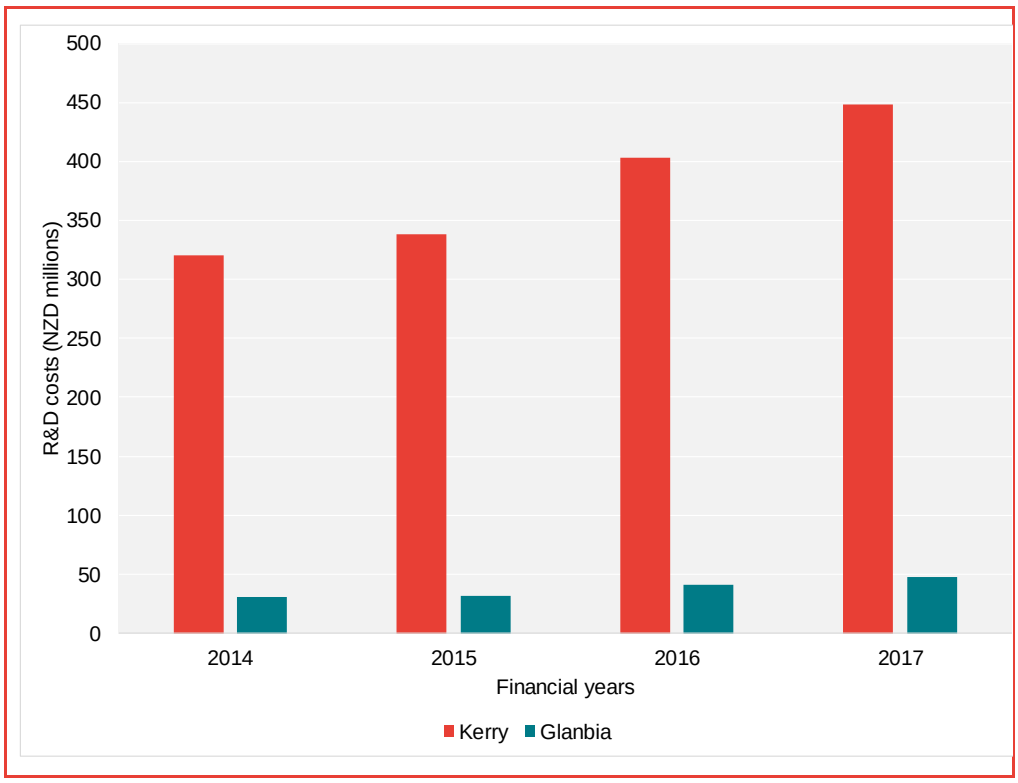
By comparison, Figure 43 shows R&D investment by two Irish dairy processors, Kerry Group and Glanbia. Both processors spent increasing amounts on R&D over the past four years, though at different absolute levels – Kerry Group R&D increased from NZ$321 million in 2013 to NZ$448 million in 2017, Glanbia R&D increased from NZ$30 million in 2013 to NZ$47 million in 2017.

Figure 42: Fonterra investment in R&D, 2008-2017 (financial years)



Source: Fonterra Annual Reports

Figure 43: Irish dairy processors R&D investment in R&D, 2014-2017 (financial years)



Source: Fonterra Annual Reports, EU Industrial R&D Investment Scoreboard

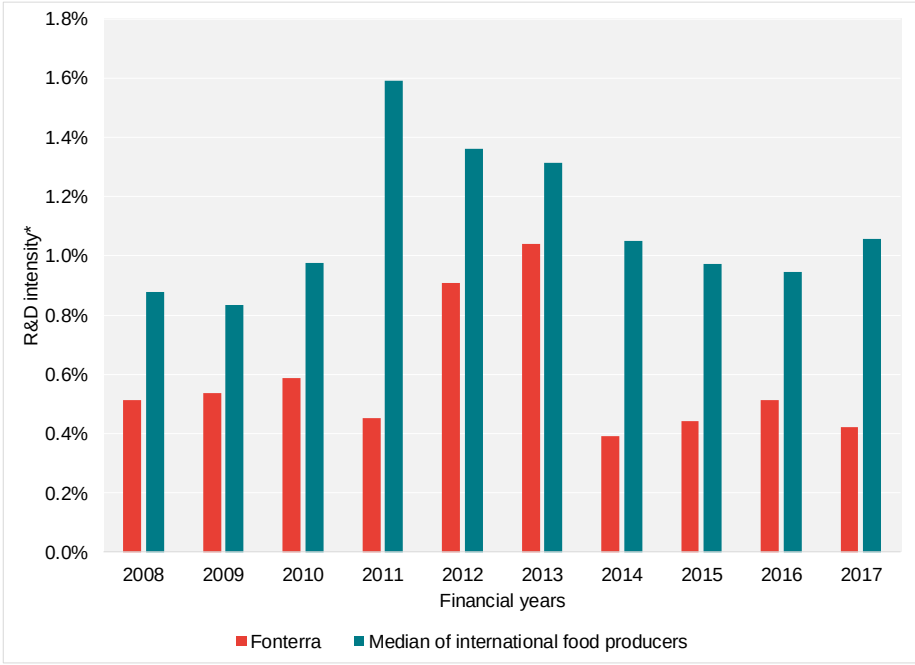
Note: EUR/NZD conversion of 1.72 used

Another indicator of innovation is R&D intensity, calculated as total R&D spend as a proportion of net sales. This proportion allows more direct comparison of R&D investment of firms of different size. Figure 44 compares the R&D intensity of Fonterra against the median R&D intensity of the largest food and beverage manufacturers in the world (as identified by the EU Industrial R&D Investment Scoreboard) over the past decade.

The data presented below indicate that over the past 10 years Fonterra's average investment in R&D has been approximately 0.6% of its net sales. By comparison, over the same period, the median R&D spend as a proportion of net sales, by the largest food producers around the world, was 1.1%. In other words, Fonterra's R&D intensity over the past decade has been well below the median R&D intensity of other leading food and beverage manufacturers.

When compared against the largest food and beverage manufacturers globally, Fonterra's R&D intensity is similarly low, as shown in Figure 45.

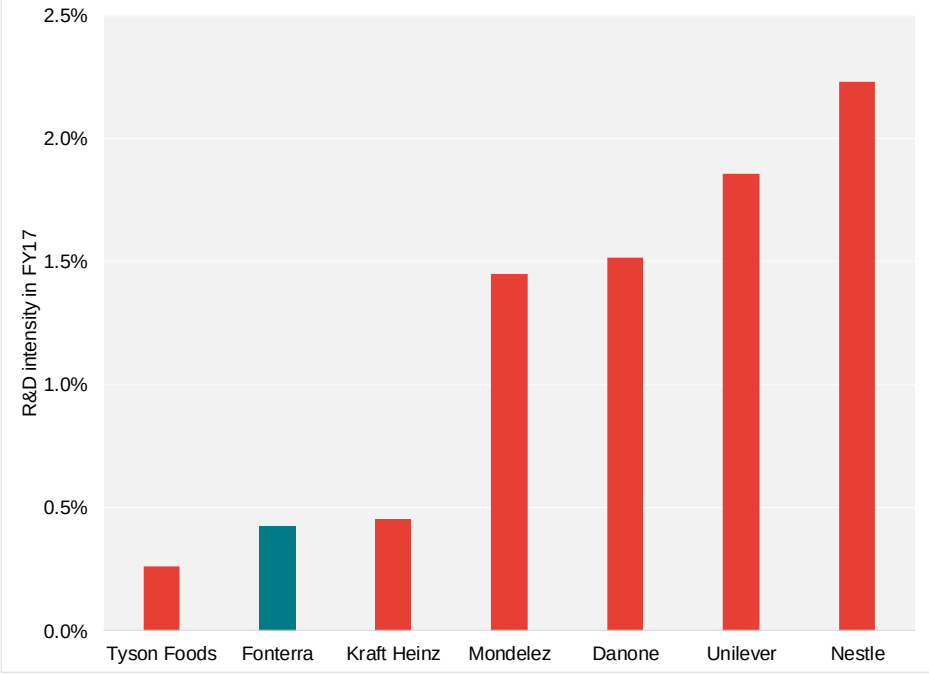
Figure 44: R&D intensity – Fonterra vs. largest food and beverage manufacturers in the world, 2008-2017 (financial years)



Source: Fonterra Annual Reports, EU Industrial R&D Investment Scoreboard

Note: R&D intensity = R&D costs / Revenue

Figure 45: R&D intensity – Fonterra vs. largest food and beverage manufacturers in the world, 2017 (financial years)



Source: EU Industrial R&D Investment Scoreboard, Fonterra annual reports

Economic performance

The best New Zealand data on R&D investment we have available are for Fonterra. We were unable to find consistent information on R&D spend for independent processors. However, press reports suggest Synlait is increasing R&D spending from $4.75 million in 2017 to $7 million in 2018, with a target of 1.5% of revenue over the next few years.[53] This is substantially more than Fonterra's current R&D intensity, and in line with the international comparators outlined above.

Government funding

The New Zealand Government has funded a Primary Growth Partnership (PGP) programme aimed at helping the dairy sector transform the value chain. An example of such a programme is provided in Box 1 below. The objective of this programme is to boost innovation and productivity of the dairy sector, in order to enhance value at every stage of the supply chain, and to put the sector on a more environmentally sustainable footing.

Whilst the value of funding committed under the Transforming the Dairy Value Chain PGP programme is substantial—$170 million over seven years—it remains a very small fraction of the amount invested by Fonterra ($15.27 billion) and independent processors ($2.65 billion) between 2001 and 2017 (see Figure 26).

Box 1: The Primary Growth Partnership programme – Transforming the Dairy Value Chain

- The initiative began in April 2011, ending in January 2018, having involved government funding of NZ$85 million and industry funding of NZ$86 million
- The commercial partners of this programme are DairyNZ and Fonterra, also involving Synlait, Landcorp, LIC, New Zealand Young Farmers, Agricultural Services Limited and ZESPRI
- The aims of the initiative are to create new products, increase on-farm productivity, reduce environmental impact and improve agricultural education
- The programme is split into 5 themes:
    - On-farm innovation and research – increasing the productive potential, resource use efficiency and product value behind the farm gate
    - Building capability for a sustainable future – building industry capability, upskilling rural professionals, developing support networks and attracting more people into the industry
    - World-leadership in food structure design – blending food science with the non-food discipline of materials science to manufacture increasingly complex foods

53 Nikki Mandow, Fonterra loses while A2, Synlait soar, Newsroom, 22 March 2018, Available at: https://www.newsroom.co.nz/2018/03/22/98997/fonterra-loses-while-a2-synlait-soar#

- World-leadership in processing and food quality management – delivering transformational science and technology to enable profitable growth in emerging dairy regions
- Robust human nutrition and health benefits – providing scientific evidence to support health benefit claims

- Indicative outcomes include:
  - Improved production and resilience of cows through identification of beneficial gene markers for production, differentiated product, fertility and animal health
  - Increased adoption of on-farm technologies and information systems, improving the tracking of production and environmental outcomes among others
  - Increased rural capability in nutrient, effluent, animal welfare, people and farm system management
  - More efficient dairy processing, including two patented new to world dairy processes
  - New products for the food service sector, including dairy products with elevated protein content
  - Expansion of New Zealand research community on post-farm gate themes
  - However, adoption of precision agriculture technologies has been lower than targeted
- MPI is currently in the process of evaluating the final outcomes of the programme

Sources:

Ministry for Primary Industries. Transforming the Dairy Value Chain. Available at: https://www.mpi.govt.nz/funding-and-programmes/primary-growth-partnership/primary-growth-partnership-programmes/transforming-the-dairy-value-chain/

Ministry for Primary Industries. Programme Progress to date – Transforming the Dairy Value Chian. Available at: https://www.mpi.govt.nz/dmsdocument/3056/loggedIn

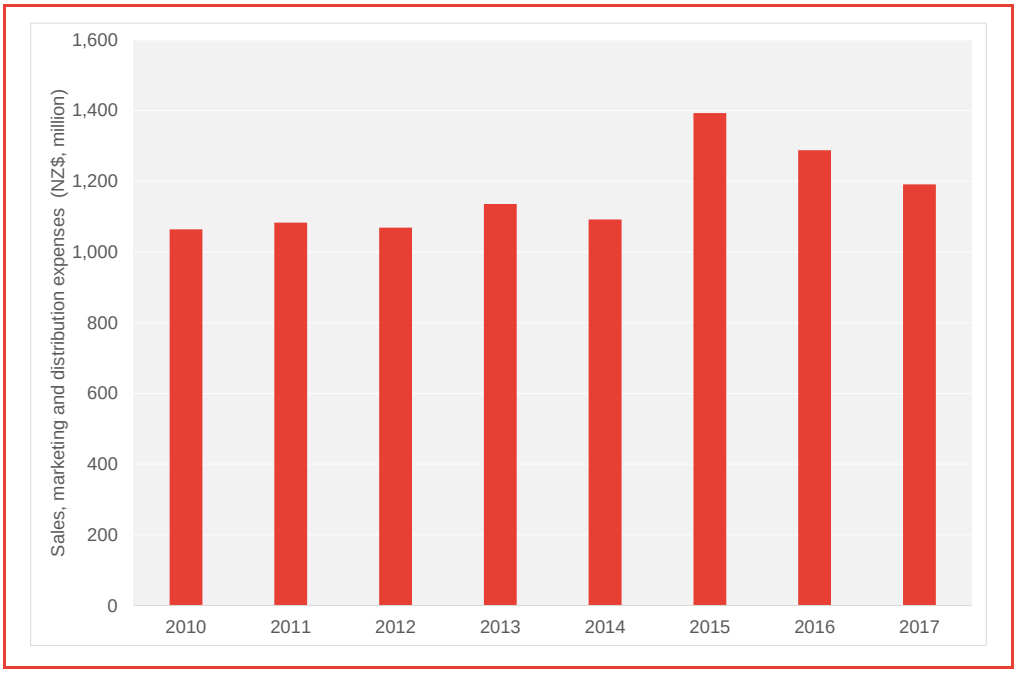
Ministry for Primary Industries. October 2017 – January 2018 – Transforming the Dairy Value Chain Executive Summary. Available at: https://www.mpi.govt.nz/dmsdocument/27765-october-2017-january-2018-transforming-the-dairy-value-chain-executive-summary

2.5.2 Investment in marketing

As well as genuine innovation through successful R&D, dairy processors can also enhance the perceived value of their products through effective investment in branding and marketing. Figure 46 reports Fonterra's historical investment in sales, marketing and distribution. The Figure shows that Fonterra has in each year since 2010 consistently invested in sales, marketing and distribution each year more than $1 billion.

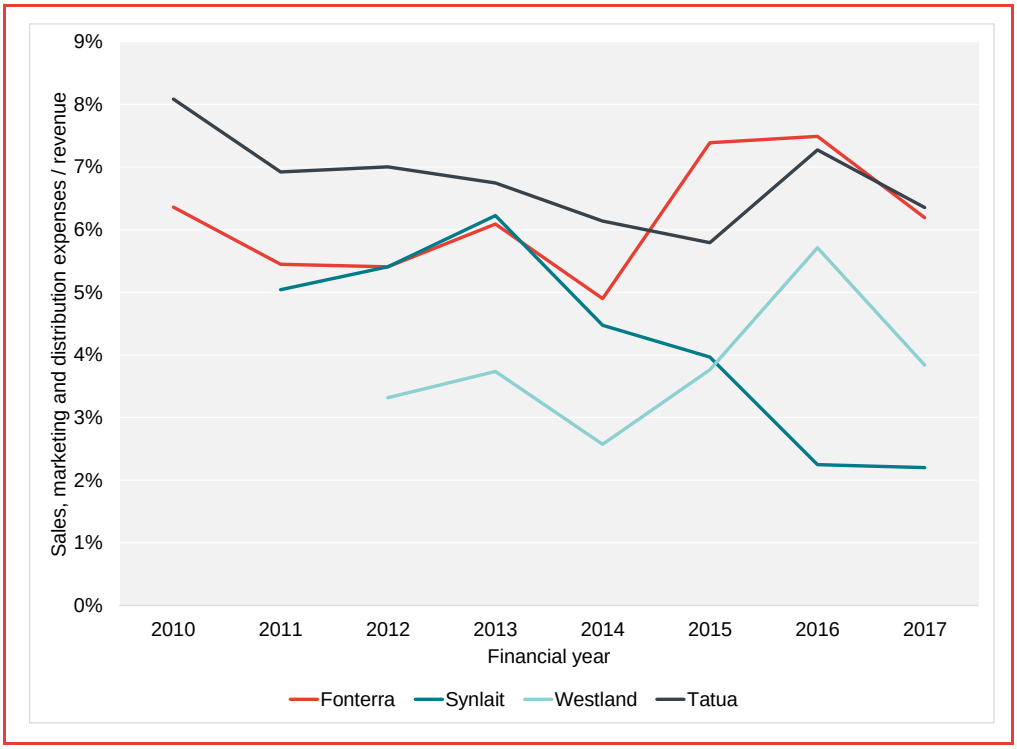
As shown in Figure 47 below, marketing levels for Fonterra as a percentage of revenue over the past few years has been roughly in line with other processors. However, it is striking that Fonterra typically invests in sales, marketing and distribution each year more than it has invested in R&D over the past 10 years.

Figure 46: Fonterra investment in sales, marketing and distribution, NZ$ million (financial years ending 31st July)



Source: Underlying data behind TDB Advisory: New Zealand Dairy Companies Review (Apr 2018) provided by MPI

Figure 47: Sales, marketing and distribution expenses as a proportion of revenue for selected dairy processors



Source: Underlying data behind TDB Advisory: New Zealand Dairy Companies Review (Apr 2018) provided by MPI

2.6 Sources of funding

2.6.1 Fonterra

Fonterra's capacity to source funding is defined by its unique corporate structure. In this subsection, we address the following three topics:

- the development of Fonterra's hybrid cooperative corporate structure;
- Fonterra's access to different forms of capital, given this structure; and
- Fonterra's capital expenditure, in the context of the different forms of capital that it has used to finance this expenditure.

Corporate Structure

Fonterra is a supplier-owned cooperative that underwent a protracted period of capital restructuring between 2007 and 2012, which culminated in the group taking on an innovative hybrid cooperative corporate structure.

Previously, Fonterra's corporate structure had evolved from the cooperatives that preceded Fonterra. As a core feature of the cooperative business model, farmers in the Fonterra cooperative were required to hold shares in a fixed proportion to the amount of milk that they supplied to the cooperative each year. As such, whenever a given farmer produced less in a particular year, Fonterra was obliged to redeem the farmer's shares, in return for the associated capital stake.

Aggregated over all farmers, this corporate mechanism exposed Fonterra's balance sheet to the fluctuations associated with milk production (which in turn depends on volatile factors such as the price of milk on commodity markets, and weather trends). This exposure is known as redemption risk. In 2008 for example, Fonterra was required to pay out $752 million of share capital to farmers, in the form of redemptions, after milk production fell due to a drought.

In 2007, Fonterra's management articulated two key objectives in relation to Fonterra's capital structure, namely:

- to decouple the firm's capacity to raise capital from the domestic production of milk in New Zealand; and
- stability in the firm's equity base (i.e., addressing redemption risk).

These changes were seen as necessary for the group to be able to take advantage of offshore growth opportunities. Management recognised that with production growth in New Zealand having fallen from around 5% in 1990 to between 2% and 3% in 2007, the next frontier for the expansion of the company lay in emerging consumer economies such as China, rather than their own more mature domestic

market.[54] Moreover, it was expected that Fonterra would have to protect its competitive position globally from the emergence of at least one low-cost producer, from candidate economies such as Brazil, Argentina or Russia.[55] Finally, the unfolding Global Financial Crisis was changing the complexion of corporate finance, with 40% now seen as an acceptable gearing ratio, rather than 50% or 60%. As such, management expressed a desire to reduce Fonterra's debt burden, and an unwillingness to fund redemption-related equity volatility with debt.[56]

Fonterra's efforts to implement a capital restructuring produced three significant related developments, which have now come to characterise its capital structure, discussed in turn below.

Abandoned capital restructuring proposal

In November 2007, Fonterra's board of directors announced the beginning of a two-year consultation program designed to restructure the group in order to address the capital structure objectives discussed above.[57] The proposition involved the creation of a new parent corporate entity, 20% of which would then be publicly listed, with member farmers retaining the remainder of the ownership. The idea was that while private investors would acquire some ownership stake in Fonterra, the cooperative members would retain control with 80% stake in the parent cooperative. The proposition was, however, rejected by member farmers. Farmers expressed a reluctance to support a restructuring that would dilute their 100% ownership of their cooperative. Moreover, farmers felt protected by the Fair Value share pricing system – under which cooperative share prices were determined by an external valuation mechanism – and preferred to avoid the uncertainty associated with a stock market price for their shares.

The result of this exchange was that Fonterra's management would need to develop an innovative way of changing the corporate structure, without impinging upon farmer ownership.

Fonterra Shareholders Market

The Fonterra Shareholders Market (FSM) was initiated in 2012 as part of the Trading Among Farmers (TAF) proposition, after having been first proposed to shareholders in 2009. It involved the establishment of an internal trading platform for shareholding farmers. With the introduction of the FSM, Fonterra would no longer be obliged to issue or redeem fixed quantities of shares at externally determined prices at the end of each year. Rather, farmers would be free to trade shares amongst themselves at a price determined internally by this new market.

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54 Fonterra, *Capital Structure*, 2007, p. 1

55 Fonterra, *Capital Structure*, 2007, p. 1

56 Fonterra. *Evolution of Fonterra's Capital Structure*, 2009 Proposal, 2009, p. 3.

57 That is, to decouple capital raising from milk production and to address redemption risk.

The benefits to Fonterra's corporate financial structure were considerable. Fonterra shares could now be considered permanent capital, alleviating the risk that this capital may have to be used to fund redemptions at some unknown future date, and affording the firm the equity capital stability that it needed to invest capital in longer-term projects.

The FSM, as part of the TAF proposal, was approved in principle by the cooperative in a vote in June 2010, before being implemented in November 2012. Approximately 1.6 billion shares are currently in circulation in the FSM, with a daily trading volume typically between 100,000 and 1,500,000 shares.

Fonterra Shareholders' Fund

Concurrently with the initiation of the FSM, Fonterra completed a partial public listing on the New Zealand stock exchange (NZX), via the Fonterra Shareholders' Fund (FSF). The FSF operates by offering "units" backed by economic rights attached to a pool of Fonterra shares to the global population of institutional and retail investors. The free float was capped at 6% of the total shares on issue; a pool of $525 million. The Fonterra Shareholders' Fund (FSF) represented the first vehicle through which external investors could gain exposure to New Zealand's largest company, and was a unique and bespoke structure developed for Fonterra by a team of investment banks. It represented a new model for cooperatives, and floated in an IPO on the NZX and the Australian Stock Exchange (ASX) in November 2012.

We understand from MPI that the primary purpose of the FSF was to provide additional liquidity for the FSM. With an external market for units, farmers would have more access to buyers for their 'dry shares'. It is important to recognise that neither TAF nor the FSF have acted as a vehicle for procuring more equity capital for Fonterra. So as not to oppose farmer shareholders' express desire not to dilute their ownership of the cooperative, a number of restrictions were imposed on the size of the FSF, along the following dimensions:

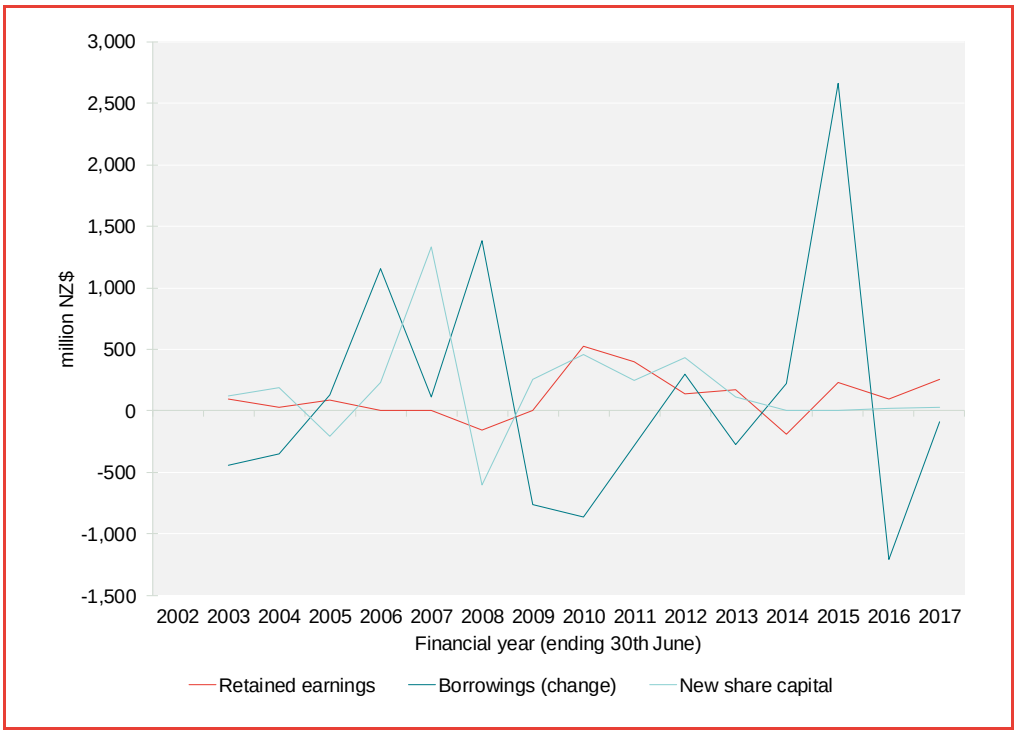
- Actual fund size: fund size over total capital base; and
- Potential fund size: actual fund size plus dry shares over total capital base.

Accordingly, the FSF has remained small, at 6% to 8% of Fonterra's total capital base. It is worth emphasising how unique these restrictions are to Fonterra's capital structure – a regular listed corporation can raise new equity in the marketplace by issuing new shares with relative freedom. Indeed, Fonterra shareholder capital has risen from NZ$5.7bn at the initiation of TAF in 2012, to just NZ$5.8bn in 2017.

Access to capital

Given the capital structure outlined above Fonterra is able to access capital via debt (borrowings) and equity (share capital and retained earnings) funding. Figure 48 illustrates the capital inflows and outflows for Fonterra since 2003 via these three channels.

Figure 48: Fonterra capital inflows and outflows

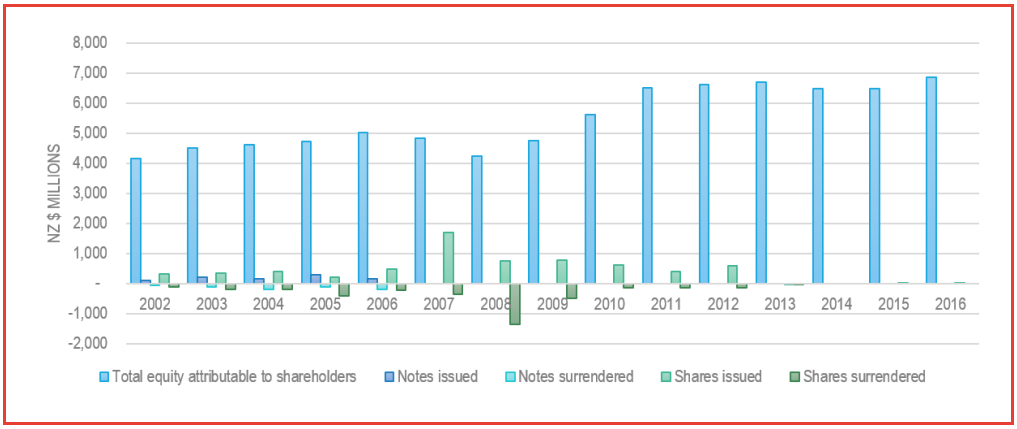


Source: Fonterra annual reports

Equity

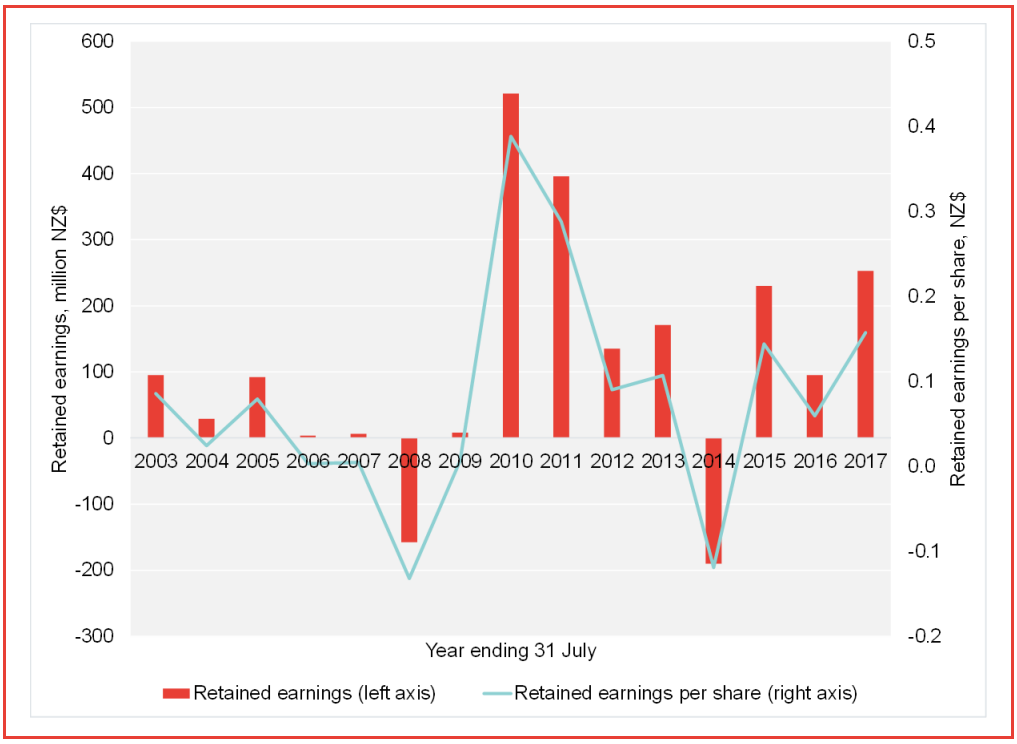
Over the 2003-2017 period evaluated in Figure 49, Fonterra has had a net equity injection of approximately NZ$2.6 billion, on top of retaining a total of NZ$1.7 billion of earnings. A more detailed breakdown of Fonterra's annual retention of earnings is available in Figure 50.

Figure 49: Fonterra equity funding from 2002 to 2016, million NZ$



Source: MPI Review of Fonterra's Financial Performance, updated August 2017

Figure 50: Fonterra's retained earnings over time



Source: Fonterra Annual Reports

Figure 48 illustrates the extent to which Fonterra was exposed to volatile inflows and outflows of share capital prior to the introduction of TAF in 2012. As discussed above, Fonterra's access to equity capital over this period was linked intrinsically to its milk supply – farmers who wished to supply Fonterra with raw milk were required to purchase shares from Fonterra, acting as a source of capital. On balance, Fonterra benefitted from this mechanism, raising NZ$2.46bn in equity share capital over the 2003-2012 period, owing to the concurrent expansion of milk supply in New Zealand over this period.

However, Figure 49 shows that since the introduction of TAF in 2012, the volatility in equity share capital flows has evaporated. Due to the presence of a market for dry shares, in the form of the FSM, farmers are no longer required to buy and sell shares directly with Fonterra. Although this has had the beneficial effect of ameliorating the above-mentioned redemption risk, it has also meant that Fonterra has raised virtually no new shareholder capital since 2012. The maturation of the farmgate milk production industry in New Zealand has also contributed.

Further to this, we discussed how farmer-shareholder opposition to external equity injections have led to the imposition of restrictions on the extent to which Fonterra can raise capital in equity markets, via the FSF.[58]

Debt

Between 2002 and 2017, net debt injection for Fonterra was approximately NZ$1.5 billion.[59] In the wake of the 2008 Global Financial Crisis resulting in a build-up of inventories, Fonterra's stated policy was to reduce its gearing ratio to below 50%.[60] Since then, as Figure 51 shows, Fonterra has maintained a gearing ratio of between 40% and 60%, while retaining a fairly strong credit rating between A- and A.[61] Figure 51 does however suggest that in the wake of TAF, Fonterra began to use borrowing as its primary source of funding, with equity share capital flows having remained flat following the implementation of TAF. The consensus amongst analysts is that Fonterra used the balance sheet stability afforded to it by TAF as a platform to increase its borrowings,[62] and the group's gross debt position increased from NZ$4.65 billion in 2012 to a peak of NZ$7.56 billion in 2015. However, with management's target gearing ratio having been updated to 40% to 45% as of 2017,[63] there is unlikely to be a willingness to continue to use debt as a primary source of capital.

By contrast, Ireland's Glanbia and Kerry Foods[64] have reduced their debt leverage over time to about 30%, largely due to significant growth in equity over the last five years. As we discuss in the next section, for independent processors in New Zealand, debt levels vary, but one commonality is that all companies use debt to some extent as a source of capital.

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58 NZ Herald. Fonterra offers farmers more shares in new capital structure. (Sep 2009). Available at: https://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=10598184

59 Debt funding increase in 2015 was mostly due to acquiring a minority stake in Beingmate, a Chinese company that owns dairy farms and processing facilities. https://www.stuff.co.nz/business/farming/102473864/fonterra-and-beingmate--where-did-it-all-go-sour

60 MPI Review of Fonterra's Financial Performance, updated August 2017

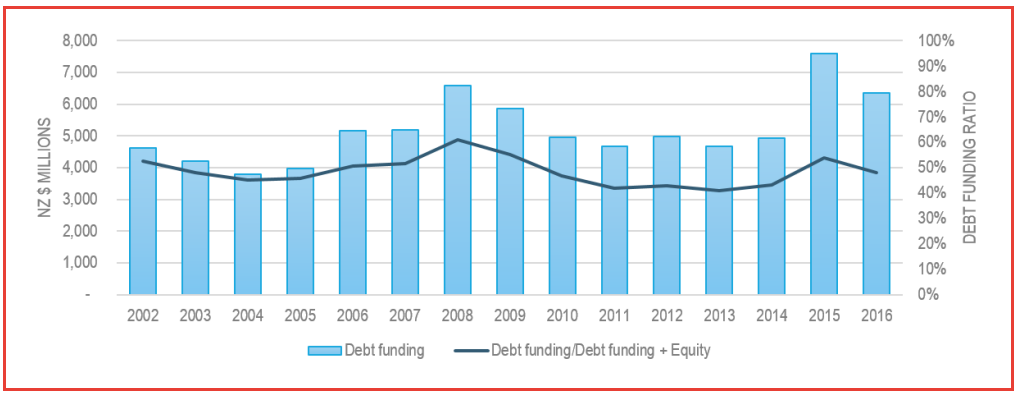
61 Fonterra. Fonterra Current Credit Rating Status. Available at: https://www.fonterra.com/nz/en/our-financials/debt-investors.html

62 First NZ Capital analyst report, 17 July 2017

63 Fonterra Annual Review, 2017

64 Which are listed companies with separate shareholding cooperatives, as discussed in the Irish case study.

Figure 51: Fonterra debt funding from 2002 to 2016 (year ending 31st July), million NZ$



Source: MPI Review of Fonterra's Financial Performance, updated August 2017

Conclusion

Since the implementation of TAF, Fonterra has faced less share capital volatility and appears to have used this stability and its strong credit rating as a platform for procuring more debt. However, management's reluctance to raise the group's gearing ratio any higher at present, coupled with the group's restricted access to equity capital from either farmer shareholders (given the presence of the FSM and the maturity of the New Zealand raw milk industry) or equity markets (given the restrictions on the FSF), suggest that Fonterra may face a capital constraint going forward. This view is corroborated by analysts following the company.[65]

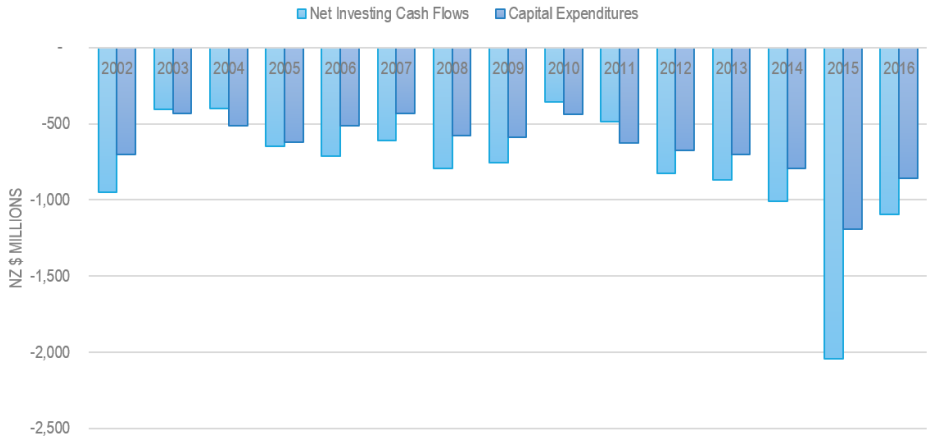
Capital Expenditure

Fonterra's corporate restructuring was designed to afford the group the capital stability needed to invest and pursue growth opportunities. The capital raised over the period since TAF primarily took the form of debt, with equity share capital inflows having all but ceased. In this section, we consider how Fonterra used this capital.

It is evident from the data presented in Figure 52 below that Fonterra did in fact increase capital expenditure quite substantially in the wake of TAF. Capital expenditure increased each year from NZ$680 million in 2012 to NZ$1,200 million in 2015. To illustrate how Fonterra has allocated this capital expenditure from a strategic point of view, Box 2 compares the components of Fonterra's capital spend with two of the Irish firms considered in Appendix 2 of this report, Kerry Group and Glanbia.

65 First NZ Capital analyst report, 17 July 2017

Figure 52: Fonterra net investments from 2002 to 2016, million NZ$



Source: MPI Review of Fonterra's Financial Performance, updated August 2017

Box 2: Comparative capital expenditure analysis – Fonterra vs. Kerry Group and Glanbia

A comparative analysis of how Fonterra, Kerry Group and Glanbia allocate capital reveals some important differences. Here, capital expenditure has been divided into two categories:

- Business sustaining capex – Describes capital used in maintaining and adding to existing operations, through purchases of property, plants, equipment and intangible assets;
- Acquisition and R&D capex – Describes capital used to acquire new established businesses and develop new products through research and development, in order to expand the business into new markets.

It is apparent from Figure 53 and Figure 54 that while Kerry and Glanbia have emphasised expansion through acquisitions and/or R&D, Fonterra have preferred to allocate capital on developing their existing core operations. More specifically, Kerry has invested heavily in both acquisitions of new business operations and R&D, while Glanbia has expanded primarily through acquisitions (Glanbia R&D expenditure has been negligible). Figure 54 however illustrates that in aggregate, all three groups invest a similar amount of capital each year, as a fraction of their EBIT. Taking totals over the whole 8-year period in question, Fonterra have spent 110% of their total EBIT on a combination of business sustaining and acquisition/R&D capex, Kerry 118%, and Glanbia 93%.

Figure 54 indicates that over the period in question, both Kerry and Glanbia have been able to maintain a wider and more stable profit margin that Fonterra, suggesting that their business strategy has been at least as successful as Fonterra's.

Figure 53: Total capex as a fraction of EBIT

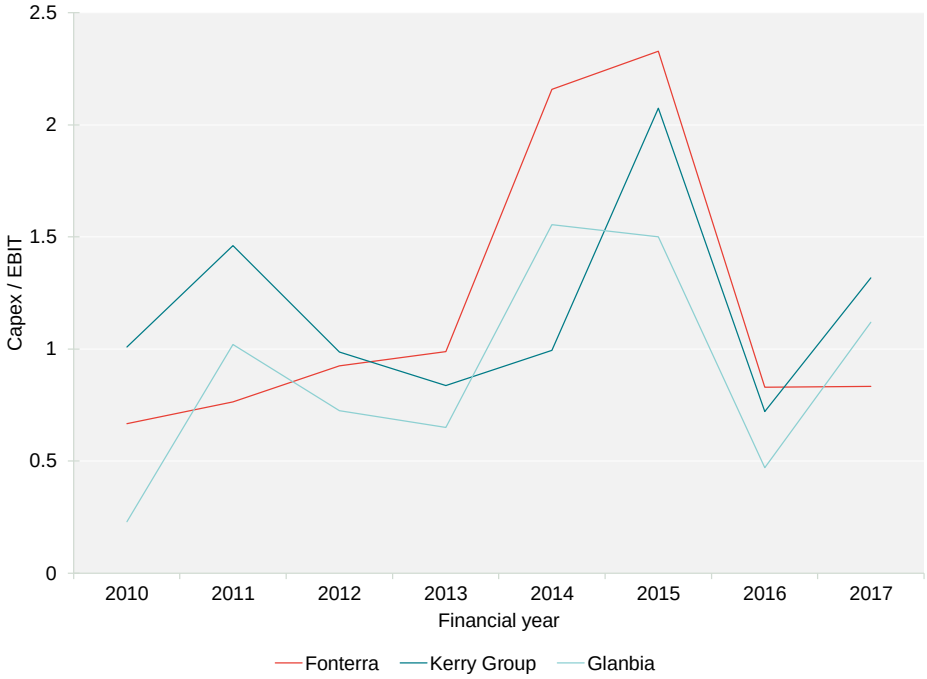
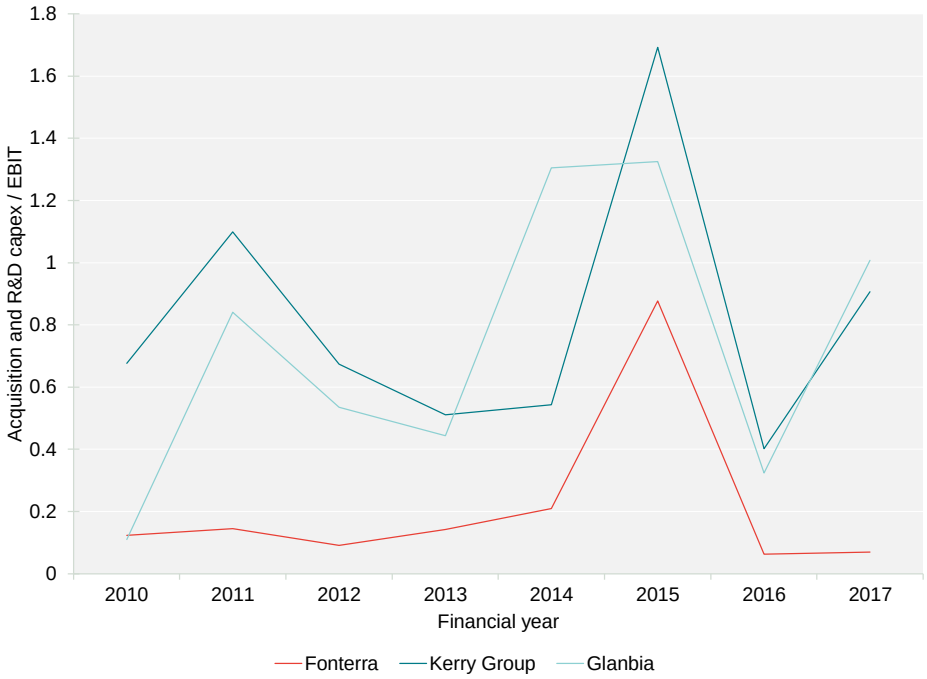


Figure 54: Acquisition and R&D expenditure as a fraction of EBIT



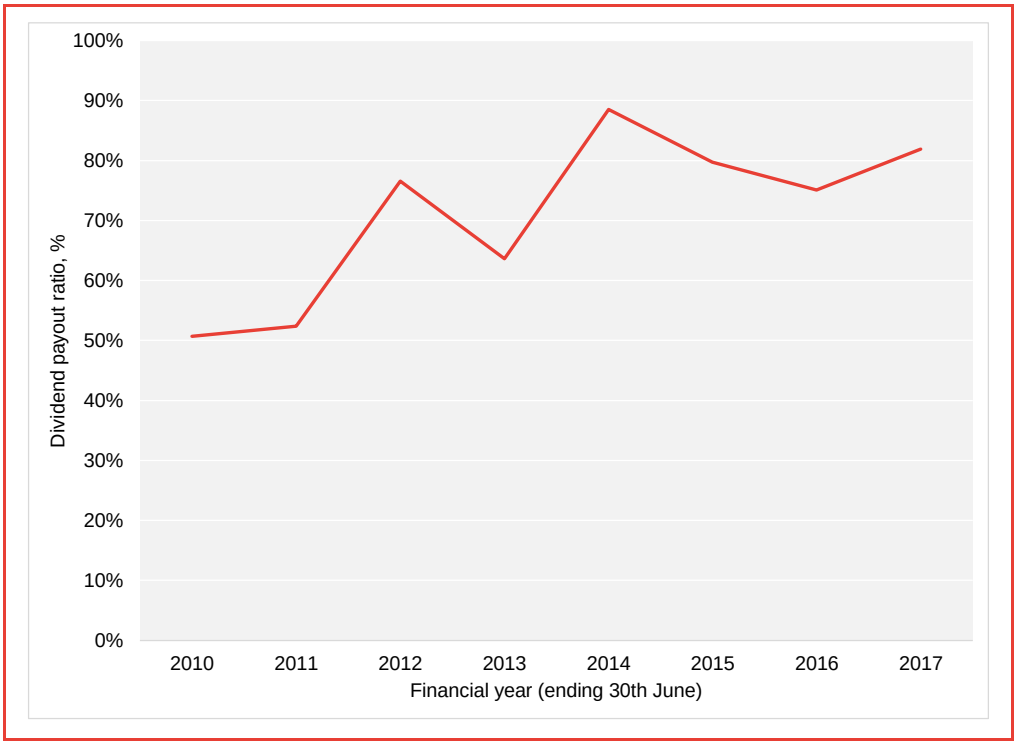
Source: Fonterra, Kerry Group and Glanbia Annual Reports

Despite the increase in capital expenditure, identified above, this investment remains directed primarily towards maintenance and expansion of capacity at existing core operations, rather than the development of new and innovative

products. However, Fonterra's more recent investments in capacity expansion suggest that this investment is targeted more at high-value product facilities, rather than commodity-type facilities, such as milk powder plants. This suggests that Fonterra has recently moved further towards a 'Value' strategy. However, whether Fonterra has the capacity to expand its capital expenditure is uncertain, in light of the possibility that it now faces a capital constraint.

Finally, in addition to its capital expenditure, Fonterra's dividend payout ratio has been significantly higher than 50% for many of the last eight years, which can be seen in Figure 55 below. This suggests that, in principle, even if Fonterra does not raise any external capital, it does have some headroom to increase retained earnings by scaling back dividends, if it needed to in order to fund expansion and R&D. In practice, Fonterra's ability to do so would depend on its shareholders' willingness to forego dividends. While in principle, this may suggest that Fonterra has the scope to free up capital for investment by scaling back dividends, farmer-shareholders have traditionally sought income from their shares, rather than investing earnings in potential growth opportunities, making this less feasible than it might be for a typical corporate.

Figure 55: Fonterra dividend payout ratio from 2010 to 2017, percentage



Source: MPI provided data

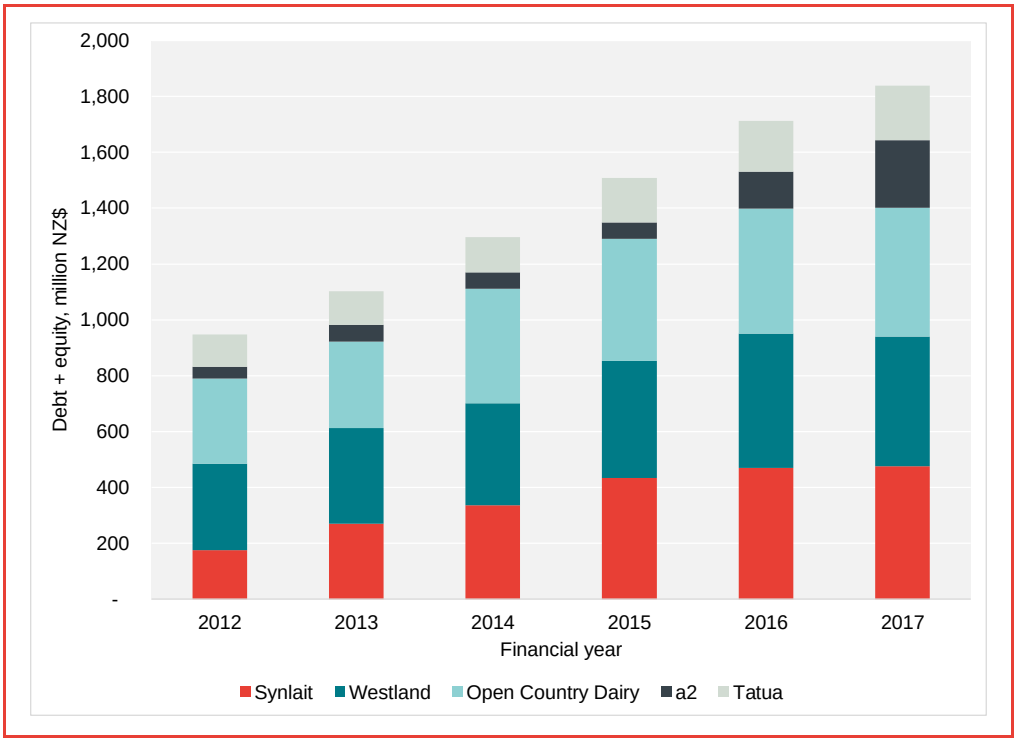
Note: Due to data limitations, dividend payout ratio = profit after tax per kgMS / dividend per share

2.6.2 Independent processors

Independent processors have successfully raised a reasonably significant quantity of external capital, as shown in Figure 56 below. Collectively, their independent processors have increased total external capital by approximately 14% per annum over the last five years.

As mentioned briefly in the previous section, debt levels for independent processors in New Zealand vary. For example, Open Country Dairy has used debt and retained profits to fund expansion – but Open Country Dairy's debt tends to be less than other independent processors, with a debt to total assets ratio in 2016 of 16%. By contrast, in 2016 Westland's debt to total assets ratio was 44%. Synlait, having a 45% debt to total assets ratio in 2015, had a significant drop in debt leading into 2016 because of substantial free cash flows that year. Cooperatives such as Tatua have a limited base of equity from farmer-supplier shareholders, and therefore have used debt to aid funding of fixed asset investment.[66]

Figure 56: Independent processors' external capital funding from 2012 to 2017

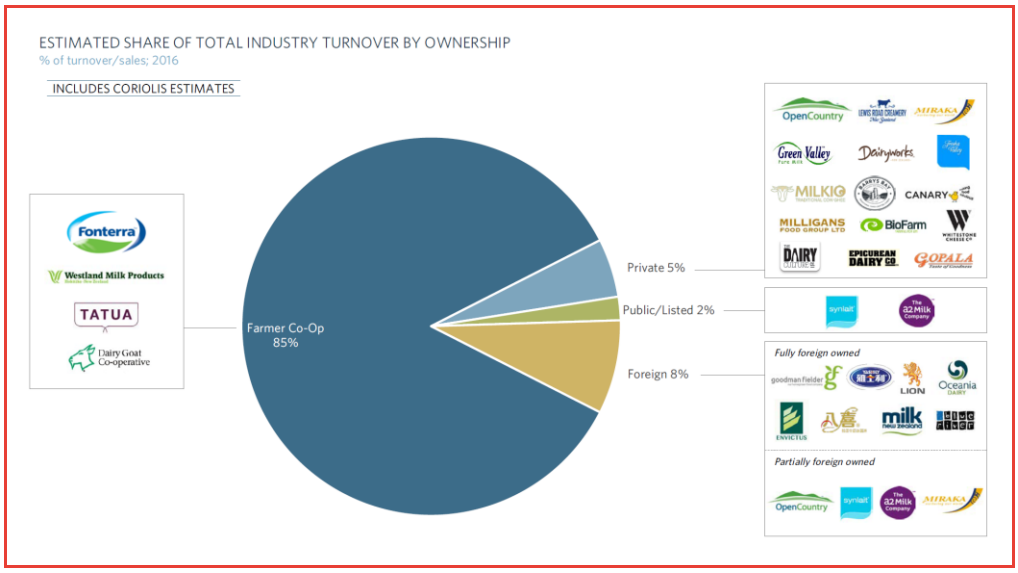


Source: MPI provided data

As shown in Figure 57 below, only around 8% of total industry turnover relates to dairy processors that have some foreign ownership.

66 TDB Advisory, (2017) New Zealand Dairy Companies Review.

Figure 57: Foreign ownership of processors in New Zealand



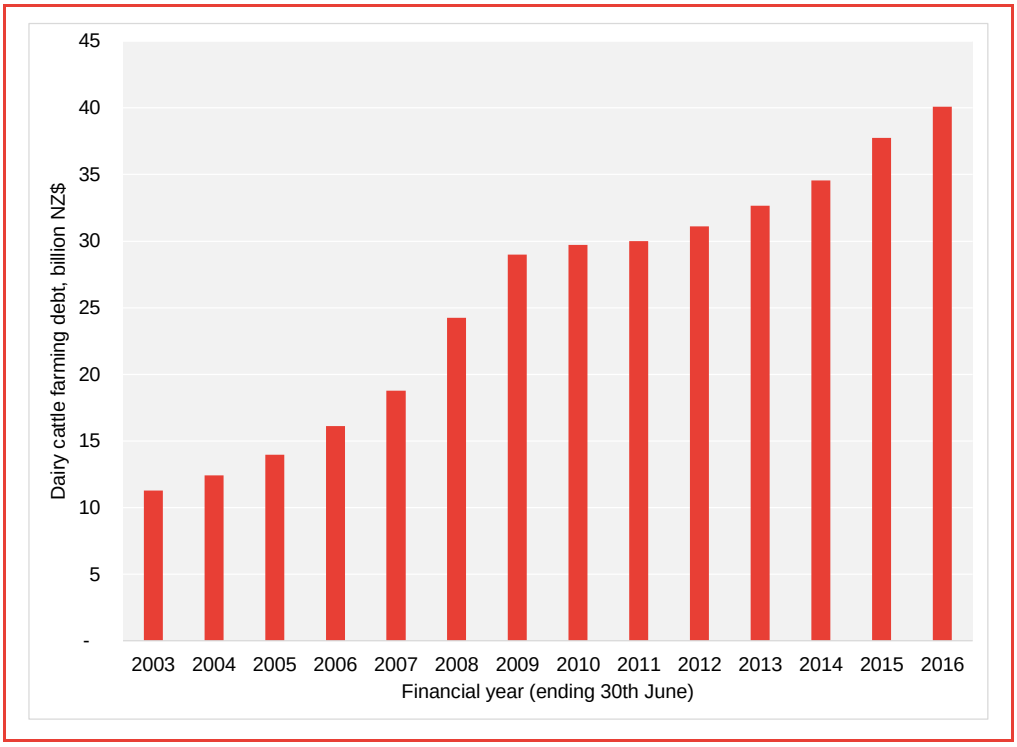
Source: The Investors Guide to the New Zealand Dairy Industry 2017, p77

2.6.3 Production

As shown in Figure 58 dairy farm debt has increased at approximately 10% per annum between 2003 and 2016, significantly outpacing 5% growth in dairy farm output value (see Figure 1). The exact reasons for this are unclear. However, one possible explanation is that the expected profitability of dairy farming has been capitalised into land prices, as illustrated in Figure 59. As a result, any new entrants into dairy farming that have entered by acquiring land have had to do so by taking on significantly more debt than in the past.

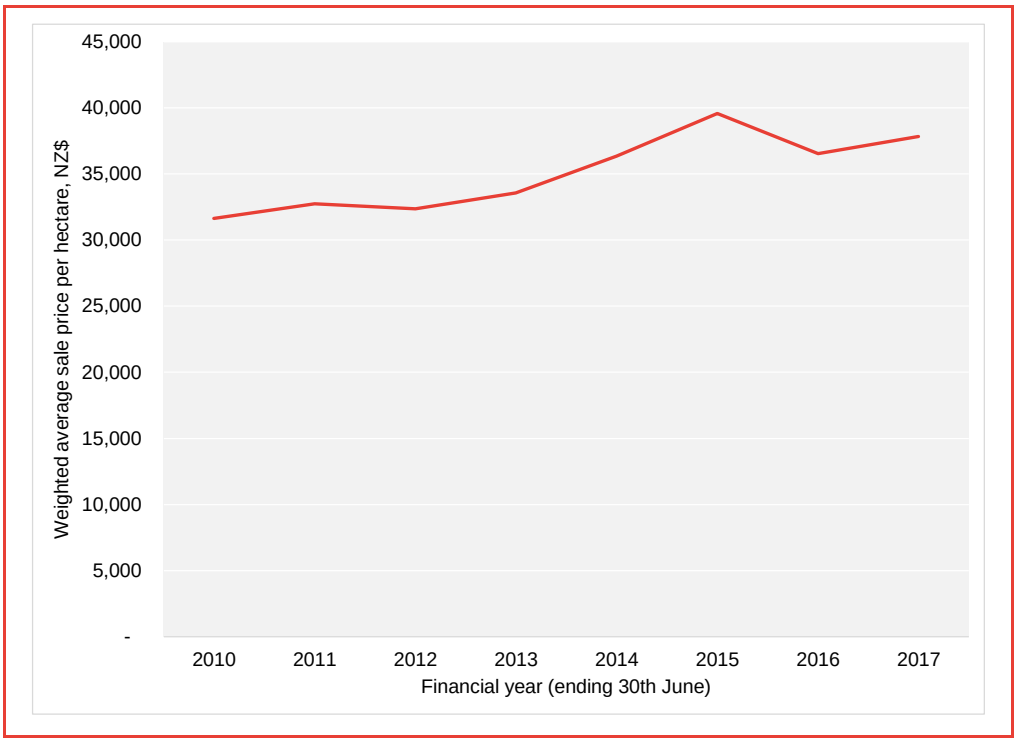
As noted, farmers are the main shareholders in the dairy sector. Given the increasing levels of on-farm debt and debt servicing costs, farmers ability and incentives to invest further into the processing sector (for example, through retained earnings) are likely to be constrained.

Figure 58: Level of debt for dairy cattle farms, billion NZ$



Source: Reserve Bank of New Zealand. Agriculture credit by loan type as at June ($m) – C26 (discontinued). Available at: https://www.rbnz.govt.nz/statistics/discontinued-statistics/c26

Figure 59: Weighted average sale price of dairy farm land per hectare, NZ$

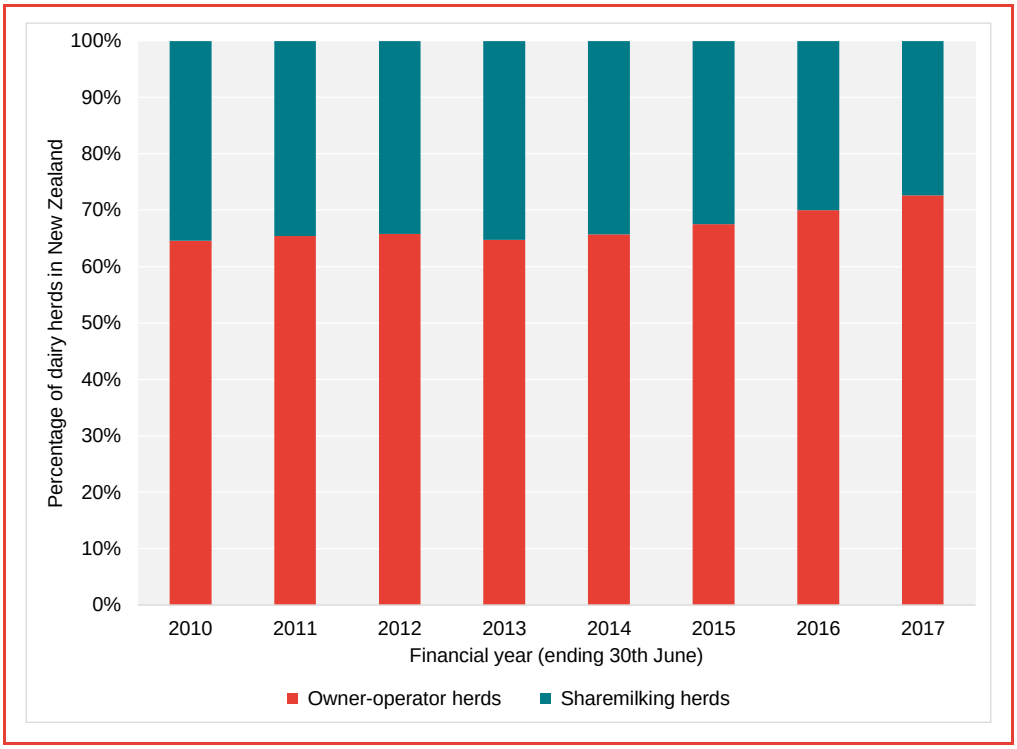


Source: Dairy NZ New Zealand Dairy Statistics 2016-17, p50

Economic performance

An alternative model to dairy farm ownership is sharemilking, whereby sharemilking farmers lease access to pasture from existing land owners. Sharemilking has historically been a popular model of dairy farming in New Zealand, particularly for farmers who wish to avoid the initial outlay of acquiring land, Fonterra shares and the associated debt burdens. Sharemilking has also been a method used by some dairy farmers to save sufficient capital to invest in their own farms. As Figure 60 shows, the proportion of sharemilking farmers has declined in recent years. The reasons for this decline are not clear.

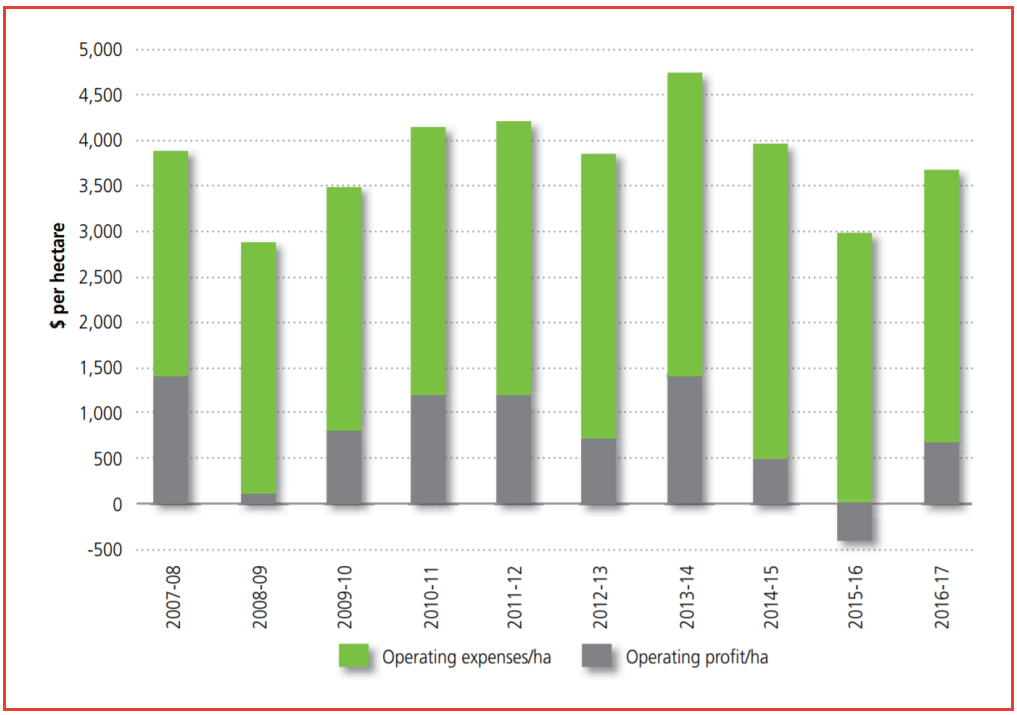
Figure 60: Prevalence of owner-operator and sharemilking ownership structures for dairy herds in New Zealand



Source: Dairy NZ New Zealand Economic Survey (2009/10 to 2016/2017 publications)

Data compiled and published by DairyNZ (see Figure 61) suggests that whilst the operating profits of sharemilking farmers in New Zealand have fluctuated significantly over the past decade, sharemilking has generally been a profitable activity. Furthermore, sharemilkers' operating expenses (which would typically include lease costs) appear to have remained fairly stable over time. This suggests that there is little evidence of rent inflation squeezing sharemilkers' profits. It should be noted that the data presented below represents an average across a sample of sharemilkers surveyed. There may therefore be instances of individual sharemilkers facing disproportionately large increases in lease costs that are not captured in this aggregate survey data.

Figure 61: Operating profit per hectare of sharemilkers dairy farm from 2008 to 2017 (year ending 31st May)



Source: DairyNZ Economic Survey 2016-17

Note: Earlier reports only extend the above time series by two years, to 2005-2006

3 Environmental performance

3.1 Overview

Key findings:

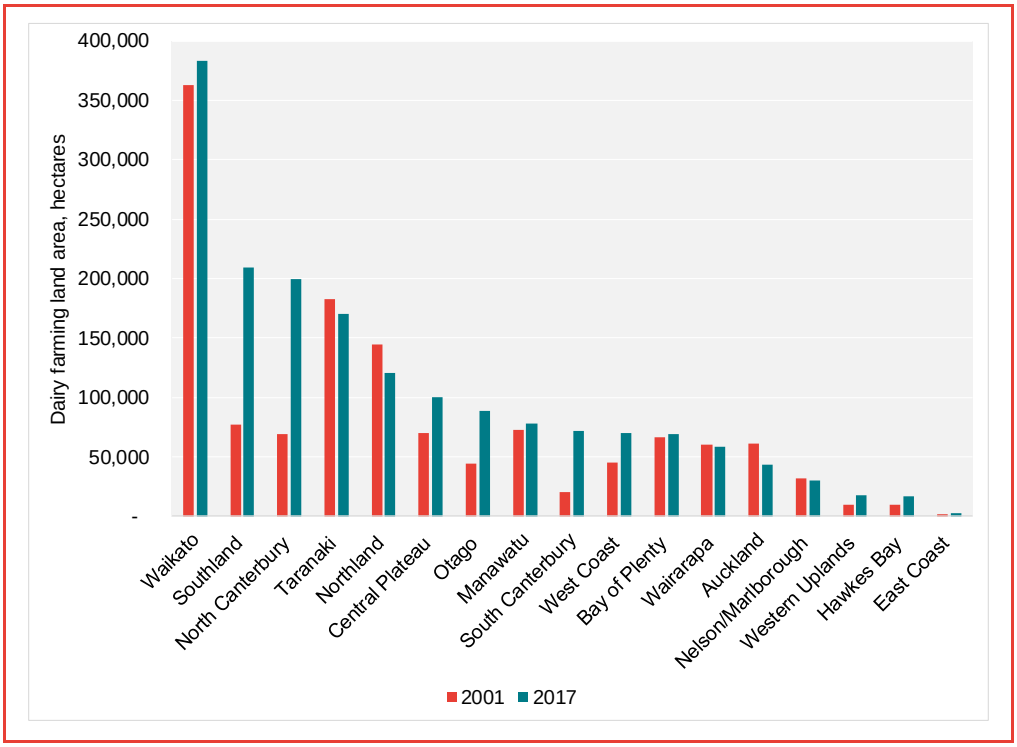
- The usage of land for dairy farming grew at a similar rate to the number of dairy cattle in New Zealand, at approximately 2% per annum between 2001 and 2017. As a result, the average number of cows per hectare has been relatively stable since 2001.
- However, dairy farm land use intensity has increased markedly in certain regions, such as North Canterbury and South Canterbury, between 2001 and 2017.
- In terms of land conversion, dairy farming has typically displaced sheep and beef farming (particularly in the South Island) and in some regions planation forestry (particularly in Waikato) and, to a much lesser extent, scrub.
- Nitrogen leaching into New Zealand's waterways increased by approximately 3% per annum over the period 2001 to 2012, in line with the increase in milk produced each year over the same period.
- Concentrations of phosphorus in river sites do not seem to have increased in line with the growth in dairy output.
- Nearly 50% of New Zealand's greenhouse gas emissions originate from agricultural activity—the vast majority of which is dairy farming. However, methane emissions from dairy cattle in New Zealand have grown relatively slowly since 2001, at approximately 1% per annum.

3.2 Land use and intensification of farming

3.2.1 Volume of dairy farming

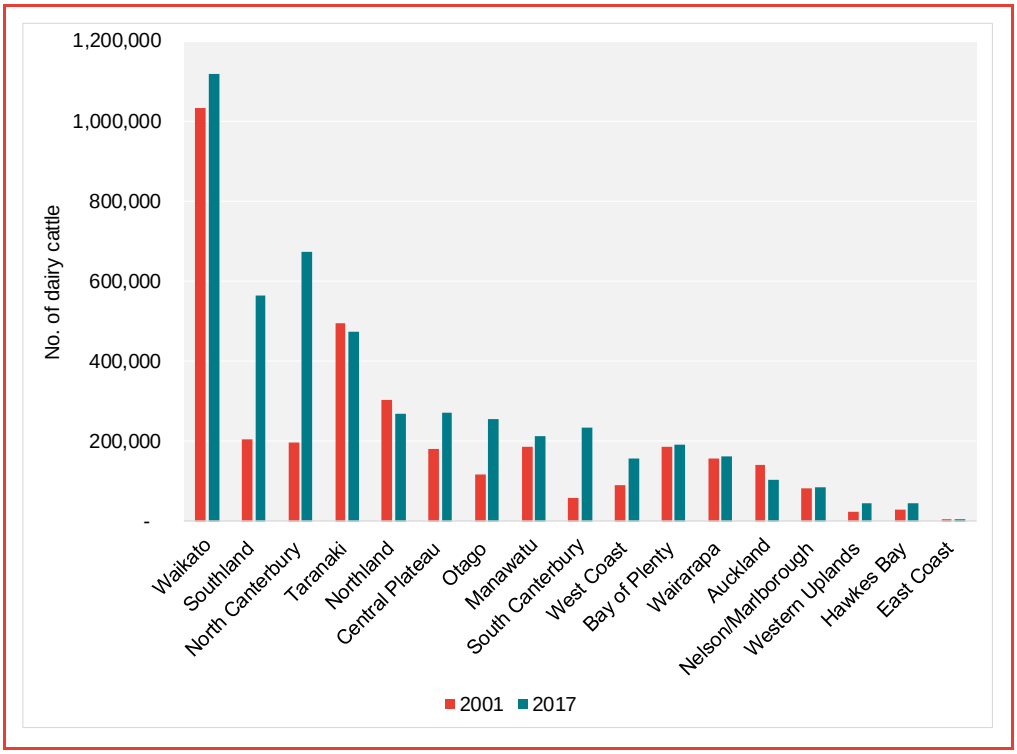
As illustrated in Figure 62 and Figure 63, the usage of land for dairy farming and the number of dairy cattle in New Zealand grew substantially between 2001 and 2017. This (combined with the data on the growth in the value of the dairy sector presented in Section 2.2) suggests that the volume of dairy activity in New Zealand has increased substantially since 2001. In contrast, the number of dairy farms and dairy cattle in Victoria has declined by 35% and 20%, respectively, over the period from 2005/06.

Figure 62: Usage of land in each region for dairy farming, hectares



Source: MPI provided data

Figure 63: Total number of cows in each region for dairy farming



Source: MPI provided data

Environmental performance

In line with regional employment due to dairy farming, the regions with the highest usage of land for dairy farming are Waikato, Southland and Canterbury. As Table 6 shows, data published by the Parliamentary Commissioner for the Environment indicates that in the dairy farming has typically displaced sheep and beef farming (particularly in the South Island) and in some regions planation forestry (particularly in Waikato) and, to a much lesser extent, scrub.

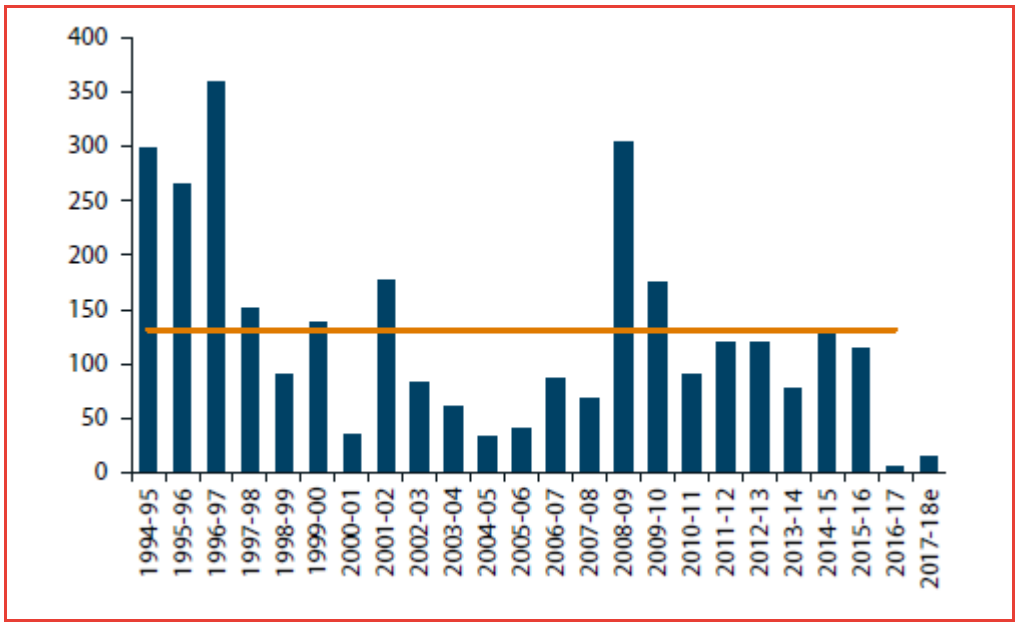
Table 6: Changes in land use between 2008 and 2012 (rounded to nearest 100 hectares)

Region	Sheep / Beef	Dairy	Plantation Forestry	Scrub
Northland	-3,900	5,500	-900	300
Auckland	-2,000	400	-100	1,800
Waikato	-7,500	28,400	-18,700	1,400
Bay of Plenty	1,100	2,800	-4,300	-400
Gisborne	-14,000	200	6,000	7,000
Hawke's Bay	-7,400	2,000	1,400	3,400
Taranaki	-1,100	4,600	2,500	-2,200
Manawatu-Wanganui	-9,300	6,200	3,200	1,800
Wellington	-4,400	200	3,400	-200
Nelson and Tasman	1,700	200	-1,000	1,100
Marlborough	-1,900	400	1,400	600
West Coast	200	5,100	-2,500	-1,500
Canterbury	-50,100	50,200	-4,200	-1,000
Otago	-17,400	12,700	2,400	-600
Southland	-35,700	38,900	1,700	-5,000
New Zealand	**-151,700**	**157,900**	**-9,600**	**6,600**

Source: Parliamentary Commissioner for the Environment, Water quality in New Zealand: Land use and nutrient pollution – Updated report, June 2015, Table 3.1

Figure 64 shows that the number of new dairy farm conversions have declined since 2009.

Figure 64: New dairy farm conversions

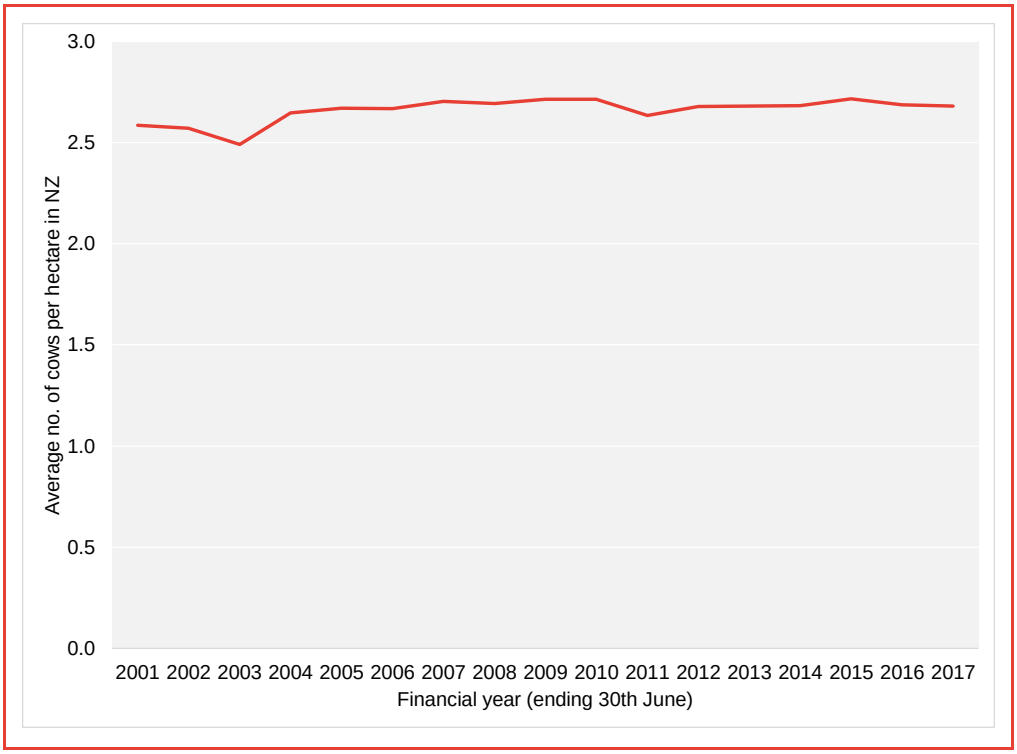


Source: ANZ AgriFocus, June 2018, Figure 13; Data from Beef + Lamb NZ

3.2.2 Intensification of dairy land use

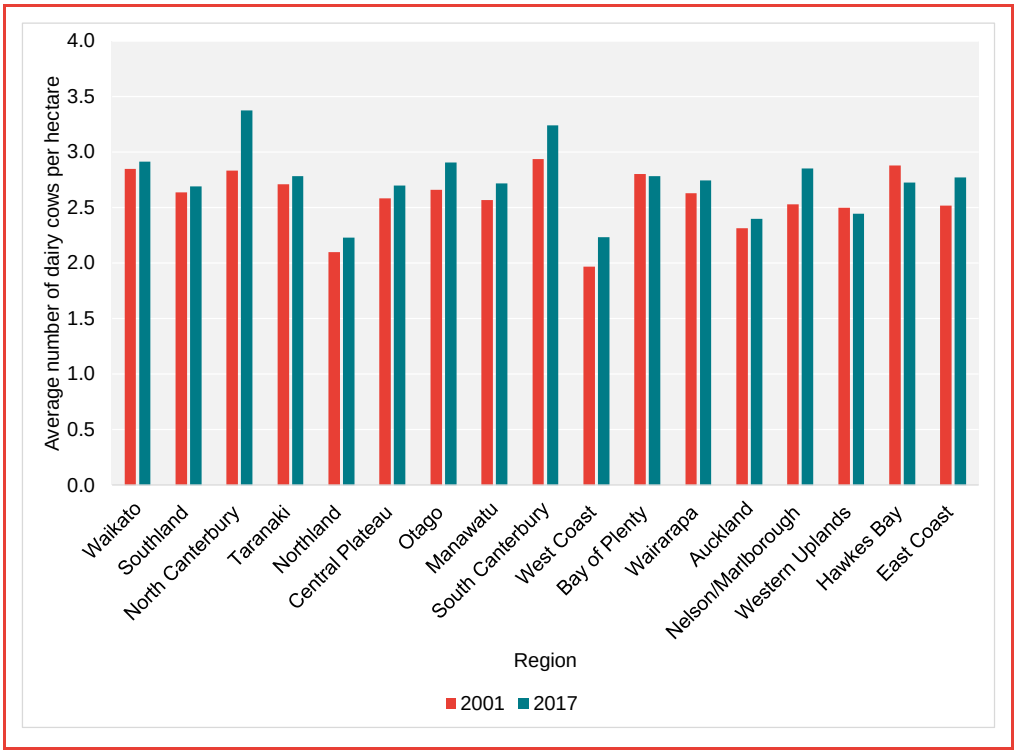
Between 2001 and 2017, the usage of land for dairy farming grew at a similar rate to the number of dairy cattle in New Zealand at approximately 2% per annum. As a result, the average number of cows per hectare of dairy farm land has been roughly stable since 2001 (see Figure 65). However, the change in dairy farming intensity between different regions varies, as shown in Figure 66. In particular, dairy farm land use intensity has a marked increase in North Canterbury and South Canterbury.

Figure 65: Average number of cows per hectare of dairy farming land used



Source: MPI provided data

Figure 66: Dairy farm land use intensity for different regions between 2001 and 2017, arranged in descending order in terms of hectares used for dairy farming

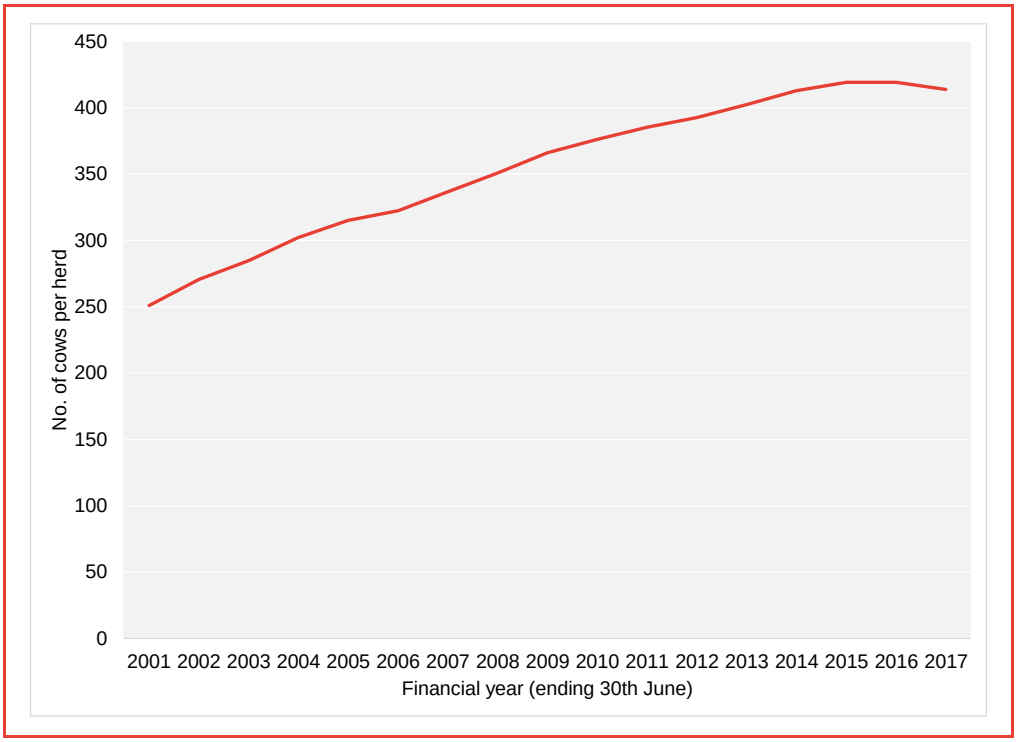


Source: MPI provided data

Average herd size has been increasing over time, plateauing since 2015. This reflects the fact that between 2001 and 2015 there were fairly large economies of scale in dairy farming to be exploited, but over the past few years the returns to scale have become more constant—for instance, due to constraints on herd size imposed by the limits of capital equipment (such as milking equipment) or available grazing pasture. The average herd size in Victoria is lower than New Zealand, at 256, having increased by 24% over the period from 2005/06. Ireland's average herd size is around 80.

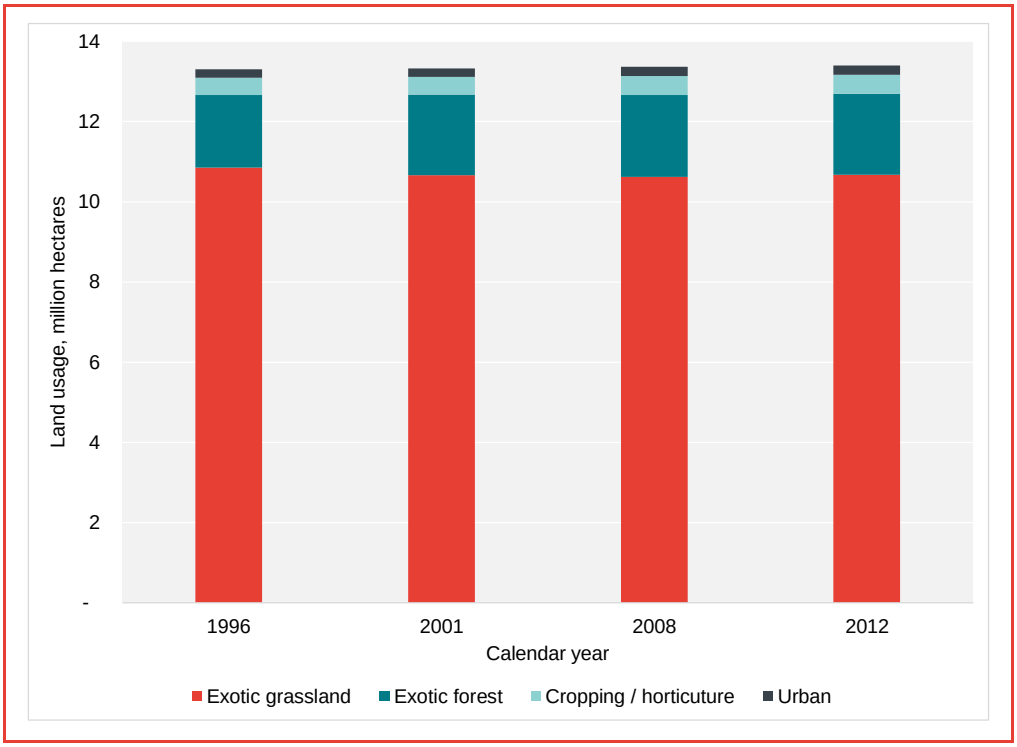
As can be seen in Figure 68 below, land usage for grassland (which includes land used for grazing by dairy cattle) did not change much between 1996 and 2012. This suggests that any increases in dairy cattle farming land was due to repurposing of existing grassland.

Figure 67: Average herd size for dairy farming



Source: MPI provided data

Figure 68: Land usage over time, million hectares



Source: MFE Agricultural Production Survey (only available for years shown in figure)

Note: The MFE assumes that exotic grasslands are primarily used for livestock production, including dairy cattle

3.3 Run off and waterway impact

The previous section presented data that since 2001 there has been a considerable increase in dairy farming activity, particularly in regions such as Waikato, Southland and Canterbury. Whilst this growth in dairy farming may have delivered significant economic benefits to New Zealand, there has also been considerable concern expressed that these benefits have come at the cost of significant environmental harm, particularly in relation to effluent and fertiliser run off that has led to pollution of waterways.[67]

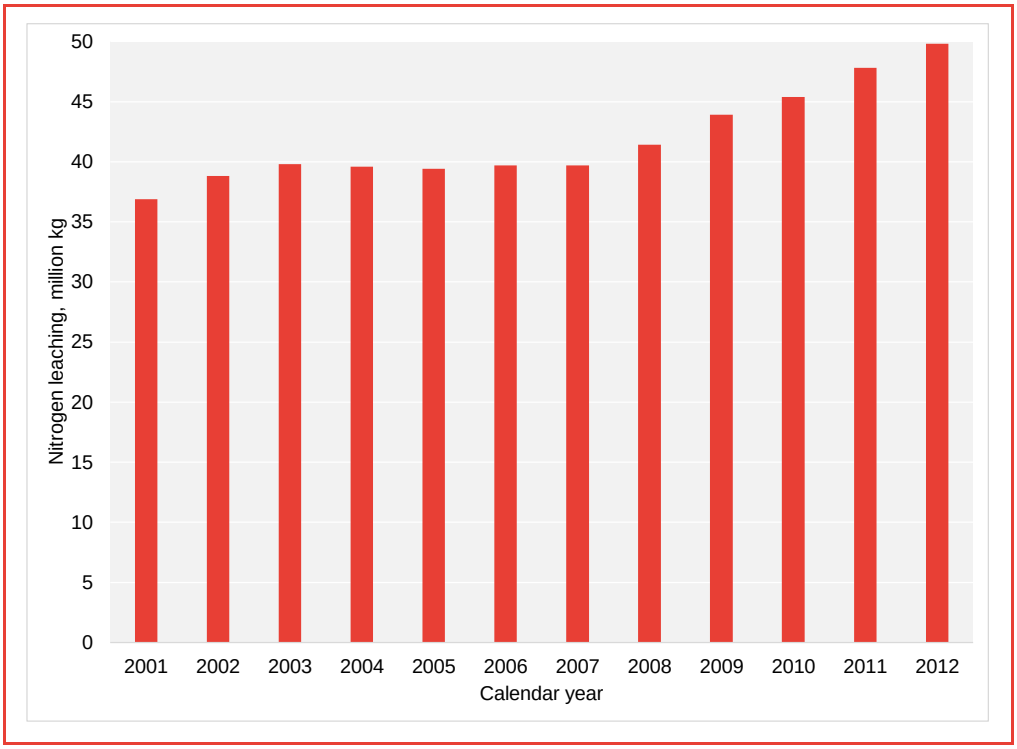
The most reliable source of data on run off impact on lakes and rivers is the Ministry for the Environment's (MFE) New Zealand's Environment Reporting series, which last covered nitrogen leaching in 2012. As such, data on nitrogen leaching attributable to dairy cattle are available only to 2012.[68] Figure 69 plots these data. While Figure 69 does not provide a picture of the extent of dairy

67 Parliamentary Commissioner for the Environment. The state of New Zealand's environment, p38. (June 2016). Available at http://www.pce.parliament.nz/media/1666/the-state-of-new-zealand-s-environment.pdf

68 https://data.mfe.govt.nz/table/52530-nitrogen-leached-from-soil-total-1990-2012/

farming run off impact over the past six years, the trend seems to be an increase in nitrogen leaching of approximately 3% per annum (from 37 million kilograms in 2001 to nearly 50 million kilograms in 2012), in line with the growth in milk production since 2001 (see Figure 3). This suggests that there has been a degradation of water quality accompanying the significant growth of the dairy sector—although it is difficult to draw strong conclusions on the impact on waterways since 2012, given the lack of subsequent data. In contrast, the available data for Australia suggest inland surface water quality has remained substantially unchanged across Victoria from 2005 to present.

Figure 69: Nitrogen leaching into freshwater from dairy cattle in New Zealand from 2001 to 2012



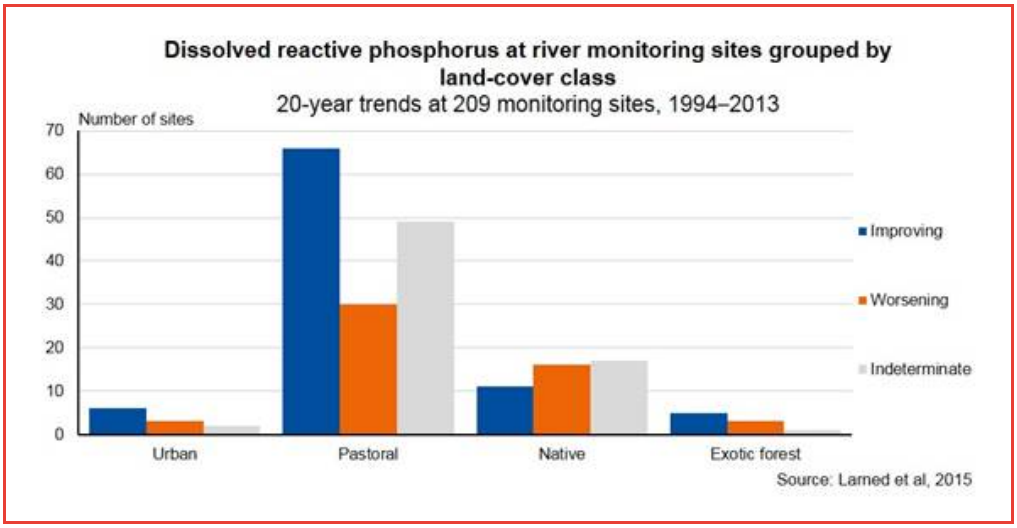
Source: Ministry for the Environment

Concentrations of dissolved reactive phosphorus in river sites do not seem to have increased in line with the growth in dairy output. As shown in Figure 70 below, between 1994 and 2013, when phosphorus concentrations were measured by MFE, 46% of pastoral sites (which includes non-dairy farmland) showed an improving trend, 21% of pastoral sites showed a worsening trend, and 34% of pastoral sites showed an indeterminate trend. MFE reports that the following may have contributed to improvements in pastoral site measurements:

- Various strategies (e.g., stock exclusion) developed since 2003 to mitigate phosphorus loss from land to water;

- The targeting of critical source areas of contaminant loss since 2008 in 77 published documents (industry guidelines, farm environment plans and regional policy); and
- Improved education of farm consultants, fertiliser company representatives and regional council staff since 2002 on mitigating phosphorus loss.

Figure 70: Change in measured dissolved reactive phosphorus at river monitoring sites between 1994 and 2013, grouped by land-cover class



Source: https://www.mfe.govt.nz/publications/fresh-water/fresh-water-report-2017-water-quality/monitored-river-water-quality#figure12

Three regions which have seen a large growth in dairy farming from 2008 to 2012 are Canterbury, Southland and Waikato, with dairy pushing out beef/sheep in the two former and plantation forestry in the latter. It is of particular importance to look at the amount of waterway pollution which has occurred since this uptake of dairy. Canterbury is even more crucial, as it contains 70% of New Zealand's irrigated land, meaning a small change in irrigation practices can have significant effects on local waterways. Water use in Canterbury is expected to double from 2015 to 2025,[69] with the current nitrate in the groundwater system expected to take 30 to 60 years to dissipate completely.

To see how the amount of water pollution for each region has changed, it is possible to examine the change in nitrate-nitrites from upstream and downstream to see if these increase after passing dairy farms. Unfortunately, the data are only available from 2007.

As Table 7 shows, Canterbury saw significant changes in the nitrate-nitrite concentration of downstream readings, likely owing to the dairy industry and other

69 "Call for Cantabs to think about future of water", Lincoln University

farming practices. Southland also saw a notable increase in nitrate-nitrites, likely because of land use conversions.

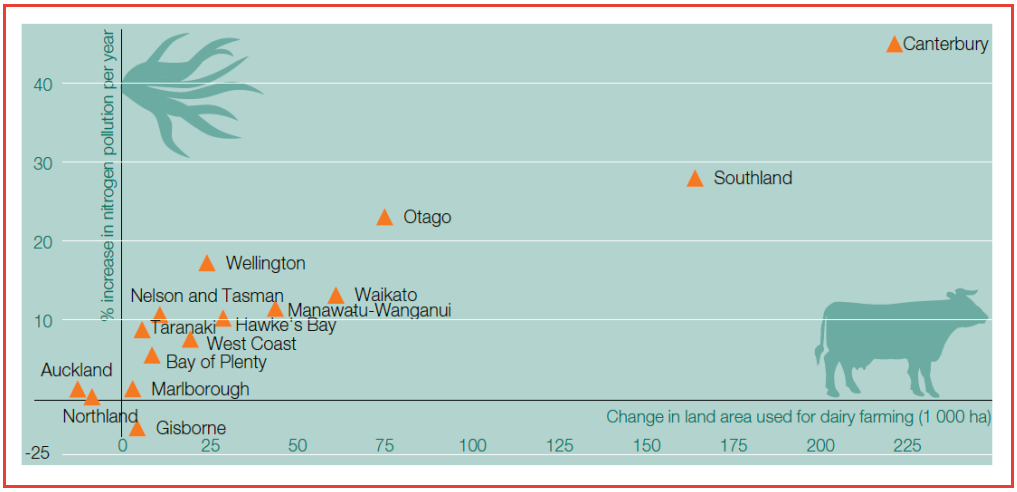
Table 7: Median nitrate-nitrite concentration in high growth dairying regions, 2007

	Canterbury (Waikakahi)	Canterbury (Rhodes)	Southland
Upstream reading	1.62	7.3	0.120
Downstream reading	1.76	9.35	0.755
Change between upstream and downstream reading (%)	8.64%	28.08%	529.17%

Source: Water quality of selected dairying farming catchments, p. 74

Figure 71 provides indicative forecasts of nitrogen leaching in freshwater by region in New Zealand, published by the OECD. The analysis indicates that those regions that have seen the most significant land conversions to dairy farming are expected to experience the greatest nitrate run off into waterways.

Figure 71: Predicted changes in nitrogen pollution of freshwater associated with large-scale land-use change to dairy farming: 1996-2020



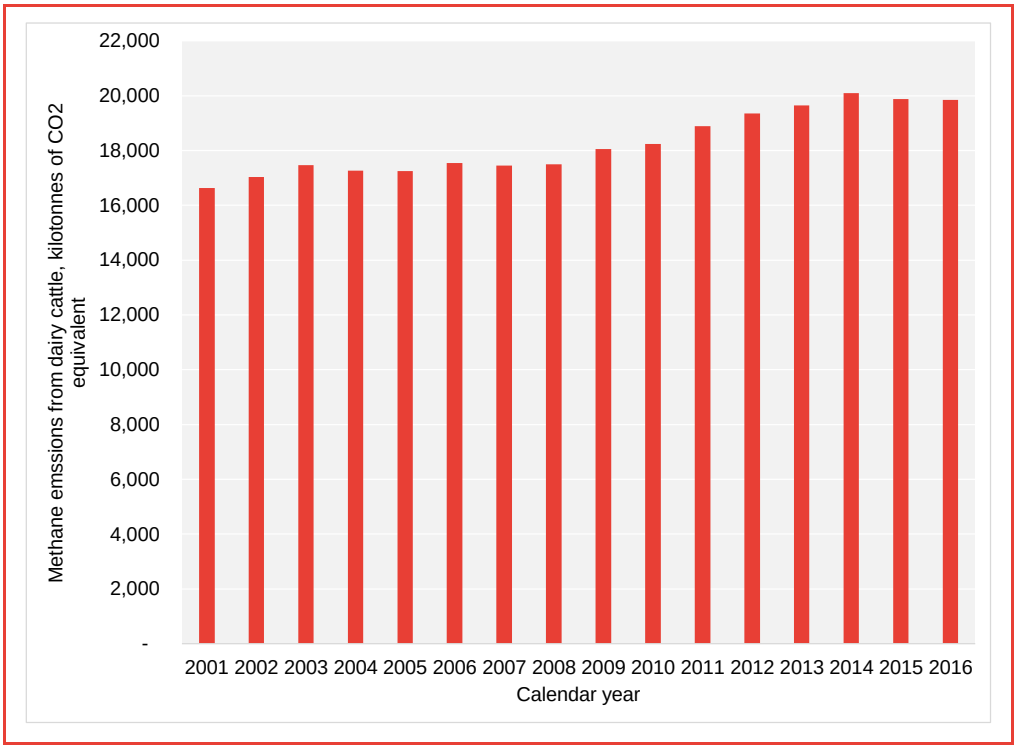
Source: OECD, Environmental Performance Reviews: New Zealand 2017, Highlights, p. 13. Original source: Parliamentary Commissioner for the Environment, Water quality in New Zealand: Land use and nutrient pollution, 2013

3.4 Emissions

Another well-recognised negative externality of the dairy farming sector is methane emissions. As shown in Figure 72 below, methane emissions from dairy cattle in New Zealand have only been growing slowly since 2001, at approximately 1% per

annum. For context, in the agricultural industry as a whole, methane emissions have actually decreased at a rate of 0.1% per annum over this period. Greenhouse gas emissions in the Australian dairy sector have grown by around 5% since 2001, compared to a 3% reduction across the Australian economy over the same period, but dairy sector emissions account for only 1.6% of total emissions in Australia.

Figure 72: Methane emissions from dairy cattle in New Zealand from 2001 to 2016 (microbe digestion and manure fermentation), kilotonne of carbon dioxide equivalent units



Source: Ministry for the Environment Greenhouse Gas Inventory

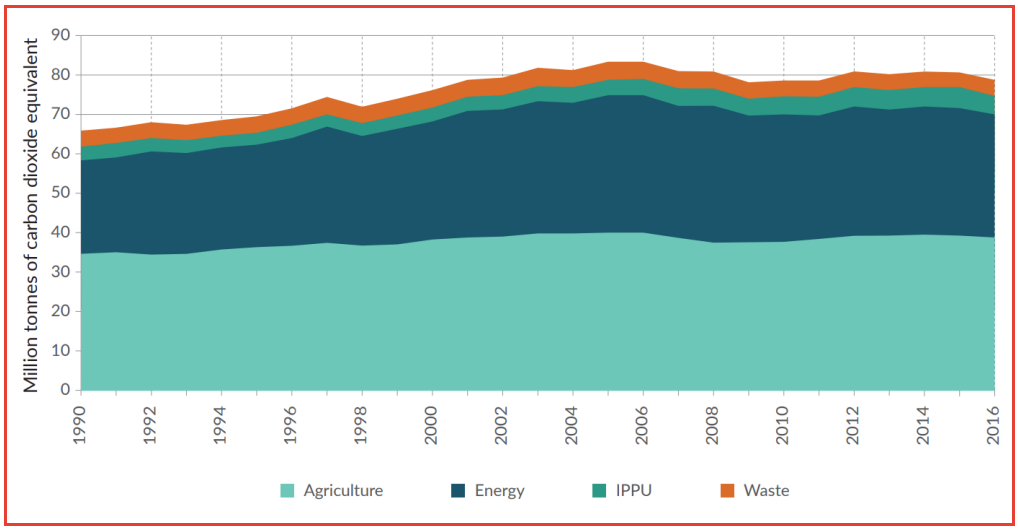
Note: Manure fermentation only makes up approximately 5% of total methane emissions from dairy cattle

The majority of New Zealand's agricultural emissions is caused by the dairy sector due to cattle and nitrogen-rich fertiliser.[70] As seen in Figure 73, agriculture makes up approximately 50% of New Zealand's greenhouse gas emissions, and methane emissions from this sector have increased by 16% cumulatively since 1990. MFE notes that this is primarily due to the doubling in size of the dairy herds in New Zealand, with a 600% increase in the application of nitrogen based fertiliser.[71]

70 Ministry for the Environment, Greenhouse gas inventory snapshot, p. 3

71 Ministry for the Environment, Greenhouse gas inventory snapshot, p. 3

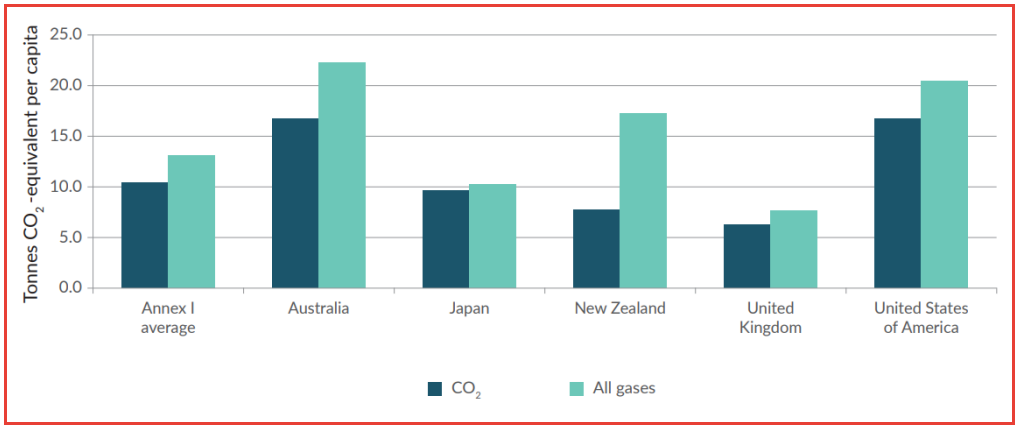
Figure 73: New Zealand's gross greenhouse gas emissions by sector



Source: Ministry for Environment, Greenhouse gas inventory snapshot

Although New Zealand only contributes 0.17% of the world's gross greenhouse gas emissions, it has quite a high emissions rate per capita. Among other Annex 1 countries New Zealand has an unusual emissions profile, with almost half of its emissions per capita coming from methane and nitrous oxide, as seen in Figure 74. This is largely because, as noted below, approximately 80% of New Zealand's electricity generation is from renewable sources, yet the amount of dairy cattle farming contributes material amounts of methane and nitrous oxide. These two gases have a greater warming effect when compared with carbon dioxide.

Figure 74: International comparisons per capita emissions, 2015

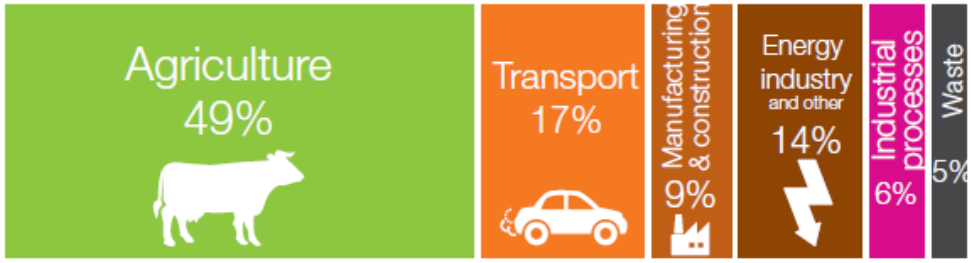


Source: Ministry for Environment, Greenhouse gas inventory snapshot

3.5 The dairy sector relative to other sectors in New Zealand

New Zealand has few sectors apart from agriculture (and dairy farming in particular) that are singled out as major polluters. For example, as shown in Figure 75, nearly half of New Zealand's greenhouse gas emissions come from agriculture (primarily methane from methane from cattle and nitrous oxides from animal waste and fertilisers) – the highest share in the OECD. Unlike many other countries, approximately 80% of New Zealand's electricity generation is produced by renewable sources (see Figure 76). This a notable contrast to Australia where coal-fired generation produces around 76% of output, and electricity generation accounts for 34% of greenhouse gas emissions. Furthermore, New Zealand has no significant heavy manufacturing industries or large-scale mining activity responsible for major environmental harm, once again in contrast to Australia's reliance on mining and gas.[72]

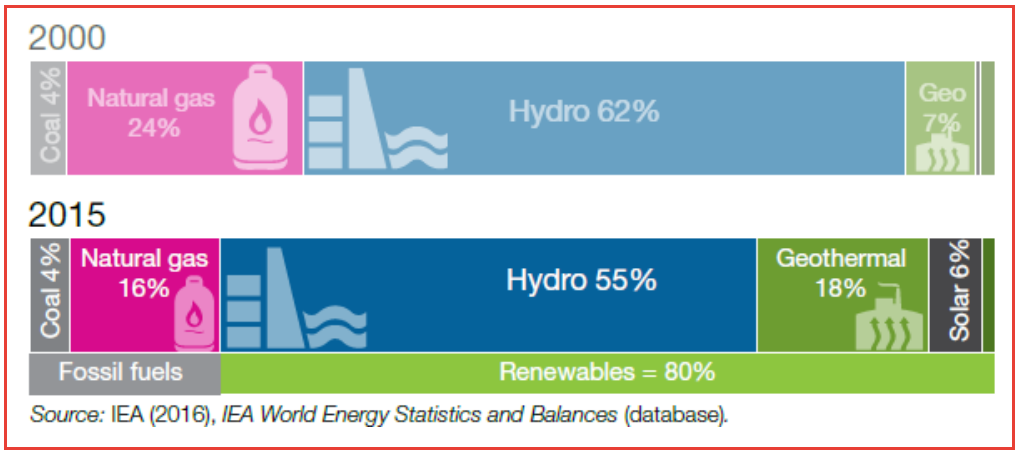
Figure 75: Greenhouse gas emissions by sector, 2014



Source: OECD, Environmental Performance Reviews: New Zealand 2017, Highlights, p. 4

72 Australia still relies on brown and black coal for much of its generation, resulting in the energy sector producing many more emissions than their dairy sector. Australia also has a very large mining industry that has attracted significant attention for causing environmental degradation.

Figure 76: Electricity generation by source



Source: OECD, Environmental Performance Reviews: New Zealand 2017, Highlights, p. 4

The relative absence of other polluting sectors in New Zealand, combined with the relative size and economic importance of the dairy sector (see Section 2.2) makes the dairy sector stand out as a natural target for scrutiny in terms of environmental performance.

3.6 Government initiatives for mitigation

Both the central and local government in New Zealand are implementing several initiatives to mitigate the impact of dairy farming on waterways and emission levels. For example, the MFE has advised that current initiatives are those summarised in Table 8 below.

Table 8: Current waterway and emissions initiatives by the government

Initiative	Overview
Central Government	
National Policy Statement for Freshwater Management 2014 (NPS Freshwater) [73]	Directs local government about how they can carry out their responsibilities
Good Farming Practice: Action Plan for Water Quality 2018[74]	Accelerates the uptake of good farming practices to improve water quality, measure this uptake and assess the benefit of these practices

73 http://www.mfe.govt.nz/fresh-water/national-policy-statement/about-nps

74 http://www.fedfarm.org.nz/FFPublic/Policy2/National/Good_Farming_Practice-Action_Plan_for_Water_Quality_2018.aspx

Initiative	Overview
Aparima catchment group[75]	Aims to increase awareness of sustainable waterway management, help communities identify what to do to improve water quality
Dairy Action Plan for Climate Change[76]	Commitment to building capability of rural professionals through training, raising awareness and undertaking dairy farm greenhouse gas pilot case studies
Zero Carbon Act[77]	Aims to reduce carbon emissions to zero by 2050 through a fair and cost effective transition. It provides legally binding long terms targets, five-year carbon budgets and an Independent Climate Commission to guide the transition
Local Government initiatives	
Southland Water and Land Plan[78]	Provides direction and guidance regarding the sustainable use, development and protection of water and land resources in the South land region
Canterbury Environment Rules[79]	Limits the amount of chemicals a farm is allowed to leach if within the catchment area
Waikato Change One nutrient discharge limits[80]	Plans to reduce the amount of contaminants entering catchments through forestry requirements, rules for farming activities and schedules for landowners to adopt rules
Bay of Plenty Rule 11[81]	Limits the amounts of nitrogen and phosphorus coming from nearby properties to protect water quality in Lake Rotorua

Source: Ministry for the Environment

75 https://www.dairynz.co.nz/news/latest-news/taking-the-lead/

76 https://www.dairynz.co.nz/environment/climate-change/dairy-action-for-climate-change/

77 https://www.mfe.govt.nz/have-your-say-zero-carbon

78 http://www.es.govt.nz/document-library/plans-policies-and-strategies/regional-plans/proposed-southland-water-and-land-plan/Pages/default.aspx

79 https://www.ecan.govt.nz/your-region/your-environment/water/whats-happening-in-my-water-zone/about-the-water-zone-committees/

80 https://www.waikatoregion.govt.nz/council/policy-and-plans/plans-under-development/healthy-rivers-plan-for-change/

81 http://www.rotorualakes.co.nz/nitrogen-discharge-allowances

3.7 Fonterra initiatives for mitigation

Fonterra has recently published its first Sustainability Report in late 2017,[82] which outlines its approach to environmental sustainability:[83]

- Improve the health and biodiversity of New Zealand land and waters by reducing the impacts of farming and manufacturing and working in partnership with others
- Lead the transition to a low-carbon future by investing in innovation and infrastructure to remove greenhouse gas emissions from our supply chain
- Meet the growing nutritional demand through improvements in productivity and minimising waste from farm to consumer

Progress for each of their performance targets is shown below in Table 9.

Table 9: Fonterra environmental performance targets and progress as of end of FY17

Indicator	Target	FY17 result	Progress
Length of defined waterways with dairy cattle permanently excluded	100% by 31 May 2017	98.4%	Essentially completed to plan and a focused effort now under way for the remaining small number of farmers.
Regular crossing points on farm have bridge or culvert	100% by 31 May 2018	99.8%	Essentially completed one year ahead of plan.
Farms with waterways have documented riparian management plan	100% by 31 May 2020	4%	Progress is better than can be reported because not all data is currently available; however, progress is slower than planned. Effort has been prioritised elsewhere. New tools and services like Farm Environment Plans will accelerate progress from now.
Farms with water meters on significant water intakes	85% by 2020	51%	On track.
Farms participating in nutrient management reporting and benchmarking	100% by 30 Nov 2015	95%	The effort required to achieve this was initially under-estimated but adoption has grown rapidly and is now approaching target.

82 https://www.fonterra.com/nz/en/our-stories/media/fonterra-releases-first-sustainability-report-on-environmental-and-social-performance.html

83 Fonterra. Sustainability Report. Available at: https://view.publitas.com/fonterra/sustainability-report-2017

Indicator	Target	FY17 result	Progress
Farm Environment Plan	100% by end 2025	NA	This is a new initiative and starts with a target for 1,000 during FY18.
Reduction in manufacturing emissions intensity (emissions per tonne of production)	30% reduction by 2030 from 2010 baseline (NZ and Australia)	7.8% reduction cumulative to FY17	This represents 26% progress over 35% of time period.
Reduction in absolute manufacturing emissions	30% reduction in absolute emissions by 2030 from FY15 baseline (Global)	5.0% reduction cumulative to FY17	This represents 16% progress over 13% of time period.
Reduction in manufacturing energy intensity (energy per tonne of production)	20% reduction by 2020 from FY03 baseline (NZ)	17.6% reduction cumulative to FY17	This represents 88% progress over 82% of time period.
Improvement in water efficiency (water used per cubic metre of milk processed)	20% reduction by 2020 from FY15 baseline for NZ	5.1% increase cumulative to FY17	New target to focus on declining water efficiency.
Site treating wastewater to leading industry standards	100% of sites by 2026 (global target)	25%	Long-term target, but on track to achieve as investments are made in site development.

Source: Fonterra. Sustainability Report, p33, p53 and p55. Available at: https://view.publitas.com/fonterra/sustainability-report-2017

3.8 Other industry initiatives for mitigation

3.8.1 Dairy Tomorrow

The Dairy Industry Strategy 2017 – 2025 (Dairy Tomorrow) is a refresh of the 2013 Strategy for Sustainable Dairy Farming by DairyNZ. Specific plans and targets are incorporated in separate initiatives (see next subsection for one such example), with Dairy Tomorrow emphasising on six goals:

- To protect and nurture the environment for future generations;
- To build the world's most competitive and resilient dairy farming businesses;
- To produce the highest quality and most valued dairy nutrition;
- To be world leading in on-farm animal care;
- To build great workplaces for New Zealand's dairy workforce; and
- To help grow vibrant and prosperous communities.[84]

3.8.2 DairyNZ Water Accord

As part of the 2013 Strategy for Sustainable Dairy Farming, the Water Accord was launched in July 2013 by DairyNZ, and is a set of national good management practice benchmarks, with the goal of mitigating the environmental impact of New Zealand's dairy farming on freshwater resources.[85] As of May 2016, notable achievements (and associated targets) include:

Table 10: Selected Water Accord achievements and target status as of May 2016

Achievement	Target	Progress
133 rural professionals are now certified nutrient management advisers	50% by May 2014	Achieved
99.4% of regular stock crossing points on dairy farms have bridges or culverts	100% by May 2018	On track
97.2% of waterways have dairy cattle excluded	100% by May 2017	On track
49.8% of dairy farms have installed water meters	85% by 2020	On track
27% of dairy farms with waterways have a riparian management plan	50% by May 2016	Behind schedule

84 DairyNZ. Dairy Tomorrow. Available at: http://www.dairytomorrow.co.nz/wp-content/uploads/2017/12/dairy-strategy-2017-A4-booklet-Part3.pdf

85 Dairy NZ. About the Water Accord. Available at: https://www.dairynz.co.nz/environment/in-your-region/sustainable-dairying-water-accord/

Achievement	Target	Progress
Nutrient management data collected from 83% of dairy farms	100% by May 2015	Behind schedule
5.2% of farms assessed were found to have significant non-compliance for dairy effluent	NA	Best on record

Source: DairyNZ. Water Accords: Progress Report for the 2015/16 season. Available at: https://www.dairynz.co.nz/media/5787294/water_accord_report_3_years_on_web.pdf

3.8.3 Synlait sustainability programme

At its annual conference in June 2018, Synlait announced the following targets:[86]

- Reduction by 2028 of greenhouse gas emissions by 35% per kilogram of milksolids on-farm, and 50% per kilogram of milksolids off-farm;
- Reduction by 2028 of water consumption on-farm and off-farm by 20% per kilogram of milksolids;
- Reduction by 2028 of on-farm nitrogen losses by 45% per kilogram of milksolids;
- Increased premium payments to suppliers for best practice dairy farming, including an incentive payment for not feeding any palm kernel extract;
- Never to build another coal-fired boiler; and
- Establishing a social investment fund to boost support for communities, organisations and projects aligned to Synlait's sustainability goals.

86 NZ Herald. Synlait launches bold environmental sustainability programme. (June 2018). Available at: https://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=12079560

4 Consumer outcomes

4.1 Overview

Key findings:

- There is some qualitative evidence of an increase in the range of consumer dairy products available in New Zealand since 2001, including an increase in the availability of premium products supplied by niche producers. Access to proprietary supermarket scanner data would allow a more systematic and comprehensive assessment of the extent to which product variety has increased.
- The retail price of most basic dairy products in New Zealand have moved in line with CPI and overall retail grocery price trends since 2007, increasing at less than 1% per annum in real terms. The main exception has been butter. The retail price of butter has increased significantly over the last decade (approximately 7% per annum in real terms).
- However, global dairy commodity prices have fallen significantly (between 15% and 28%, in nominal terms, depending on the price index used) over the same period. It is unclear why the retail price of dairy products in New Zealand have increased in nominal terms (remained flat in real terms), while the global commodity prices have fallen materially.
- The retail price of fresh milk prices in New Zealand does not vary between seasons, despite the high degree of seasonal variation in the cost of milk production.

4.2 Sales channels

The retail dairy product market in New Zealand is relatively small, accounting for just 5% of New Zealand dairy production.[87] There are three key channels to market for retail dairy products in New Zealand: supermarkets account for the majority (around 60%) of dairy product retail sales, with convenience stores and hospitality sales making up the remainder.[88] Although supermarkets are also the most important sales channel for retail dairy products in Australia, they account for only 38% of sales.[89]

4.3 Product range

The key products supplied in the domestic retail market are fresh milk, cheese, butter and yoghurt, which collectively account for around 80% of the volume

87 Dairy Companies Association of New Zealand, About the NZ Dairy Industry, Available at: https://www.dcanz.com/about-the-nz-dairy-industry/.

88 TDB, Review of the Regulatory Environment for Domestic Dairy Products, March 2018, p28.

89 ACCC, Dairy Inquiry: Final Report, April 2018, p110.

consumed. The remainder of the market consists of a range of products including flavoured milks, dairy desserts, cream cheese, sour cream and specialty cheese.[90]

The supply of dairy products in the domestic market is dominated by Fonterra, who supplies the full range of products and lead the market in all channels, with Goodman Fielder the second largest player.[91] There are a number of smaller niche suppliers producing a range of speciality products, including:

- Fresha Valley and Green Valley (milk);
- Dairyworks (cheese);
- Lion (yoghurt);
- The Collective (yoghurt); and
- Lewis Road (milk, butter and ice cream).[92]

Branded products produced by these businesses compete with supermarket house brands produced by Fonterra (milk, cheese, butter), Goodman Fielder (milk and cheese, produced by Fonterra and repackaged), Fresha Valley (milk) and Dairyworks (cheese, again produced by Fonterra and repackaged).[93] Synlait has recently won the contract to supply house-branded milk to Foodstuffs South Island, a contract historically held by Goodman Fielder.[94] In addition, a number of companies import speciality products.

In 1999 the Commerce Commission noted the domestic consumer dairy product market included fresh (or town) milk, processed milk products, butter, block cheese, speciality cheese, spreads, processed cheese, yoghurts, dairy desserts and dips.[95] At that time these products were supplied by dairy cooperatives, private companies, joint venture companies and importers through the sale of both

90 TDB, Review of the Regulatory Environment for Domestic Dairy Products, March 2018, p28.

91 TDB, Review of the Regulatory Environment for Domestic Dairy Products, March 2018, p29.

92 TDB, Review of the Regulatory Environment for Domestic Dairy Products, March 2018, p29.

93 TDB, Review of the Regulatory Environment for Domestic Dairy Products, March 2018, p29.

94 Foodstuffs NZ, Synlair partners with Foodstuffs South Island to supply fresh milk and cream, Media release, 21 December 2017, Available at: https://www.foodstuffs.co.nz/media-centre/news-media/synlait-partners-with-foodstuffs-south-island-to-supply-fresh-milk-and-cream/.

95 Commerce Commission, Draft Determination pursuant to the Commerce Act 1986 ("the Act") in the matter of an application for authorisation of a business acquisition involving: New Zealand Dairy Board, Kaikoura Co-Operative Dairy Company Limited, Kiwi Co-Operative Dairies Company Limited, Marlborough Cheese Co-Operative Limited, The New Zealand Co-Operative Dairy Company Limited, Northland Co-Operative Dairy Company Limited, South Island Dairy Co-Operative Limited, Tasman Milk Products Limited, Tatua Co-Operative Dairy Company Limited, Westland Co-Operative Dairy Company Limited, South Island Dairy Co-Operative Limited (Draft Determination), 27 August 1999, p21.

proprietary and house brands to supermarkets, convenience stores and retailers.[96] The Commission also noted the presence of high value speciality cheeses, produced by specialist producers.[97] The Commission identified a series of domestic consumer markets relevant to its analysis in 1999, including the markets for town or fresh milk in the North and South Islands, cheese, consumer spreads, cultured dairy products and dairy ingredients. The Commission reported the relatively inelastic demand for fresh milk,[98] consistent with the perception of fresh milk as a core or essential product.

In 2011 the Commerce Commission undertook an inquiry into whether to initiate a Commerce Act (the Act) Part 4 Inquiry into Milk Prices, motivated by concerns about milk prices being too high. The Commission found that although there are only two large supermarket chains operating in New Zealand, these chains operate in competition with each other and face competition from smaller retailers.[99] The Commission noted that New Zealand supermarkets have not priced milk as aggressively as Australian supermarkets, who retail private label milk at A$2 for two litre bottles as we discuss in Section 7, reflecting less intense competition in supermarket retailing or different competitive dynamics.[100] The Commission found there was more than the little or no competition required by the Act, and therefore no basis to initiate a Part 4 Inquiry into retail milk supply.

There is some evidence that the range of retail dairy products available in New Zealand has increased over the period since 2001—for example the entry of a large number of niche suppliers since 2001, who offer specialised products and serve localised consumer markets. MPI has advised us that there is qualitative evidence of the expansion of product ranges over time, with new packaging and products, and the development of a range of new specialist and niche dairy products beyond cheeses, including for example yoghurts, ice cream and organic fresh milk.

As Figure 77 and Figure 78 show, per capita consumption of milk, butter and cheese in New Zealand has increased slightly over the period 2011 to 2016. This trend could be due (in part) to an improvement in the quality and variety dairy products available to domestic consumers. If so, this would be consistent with the Australian experience, where consumer preferences have changed to reflect

96 Commerce Commission, Draft Determination, 27 August 1999, p21.

97 Commerce Commission, Draft Determination, 27 August 1999, p21.

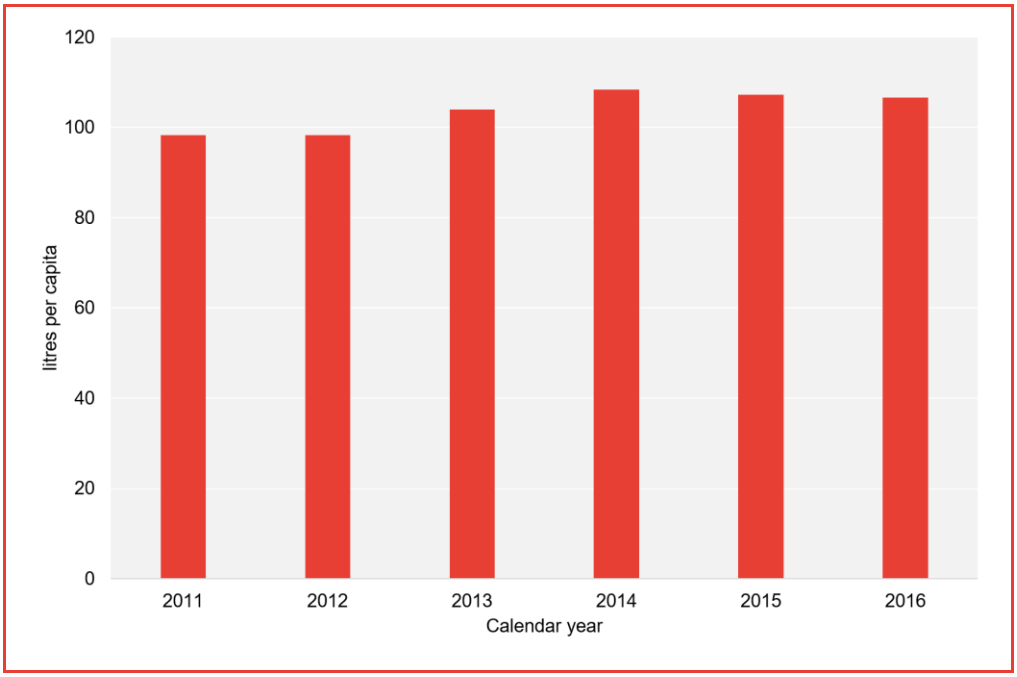
98 Commerce Commission, Draft Determination, 27 August 1999, p39.

99 Commerce Commission, Milk Markets: Consideration of whether to initiate a Commerce Act Part 4 Inquiry into milk prices, August 2011, pp5-6.

100 Commerce Commission, Milk Markets: Consideration of whether to initiate a Commerce Act Part 4 Inquiry into milk prices, August 2011, pp5-6.

multicultural influences on food trends, health perceptions, new product development, and flavour and packaging innovations, as discussed in Section 7.[101]

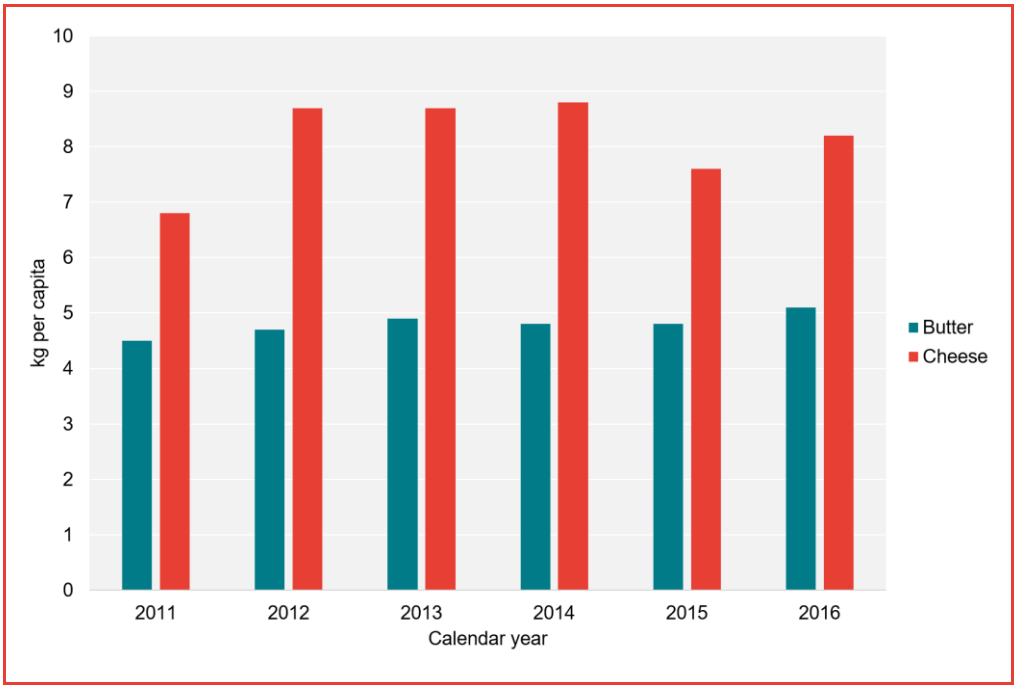
Figure 77: New Zealand milk consumption (litres per capita) 2011 to 2016



Source: Canadian Dairy Information Centre, Global consumption of dairy products, Available at: http://www.dairyinfo.gc.ca/index_e.php?s1=dff-fcil&s2=cons&s3=consglo

101 Dairy Australia, Dairy Industry in Focus 2017, p22.

Figure 78: New Zealand butter and cheese consumption (kg per capita) 2011 to 2016



Source: Canadian Dairy Information Centre, Global consumption of dairy products, Available at: http://www.dairyinfo.gc.ca/index_e.php?s1=dff-fcil&s2=cons&s3=consglo

Whilst the data above provides some indirect evidence of an improvement in product variety and consumer choice, we have not been able to find any quantitative publicly-information available that may be used to analyse systematically the extent to which product variety has improved over time. Analysis of supermarket scanner data over time would allow a systematic and comprehensive examination of this question. However, these data are commercially sensitive and proprietary, and were unavailable to us during this project. If MPI seeks more definitive evidence on how product variety and choice has changed over time, we recommend that MPI investigate whether supermarket scanner data (from 2001 to 2017) can be obtained.

4.4 Retail prices

A major area of political concern in relation to the dairy sector over the past decade or so has been public perception about the affordability of dairy products to retail consumers in New Zealand. The overwhelming perception has been that products such as milk, cheese, butter and yoghurt—which are viewed by many consumers as staple foods, culturally important to New Zealand, and essential to health and wellbeing—have become increasingly unaffordable to many New Zealanders. This perception has been difficult to reconcile with the fact that New Zealand is a major dairy-producing nation.

There is some evidence that the retail price of milk has increased over time. As shown in Figure 79, data compiled by Stats NZ suggests that between 2006 and 2017, the price of milk increased in nominal terms by approximately 20%. However, to put this price increase in context, the retail price of eggs rose almost the same amount over the same period, the price of lamb increased by 40%, and the price of beef by almost 60%.

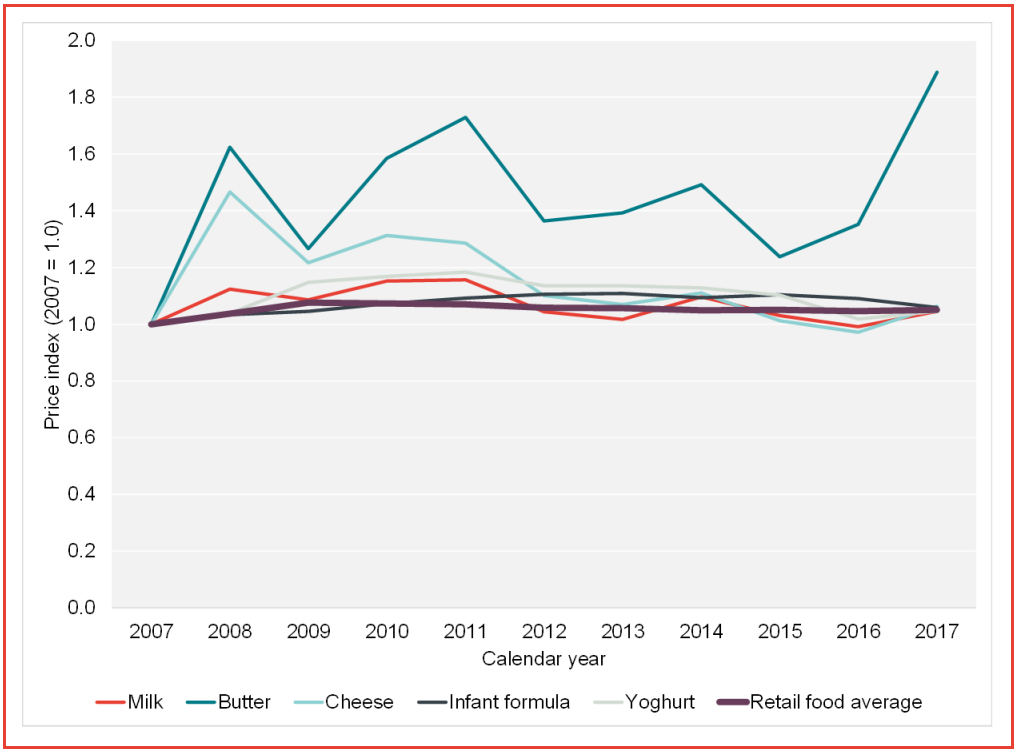
Figure 80 shows that the retail price of fresh milk, cheese, yoghurt and infant formula has, remained relatively flat in real terms since 2007, and in line with the real change in the average price of retail food.[102] The price of cheese rose significantly (by more than 40%) between 2007 and 2008, but by 2017 had declined close to 2007 levels. Only the price of butter appears to have shown sustained increase, nearly doubling in real terms since 2007. Other than butter, other dairy product prices have since 2007 been moving roughly in line with retail food prices.

Figure 79: Domestic food price index for various food types from 2006 to 2017

Source: Stats NZ

102 Data for earlier years are not available publicly in a consistent form. It is possible that data for earlier years would have shown a more material increase in retail dairy prices, even if that is not evident over the past decade.

Figure 80: CPI-deflated real price index of dairy products, compared to the retail food price index in New Zealand from 2007 to 2017

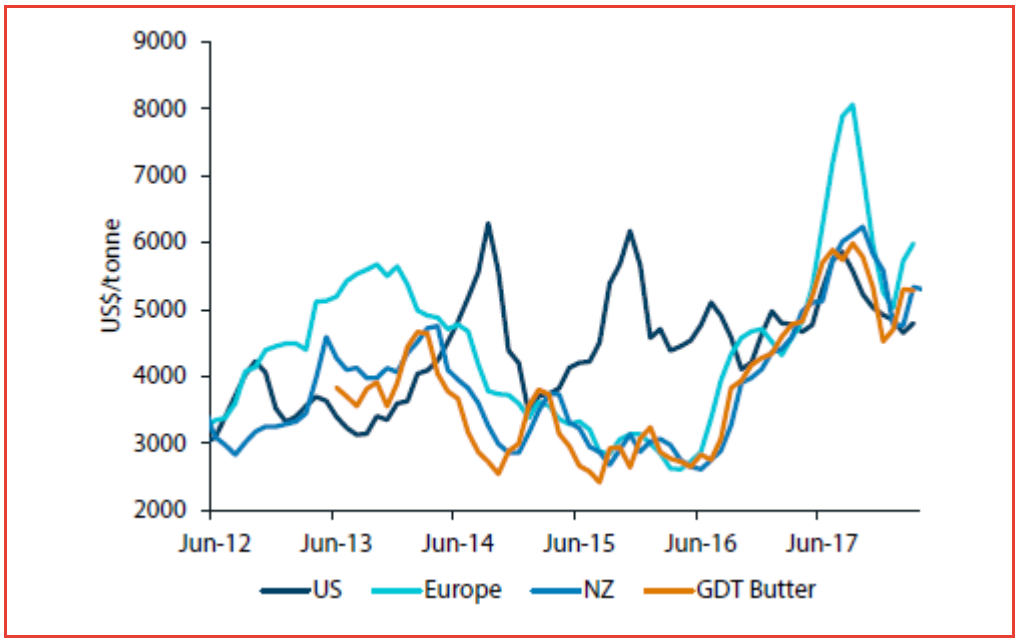


Source: Stats NZ

Similar price trends to New Zealand can be observed in Ireland – with most retail dairy prices flat to declining since 2007. The price of dairy products in Australia is influenced significantly by the supermarkets' strategy of discounting milk and block cheese to attract customers. Over the period since 2011, when this strategy was introduced, the price of private label milk has fallen by 12% in real terms.

Figure 81 suggests that, whilst the price of butter has increased significantly in New Zealand, this trend has not been out of step with the trend in international butter prices.

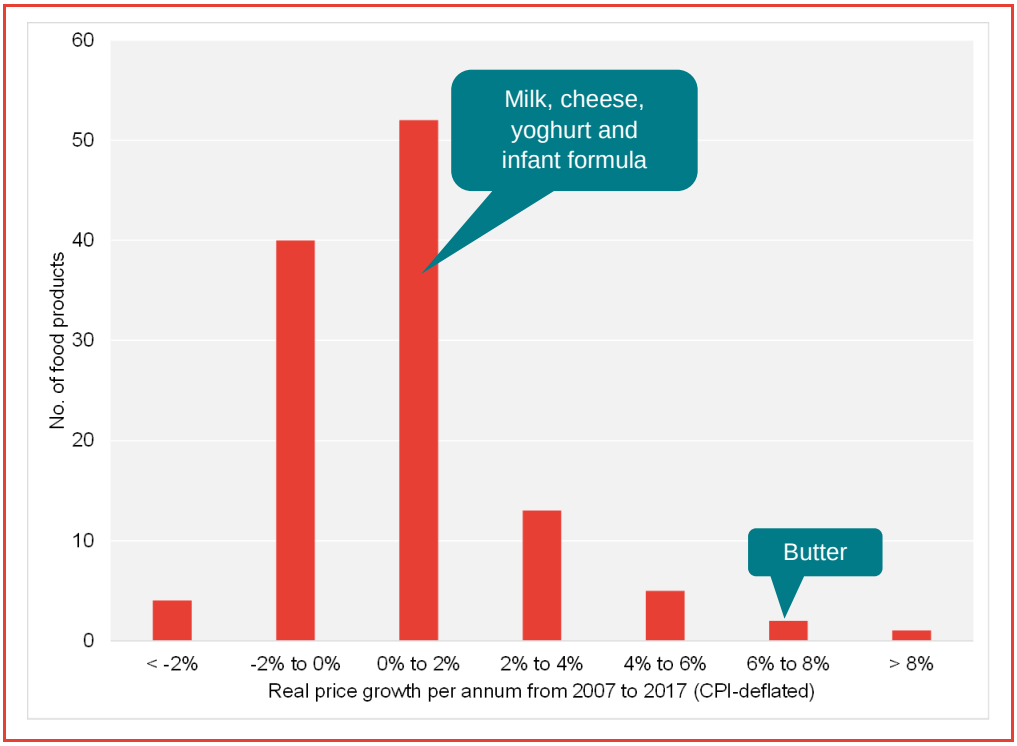
Figure 81: International butter prices



Source: ANZ AgriFocus, June 2018, Figure 13; Data from CLAL, Datum, USDA, GlobalDairyTrade

Using data compiled and published by Stats NZ, we analysed how the real rate of change in the retail price of milk, butter, cheese, infant formula and yoghurt compared to the real change in the retail price of 117 food types (e.g., apples, eggs, beef, bread, etc.). Figure 82 below shows that, with the exception of butter, the real change in price of fresh milk, cheese and infant formula is close to the median change across all retail foods analysed.

Figure 82: Histogram of CPI-deflated real price growth per annum between 2007 and 2017 (calendar years) for various retail food products



Source: Stats NZ

The data above show that, with the exception of butter, the price of most staple dairy products have increased in line with CPI inflation. Based on these data, political and public perceptions about excessively large increases in the retail price of dairy products—milk in particular—appear to be overstated and not borne out by the empirical evidence.

It is important to note that the dairy products (particularly high value added products) can be highly differentiated, and that this diversity of offerings can be reflected in prices, taking account consumers' tastes and preferences, and willingness to pay for premium and budget offerings. The simple analysis presented above does not take account of this product and price differentiation. It is possible that the prices of premium dairy products have changed at a different rate to that of standard (e.g., budget brand) retail dairy products, and the analysis above will not reveal this. However, without detailed access to proprietary supermarket scanner data over a relatively long period of time, it is not possible to determine how the price of differentiated dairy products have evolved over time.

It could be expected that the retail prices of dairy products have moved in line with international commodity price trends. However, over the period for which retail price data are available publicly (2007 to 2017) global dairy commodity prices decreased by 15% and 28%, respectively according to the ANZ and GDT indices

presented in Section 2.2. It is unclear why domestic retail prices for dairy products have not experienced similar reductions.

One notable fact in the retail dairy market in New Zealand is the absence of seasonal variation in retail prices. While the demand for fresh milk for domestic consumption is relatively constant over the year, milk production in New Zealand is highly seasonal (as discussed in Section 2.2.2). It considerably more expensive to produce fresh milk for consumption by domestic consumers in the winter months, given the requirement to compensate farmers for the additional costs of feeding and managing their herds to produce winter milk. However, retail milk prices do not vary over the year to reflect this cost differential.

5 Social performance

5.1 Overview

Key findings:

- The dairy sector has delivered large economic benefits to New Zealand, but there is public concern that this has come at the cost of poor environmental and consumer outcomes.
- The dairy sector attracts considerable public and political scrutiny, as evidenced by the large number of news articles on the sector in recent years, and has been the topic of Parliamentary and Commerce Commission inquiries.
- The dairy sector's social licence to operate is affected by public concerns about affordability, environmental damage, employment issues, Fonterra's corporate behaviour, animal welfare, farmer welfare and food safety.

5.2 Clear economic benefits from the New Zealand dairy sector

The evidence presented in Section 2 shows that the dairy sector has undoubtedly delivered large economic benefits to New Zealand. The output from this sector (and, therefore, the income to New Zealand) has more than doubled from $7.9 billion in 2001 to $16.6 billion in 2016. A major contributor to this success is the efficiency of milk production within the supply chain, and the sector's ability to capitalise on a major boom for commodities in Asia generally, and China specifically.

However, there is a widespread public perception that the success of this industry has come at a cost to New Zealanders, in terms of poorer environmental and consumer outcomes.

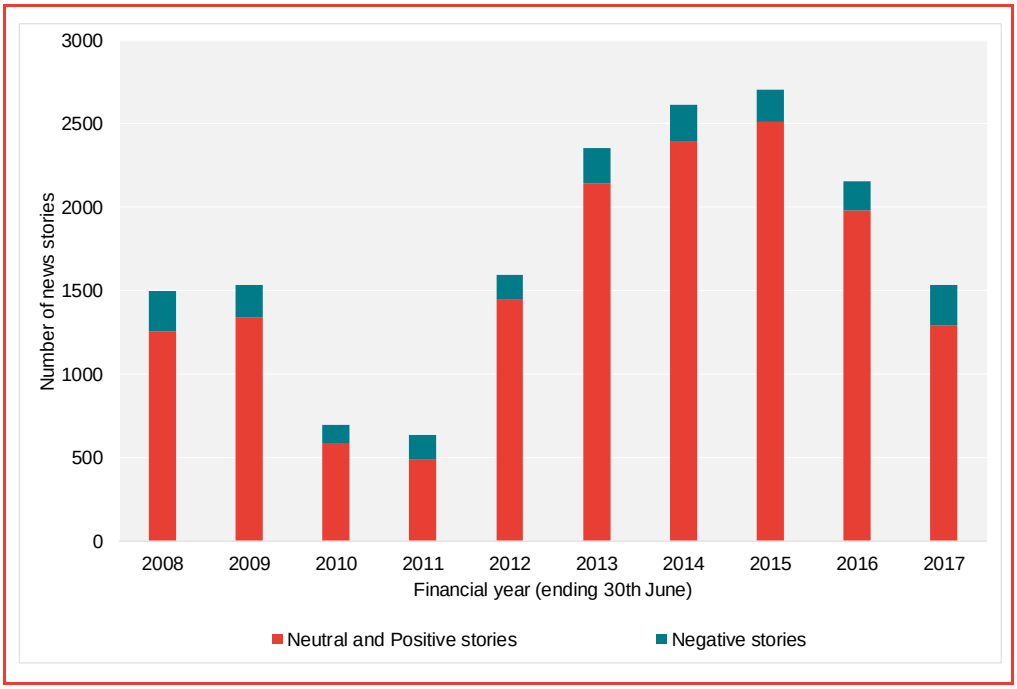
5.3 Analysing public perception by examining media reports

In order to gain an indicative understanding of public perception of the New Zealand dairy sector, we analysed using LexisNexis all media reports in 10 major daily and weekly newspapers in New Zealand, covering a range of regions, over the 10-year period 2008 to 2017, inclusive.[103]

103 These papers were: The Dominion Post, The Evening Post, Manawatu Standard, National Business Review, The New Zealand Herald, Otago Daily Times, The Press, The Southland Times, The Sunday Star-Times and Waikato Times.

First, we identified the total number of news stories that presented a 'negative' report of the dairy sector. Figure 83 shows identifies the number of negative news stories about the dairy sector, amongst all stories in a given year. It is noteworthy that only a relatively small proportion of all news stories about the dairy sector—ranging between 7% and 23% (12.39% on average) of all media reports in the 10 publications we examined—were negative news stories.

Figure 83: Number of news stories about NZ dairy, categorised into negative and non-negative stories



Source: Top New Zealand newspapers

We then examined these negative stories in further detail, classifying them into specific topics, to understand the types of issues that created a negative public perception of the sector. Figure 84 breaks down all negative news articles we identified into 10 categories:

- **Affordability for customers.** Articles relating to concerns about the high prices of retail dairy products in New Zealand – particularly milk. The sharp increase in media reports on this issue in 2011 corresponded with two major inquiries: one by the New Zealand Parliament Commerce Committee and another by the Commerce Commission on milk pricing.
- **Environmental damage.** Articles mostly about the negative environmental impact on water quality and waterways. This issue was particularly prominent in 2017 (as indicated in Figure 84) in the run-up to the general election in which at least two parties identified the dairy sector as a major polluter, and stood on pledges to clean up New Zealand's lakes and rivers.

- **Job losses and employment disputes.** Articles relating to processing plant closures that results in large numbers of redundancies, as well as industrial disputes between workers and dairy processors, particularly Fonterra.
- **Fonterra corporate behaviour.** Articles on a wide range of topics relating to lawsuits involving Fonterra, Fonterra disputes with suppliers, farmer dissatisfaction with Fonterra's payouts, complaints by competitors about Fonterra's conduct, and reviews by various regulators with oversight of Fonterra's activities. The increase in the number of articles in this category in 2016 related to the Commerce Commission's review of competition in the dairy sector, Lewis Road Creamery's legal dispute with Fonterra about labelling of the Kapiti premium milk range, and dissatisfaction from farmers about Fonterra's decision to extend payment times for milk supplied to 61 days.
- **Animal welfare.** Articles involving the abuse and mistreatment of animals are in the animal welfare category. In 2015 there was much public debate about amendments to the Animal Welfare Act 1999, including a SAFE campaign on bobby calves, which caused a sharp increase in the negative articles regarding animal welfare in the dairy industry.
- **Farmer welfare.** Articles about farmer debts and social issues affecting dairy farmers, including for example the nature and extent of foreign ownership and resulting off-shoring of profits and the affordability of dairy farms for young farmers.
- **Food safety.** Articles relating to dairy product health scares and product recalls. Most of the news stories in this category in 2008 related to Sanlu contamination scare. The high number of food safety articles in 2013 and 2014 relate to the large-scale product recall that Fonterra undertook in response to a botulism scare in whey products used as ingredients in infant formula and sports drinks.
- **Crafar saga.** News stories about how Crafar Farms, a New Zealand family owned business, was prosecuted for pollution offences and incidents regarding poor animal welfare. The Crafar saga was only around until 2012, due to the company being put into receivership in late 2009.
- **Trading Among Farmers.** Articles in 2012 about a proposed scheme to allow shareholding farmers in Fonterra to trade their equity in a market, rather than via the cooperative.
- **Other.**

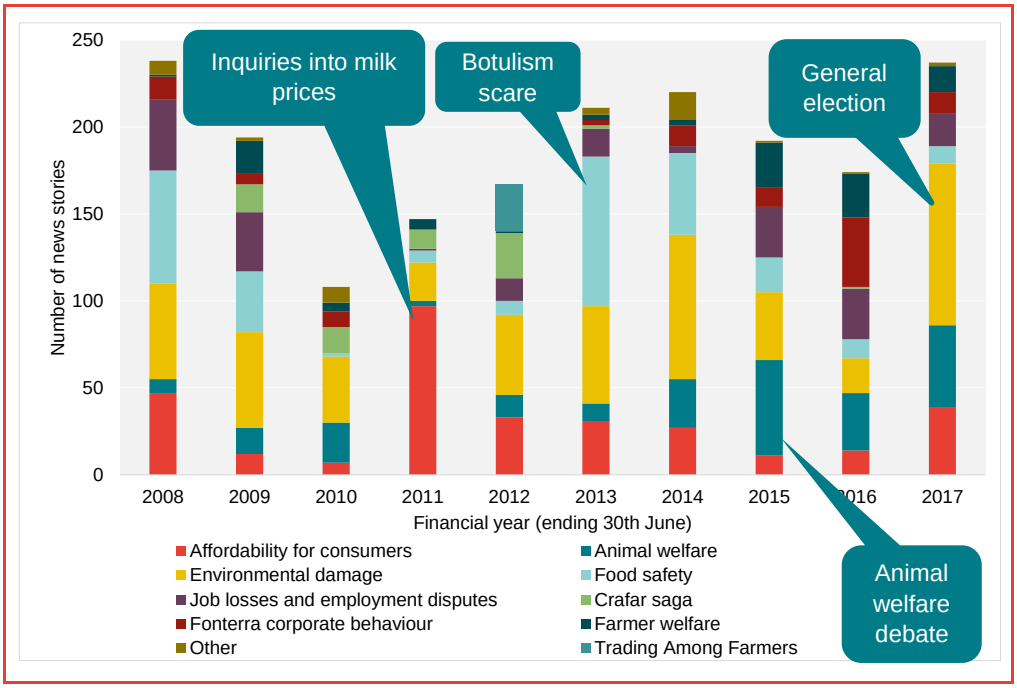
The key insights from Figure 84 are the following:

- The most significant issues that have driven negative news stories about the dairy industry over the past decade have been:
  - Affordability of dairy products (in particular milk);

- environmental harm caused by dairy farming (in particular, degradation of water quality);
- Food safety (in particular, contamination scares affecting exported products); and
- Animal welfare.

- Most of these issues increase in prominence in particular years. However, fears about declining water quality appears consistently to be a matter of public concern and media scrutiny. The intensity of debate over this issue reached a peak during the 2017 general election.

Figure 84: Negative news stories, broken down by category



Source: Top New Zealand newspapers

The analysis presented above is necessarily indicative only. For instance, classifying multifaceted media reports as 'negative' involves considerable judgment and is inherently subjective. Further, the analysis above has used only a sample of newspapers—albeit major publications. Finally, the analysis above assumes that media reports track well public sentiment, which ultimately determines a sector's social license. This, of course, may not be true. Therefore, the findings above are presented simply as an indication of the sorts of issues that have attracted scrutiny of the New Zealand dairy sector by the general public.

5.3.1 Environmental harm

A key topic that has attracted consistently negative media attention over the past decade appears to be environmental harm associated with dairy farming activity. In terms of environmental detriment:

- There is a concern that that water quality has deteriorated significantly in some parts of the country due to significant growth in the volume of dairy farming, intensification of dairy land use in certain regions, and irrigation of land to facilitate dairy farming in regions previously dominated by other land uses. The available evidence certainly indicates a trend towards worsening of water quality (e.g., due to nitrogen leaching)—although, surprisingly, reliable data on nitrogen leaching are not available beyond 2012.
- In addition there is good evidence that agricultural activity (and dairy farming, mostly) contributes nearly 50% of all of New Zealand's greenhouse gas emissions—the highest proportion in the OECD. Methane emissions from dairy cattle in New Zealand have been growing at approximately 1% per annum since 2001. The dairy industry stands in stark contrast in New Zealand to many other industries that are typically highly polluting in other countries, such as transport and electricity generation.

5.3.2 Affordability

There has also been a widespread perception amongst the public that the retail price of dairy products has increased significantly in recent years. These concerns have led to inquiries by the Commerce Commission (at the request of the Government) and the New Zealand Parliament Commerce Committee.

Although there have also been a number of inquiries into the Australian dairy sector in recent years, its smaller contribution to the Australian economy compared to other industries that have a more significant environmental impact, like energy and mining, limit the scrutiny on the Australian dairy sector compared to New Zealand.

We have analysed the best available data on retail dairy products and found that the prices of fresh milk, cheese, yoghurt and infant formula have (over the past decade) largely moved in line with CPI and the prices of other grocery products. The price of butter in New Zealand has nearly doubled in real terms over that period, but these price movements appear to be in line with international butter prices, suggesting that these price changes have been driven by global demand pressures. Therefore, based on the empirical evidence available, the concerns surrounding significant inflation of the price of domestic retail dairy products seems unsupported. In reaching this view, we do make two caveats, however.

- Firstly, we have no reliable and consistent data on retail prices prior to 2007. It is possible that if these data were available, it might show a significant increase in prices prior to 2007.
- Secondly, dairy products can be highly differentiated, and the price data we have analysed (collected through surveys conducted by Stats NZ) may not reflect well the variety of retail products available in the market or the dispersion of prices that typically accompanies highly differentiated products.

We do note that analysis of dairy commodity price indices (including Fonterra's GDT data) suggest that between 2007 and 2017, global dairy commodity prices have fallen very materially (between 15% and 28%, in nominal terms, depending on the price index analysed). It is unclear why the domestic prices of most basic dairy products have increased in nominal terms (remained flat in real terms) while global dairy prices have fallen over the same period.

6 Comparing the performance of the New Zealand dairy sector

Key findings:

- Differences in data availability and circumstances limit the lessons for the New Zealand dairy sector that can be drawn from case studies of the Australian and Irish dairy sectors, and the New Zealand tourism sector.
- The dairy sector in New Zealand is much larger than that in Australia and Ireland, in terms of production, output value and exports, but smaller than tourism.
- The growth of the output value of the dairy sector in New Zealand over the period since 2001 (2.9%) has outstripped that of the dairy sectors in Ireland (2.1%) and Australia (-0.1%), but has been smaller than the growth in tourism expenditure in New Zealand (4.1%).
- The dairy sector in New Zealand was well positioned to respond to the increase in international demand for dairy products (particularly from Asia), while the dairy sectors in Ireland and Australia faced constraints on their capacity to increase production, in the form of quotas and water availability, respectively.
- Irish dairy processors have enjoyed access to the high value EU market and have been relatively successful in targeting the US market (particularly with premium products). There is no evidence that Australia's free trade agreement with the United States enabled the Australian dairy sector to focus on producing high value export products and to grow the value of the sector by that means.
- Dairy exports from Ireland are dominated by exports to the EU, but exports to non-European union countries including the USA, Algeria, China, Saudi Arabia and Nigeria have been increasing substantially since milk production quotas have been eased and abolished. Like New Zealand, Australia's dairy exports are dominated by exports to Asia.
- The product mix of the dairy export portfolios varies between New Zealand (which is dominated by milk powder), Ireland (cheese and butter) and Australia (fresh milk, milk powder and cheese).
- The dairy sectors in both Ireland and Australia are seasonally pastoral based, like New Zealand. The seasonality of production has increased in Ireland as production has increased, and has declined in Victoria in response to payment terms offered by processors.
- The processing industry is relatively concentrated in both Ireland, where there is a mix of corporates and cooperatives able to access other forms of equity capital, and Australia, which is dominated by corporates focused on processing.
- There is no evidence that the degradation of waterways and water quality observed in New Zealand has occurred in Ireland or Australia. This could be due to stricter environmental protections (particularly EU regulations that apply in Ireland) and also because the dairy sectors in those countries are considerably smaller and less intensive than the dairy sector in New Zealand.
- Retail prices in Ireland have been declining in recent years, and in Australia since 2001 as a result of the pricing strategies of supermarkets.
- Despite concerns about the strain on local infrastructure due to tourism the majority of New Zealanders believe that tourism is good for New Zealand, likely reflecting the sector's significant economic contribution.

In addition to analysing the performance of the New Zealand dairy sector we undertook case studies of several other industries to put the performance of the New Zealand dairy sector in context. In particular, we considered the performance of:

- the dairy sector in Australia (see Appendix 1)
- the dairy sector in Ireland (see Appendix 2)
- the tourism sector in New Zealand (see Appendix 3).

The intent of the case studies was to establish points of comparison against the performance of the New Zealand dairy sector. Differences in data availability and operating environments make the comparison of the case studies difficult. Nevertheless, in this section we present our observations drawing on the analysis presented in the case studies.

This section discusses briefly the key findings from the case studies, considering the dairy sector and tourism sector in turn, and summarises the key features of the industries.

6.1 Dairy sector comparisons

New Zealand's dairy industry is substantially larger than the dairy sector in Ireland and Australia, in terms of output value, volumes produced and exports. For example, the output value of dairy farming in New Zealand in 2016 was more than twice the output value of dairy farming in Australia and in Ireland in that same year.[104] The growth in milk production in New Zealand over the period since 2001 has outstripped the growth in milk production in both Australia and Ireland. The value of dairy exports from New Zealand in 2017 was NZ$14.6 billion. The value of exports from Australia was NZ$3.2 billion in 2016/17, and the value of exports from Ireland was NZ$6.7 billion in 2017.

Australia's processing sector is largely corporatised with some cooperatives remaining, while cooperatives (which have access to other forms of equity capital) dominate in Ireland.

Australia and Ireland practice pastoral based dairy farming, like New Zealand. In Ireland seasonality has been increasing with an increase in production volumes, while in Victoria (which produces the majority of Australia's exports) seasonality has been declining in response to the payment terms offered by processors.

Historically, milk production in Ireland has been constrained by EU quotas. Milk production has increased substantially since quotas have been eased and then

104 Whilst data on the output value of dairy processors in New Zealand are available, comparable data are not available for Australia or Ireland.

abolished in 2015. The constraint on milk production meant processors in Ireland were not able to increase volumes, and therefore sought to grow through:

- Product diversification (e.g., meat and food processing);
- Geographic diversification (e.g., UK, US, Germany etc.);
- Developing brands; and
- Moving up the value chain (e.g., into infant formula and nutritionals).

Ireland's EU membership provided frictionless access to the high value European market, and Irish cooperatives have had considerable success entering the US market in recent years—particularly in high value nutritional products. Exports to Asia and Africa have also grown significantly as production constraints have been removed. New Zealand does not have free trade agreements with the EU or the US at the present time so New Zealand dairy exporters face trade barriers when accessing those markets. By comparison, New Zealand has a number of free trade agreements with a number of Asian countries. The greatest growth markets for New Zealand dairy exporters have been in Asia, notably China.

The Irish dairy processing sector includes firms specialising in upstream activities (milk collection and primary processing), downstream activities (secondary processing and branding) as well as fully vertically integrated firms engaged in every functional activity at the processing level. There is evidence of an active factory gate market in Ireland. The vertical separation of processors in Ireland has arguably allowed (and incentivised) those processors to specialise and innovate in order to succeed commercially. In New Zealand, Fonterra and many other processors tend to be vertically integrated.

Milk production in Ireland has grown over time. However, there is no evidence that this has resulted in significant environmental degradation. This may relate to the environmental regulation and EU subsidies in place to manage environmental performance. This could also reflect the relatively small size of the Irish dairy sector (which would likely impose lower environmental burdens).

Retail dairy prices in Ireland have been volatile over the period since 2001, declining in recent years, but have not attracted public scrutiny to the extent observed in New Zealand.

The dairy sector in Australia has undergone a period of adjustment following deregulation of the industry in 2000. This restructuring, combined with limitations on water availability as a result of the millennium drought and water industry reforms, have resulted in a decline in milk production since 2001. This stands in stark contrast to the large increases dairy farming activity and milk production observed in New Zealand.

Like New Zealand, the Australian export industry is heavily focused on Asia, although the portfolio of products is evolving differently to New Zealand, with fresh milk becoming an increasingly important export product. There is limited

evidence that Australia's free trade agreements, including with the US, have enabled the sector to focus on producing high value export products. (As noted above, a number of Irish processors compete successfully in the US, notwithstanding that the EU does not presently have a free trade agreement with the US.)

Milk prices in Australia have been declining in real terms, reflecting the $1/L pricing policy of the major supermarkets.

There have been a number of inquiries into the dairy industry in Australia over the period since 2001, most recently the ACCC's 2018 Dairy Industry Inquiry motived by concerns over late and retrospective price adjustments by two major processors (including Fonterra Australia). Nevertheless, the Australian dairy sector does not attract as much social/public scrutiny as does a number other, larger sectors in Australia (including the energy, mining and banking sectors).

6.2 Tourism industry comparison

At a conceptual level there any many similarities between the New Zealand tourism and dairy sectors: both are land based industries with an international focus that make a significant contribution to both the national and regional economies. However, differences in data availability and the nature of the products and services involved make a direct comparisons of sector performance difficult.

The tourism sector in New Zealand is substantially larger than the dairy sector. The total output value of the New Zealand tourism sector in 2016 was NZ$36 billion. By comparison, the total output value of the dairy processing sector (which incorporates the value of output from dairy farming and other sectors that provide inputs to dairy processing) in 2016 was NZ$16.6 billion.

There is significant overlap between the key dairy export markets and tourism markets. Australia, China, the US are New Zealand's three largest dairy export markets and also account for the largest share of international arrivals. Tourism New Zealand has been explicitly targeting higher spending visitors, however it is difficult to assess its success: while expenditure per tourist increased materially for most visitors between 2013 and 2015 this may have been enabled by the depreciation of the New Zealand dollar rather than the effectiveness of the tourism sector in offering premium products and services, and expenditure per tourists from Japan and Korea declined over the same period.

The average price of key tourist products and services (excluding international air travel) increased by 24% over the last 10 years while CPI increased by 17%. In contrast, the price of dairy products has remained relatively constant in real terms over the last 10 years.

There is some evidence that the large increase in international tourists has placed strain on local infrastructure, and has resulted in some loss of environmental

amenity value and degradation of public lands and waterways. Concerns about environmental damage and loss of amenity value have also been raised in relation to the rapid expansion of the New Zealand dairy industry since 2001.

The Mood of the Nation survey cited "increased traffic congestion on holiday routes" and "increased littering" as the top concerns related to growth in international tourism. However, the same survey suggests that the vast majority of New Zealanders consider that tourism is good for New Zealand, likely reflecting its significant economic contribution.

6.3 Case study summaries

Table 11 summarises the key features of New Zealand's dairy sector, and seeks to make relevant comparisons (to the extent possible) to the Australian and Irish dairy sectors, and to the New Zealand tourism sector.

Table 11: Comparison of New Zealand dairy with other case studies

Feature	New Zealand dairy	Australia dairy	Ireland dairy	New Zealand tourism
Economic outcomes				
Output value (dairy farming, 2016)	NZ$8.0 billion	NZ$4.0 billion	NZ$3.1 billion	NZ$36 billion (tourism expenditure)
Output value (processing, 2016)	NZ$16.6 billion	NA	NA	
Output CAGR (dairy farming)	2.9% (2001 to 2016)	-0.1% (FY02 to FY17)	2.1% (2001 to 2017)	4.1% (2001 to 2017)
Value of exports / international receipts	NZ$14.6 billion (2017)	NZ$3.2 billion (2016/17)	NZ$6.7 billion (2017)	NZ$21.4 billion
Industry volume (2017)	20.7 billion litres	9.0 billion litres	7.2 billion litres	3.7 million visitor arrivals
Industry volume CAGR	3.0% (2001 to 2017)	-1.5% (FY02 to FY17)	2.1% (2001 to 2017)	4.3% (2001 to 2017, only for international visitors)
Top export markets	China, United States, Australia, Japan, Philippines	Japan, Singapore, Malaysia, Indonesia and China	EEA countries (~60% by volume)	Australia, China, UK, USA, Germany
Major export products / services by value	Whole milk powder, butter, cheese	Cheese, skim milk powder, whole milk powder	Cheese, butter, concentrated milk and cream	Air transport, food and beverage services, accommodation, retail trade

Feature	New Zealand dairy	Australia dairy	Ireland dairy	New Zealand tourism
Ownership structure of processors	Cooperatives, with substantial private-equity investment in recent years	Largest six processors are owned by foreign corporates	Cooperatives, with substantial private-equity investment in recent years	NA
Market concentration	Very high – Fonterra has ~80% market share by milk volume	High – top six processors have ~85% market share by milk volume	High – top four processors have ~75% market share by milk volume	Low for most industries within tourism (e.g., attractions, hotels, tour services); High for some exceptions (e.g., land transport, airlines)
Innovation and value add	• Fonterra has invested ~NZ$90 million per annum on R&D, decreasing slightly over the last decade • R&D intensity for Fonterra is historically lower relative to the median for large food producers across the world	NA	• The two largest processors have spent increasing amounts on R&D over the past four years • Kerry Group spent NZ$448 million on R&D in 2017 and Glanbia NZ$47 million	• R&D expenditure in commercial services and tourism was NZ$112 million in 2016 • NZ Tourism spends just under 1% of international tourism expenditure
Environmental outcomes				
Number of dairy cows	4.9 million	1.5 million	1.3 million	NA
Stocking rate (cows per hectare)	2.8 (on average)	0.93 (Victoria)	2.5 (top performing farms)	NA

Feature	New Zealand dairy	Australia dairy	Ireland dairy	New Zealand tourism
Environmental impact	• While nitrogen leaching has increased (at a rate of approximately 3% per annum between 2001 and 2012), concentrations of phosphorus do not appear to have increased • Methane emissions from dairy cattle has been growing at a CAGR of ~1% between 2001 and 2016	• There are no consistent trends in nitrogen or phosphorus concentrations across Victoria, and water quality has remained unchanged • Greenhouse gas emissions from dairy cattle increased at a CAGR of ~1% between 2010/11 to 2013/14. However, greenhouse gas emissions from dairy cattle accounted for 1.6% of total greenhouse gas emissions, compared to 34% for electricity in 2013/14	• Since 2007 the surface water quality has remained fairly stable • The average carbon-dioxide-equivalent footprint on Irish dairy farms have decreased between 2014 and 2016	• Concerns have been expressed by the public that tourism growth has put significant strain on local infrastructure, and resulted in loss of environmental amenity value and degradation of public lands and waterways • The “Mood of the Nation” survey cited “increased traffic congestion on holiday routes” and “increased littering” as the top concerns related to growth in international tourism
Consumer outcomes				

Feature	New Zealand dairy	Australia dairy	Ireland dairy	New Zealand tourism
Consumer prices	• Dairy products' price changes are roughly in line with CPI and overall retail grocery price trends, increasing at less than 1% per annum in real terms. • Among dairy products, the retail price of butter has increased significantly over the last decade (approximately 7% per annum in real terms), while other dairy product prices increased slightly before dropping back close to 2007 prices in real terms	• Supermarkets discount milk and block cheese heavily to attract customers • As a result, retail prices for dairy products have been decreasing, with the price of A$1 per litre private label milk declining by 12% in real terms since its introduction in 2011	• The Irish dairy retail price index increased significantly in 2007, but has been relatively flat to declining since then • The Irish dairy retail price index is now 11% below its peak in 2008	• Prices of tourism-related products are more volatile than the CPI over the last 10 years • Excluding international air travel, the average sub-set of tourism-related prices considered increased by 24%, while CPI increased by 17% over the last 10 years
Social outcomes				

Feature	New Zealand dairy	Australia dairy	Ireland dairy	New Zealand tourism
Public perception of sector	• The dairy sector has delivered large economic benefits to New Zealand • However, there is a widespread public perception that the success of this industry has come at the expense of environmental and consumer outcomes • Key concerns include affordability of dairy products, environmental harm caused by dairy farming, food safety and animal welfare	• Milk prices have fallen in real terms, but there remains concern that A$1 per litre milk devalues the public perception of the industry • Key concerns include animal welfare, environmental degradation and the foreign ownership of Australian farms and brands, though dairy farming has not been singled out particularly • The relative size of the Australian dairy sector limits its exposure to scrutiny. Other larger industries (e.g. energy and mining) attract greater prominence and critical examination in the Australian context	• A significant amount of farming income is derived from EU subsidies, entailing less public resistance than if subsidies were funded directly from Irish taxes • Subsidies are targeted at environmental outcomes, alleviating some of the environmental pressures that arise due to increased dairy output • Milk retail prices have generally increased with the price of other staples, and declined slightly over the last five years • Taken together, the Irish dairy sector has not attracted a high degree of scrutiny or criticism within Ireland	• The most recent 'Mood of the Nation' survey results from March 2018 indicate that 96% of New Zealanders believe that tourism is good for New Zealand. 39% of New Zealanders think that international tourism puts too much pressure on New Zealand. • The most common perceived benefits of international tourism include economic growth (60%), business growth (59%) and employment growth (52%) • Major stress points perceived include pressure on infrastructure, accommodation shortages, environmental damage, freedom camping and increased traffic congestion

7 Appendix 1: Performance of Australian dairy sector

7.1 Overview

Key findings:

- Dairy is Australia's third largest agricultural industry (behind beef and wheat), with farmgate production valued at A$3.7 billion (NZ$4.0 billion) in 2016/17.
- The Australian dairy sector is seasonal and pastoral based, like New Zealand, but seasonality has been declining in Victoria (which accounts for 64% of production and the majority of exports) in response to the pricing terms offered by processors.
- Australia's milk production has been relatively stable in recent years, falling to a 10 year low of 9.0 billion litres in 2016/17 in response to industry restructuring after deregulation and constraints on water availability. New Zealand's milk production increased by 37% between 2007 and 2017 to 20.7 billion litres.
- Around 37% of Australia's milk production is converted into products that are exported, generating revenue of A$3.0 billion in 2016/17, with negligible growth from the A$3.2 billion exported in 2001/02.
- Fresh milk accounted for the largest share of Australian exports in 2016/17 at 24%, followed by cheese (21%) and skim milk powder (19%). In contrast, New Zealand's dairy exports were mainly comprising of whole milk powder (36%) followed by butter (19%) and cheese (13%).
- The number of dairy farms has declined by 35% in Victoria since 2005/06, in direct contrast to the land conversions seen in New Zealand.
- The average number of dairy cows per hectare in Victoria is just over 0.9, much lower than the 2.8 cows per hectare observed in New Zealand.
- Inland surface water quality has remained substantially unchanged across Victoria from 2005 based on the relatively limited available data. This may be a function of related water reforms intended to improve environmental outcomes, together with the decline in dairy production.
- Retail milk prices have declined in real terms by 12% since 2011, largely as a result of price competition between supermarkets. In contrast retail dairy prices, with the exception of butter, have remained relatively constant in real terms over the period since 2007.
- The Australian dairy sectors receives considerably less public scrutiny than other larger and more prominent sectors in Australia, such as energy, mining and banking.

7.2 Brief overview of policy and historical context

This section summaries briefly the policy context within which the Australian dairy sector operates, as background to the description of performance over the last two decades.

Prior to 2000 the production, price and use of milk in the dairy industry in Australia were regulated by state and federal governments. Farm gate milk prices were set by state governments, with different prices set for:

- 'market milk' supplying drinking milk; and
- 'manufacturing milk' supplying processors of dairy products, to produce products including cheese, butter and milk powder.

Market milk was sold at a considerable premium to manufacturing milk, intended to reflect the higher production costs associated with meeting the continuous year-round demand for fresh milk.[105]

The volume of market milk produced was regulated by state governments, while manufacturing milk volumes were not regulated.[106] However, the federal government operated an income support scheme for producers, based on the difference between market and manufacturing milk prices.[107]

Regulation was funded via levies paid by dairy farmers on market milk and by manufacturers on dairy products sold in Australia.

The industry was deregulated on 1 January 2000, with the removal of state legislation governing the sourcing and pricing of fresh drinking milk. An adjustment package, comprising $1.7 billion in payments over eight years, was established by the federal Government.[108] The package was funded via a levy on dairy beverages over the period until February 2009.[109]

Since deregulation there has been a period of adjustment, involving land switching away from dairy farming and consolidation of remaining farms. As a result both dairy farm numbers and milk production have fallen since deregulation, in each state and across Australia.[110]

Australia's dairy sector varies between states, with states in the northern part of Australia focused in supplying fresh milk and perishable goods to the domestic market and states in the south of Australia (Victoria, Tasmania and South Australia) also producing products for export.[111] Dairy farming is concentrated in coastal areas, and inland production is supplemented with irrigation.[112] In Victoria year round pasture growth is supported by relatively high rainfall in Gippsland and Western Victoria, and irrigation in the north of the state.[113]

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105 ACCC, Dairy Inquiry: Final Report, April 2018, p4.

106 ACCC, Dairy Inquiry: Final Report, April 2018, pp4-5.

107 ACCC, Dairy Inquiry: Final Report, April 2018, p5.

108 ACCC, Dairy Inquiry: Final Report, April 2018, p4.

109 ACCC, Dairy Inquiry: Final Report, April 2018, p4.

110 ACCC, Dairy Inquiry: Final Report, April 2018, p1.

111 ACCC, Dairy Inquiry: Final Report, April 2018, p1.

112 ACCC, Dairy Inquiry: Final Report, April 2018, p9.

113 ACCC, Dairy Inquiry: Final Report, April 2018, p9.

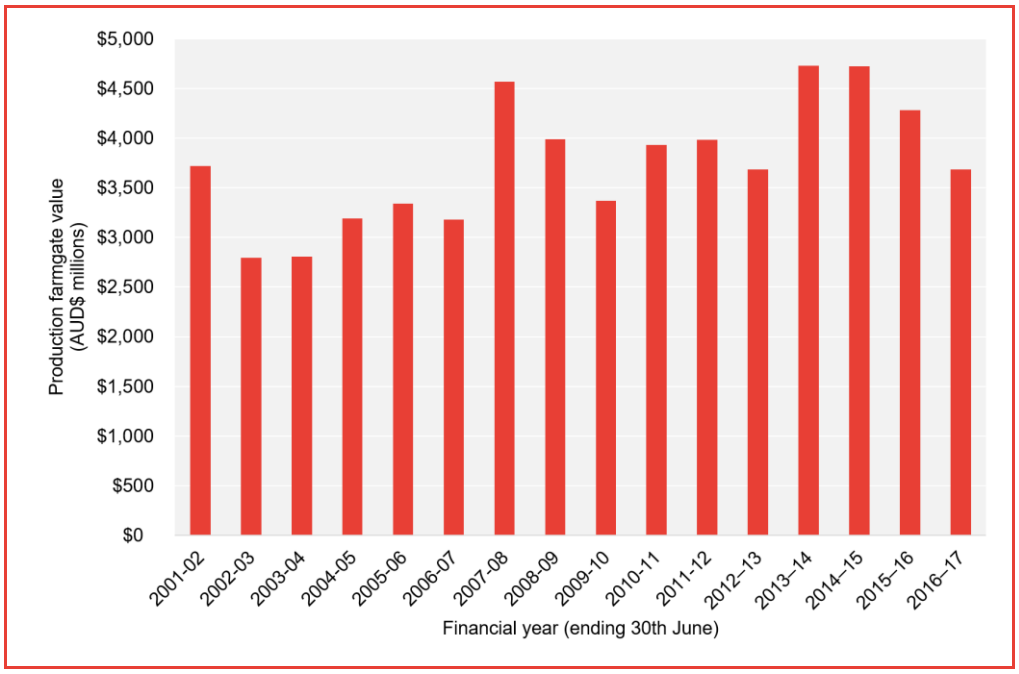
7.3 Economic performance

7.3.1 Value of sector

Output value

Australia's dairy sector is its third largest agricultural sector (behind beef and wheat), with farmgate production valued at A$3.7 billion in 2016/17. Figure 85 shows the value of Australia's dairy industry has varied over time, peaking at A$4.7 billion in 2013-14, and remaining roughly flat over the period from 2001/02 to 2016/17 (compound annual growth rate of -0.1%). Around 26,500 people were employed in milk production (i.e., dairy farming as opposed to processing) in Australia in 2016/17. In 2012/13 dairy processing in Australia generated a total industry value add of around A$2.4 billion, employing 17,500 people.[114]

Figure 85: Milk production



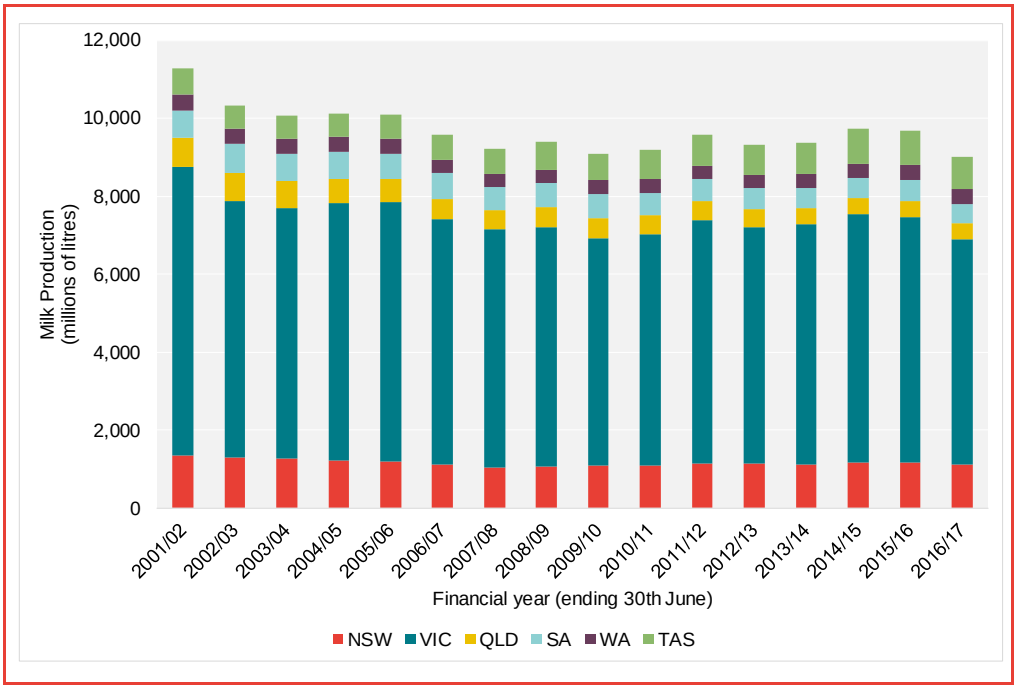
Source: DAWR, ABARES

Australia produced on average 9.4 billion litres of milk each year over the 10 years to 2016/17. Milk production has been relatively stable in recent years, as shown in Figure 86, falling to a 10 year low of 9.0 billion litres in 2016/17, 5% below the 11.3 billion litres in 2001/02. Drinking milk accounts for the largest share of output

114 Productivity Commission, *Relative Costs of Doing Business in Australia: Dairy Product Manufacturing*, Research Report, September 2014, p9.

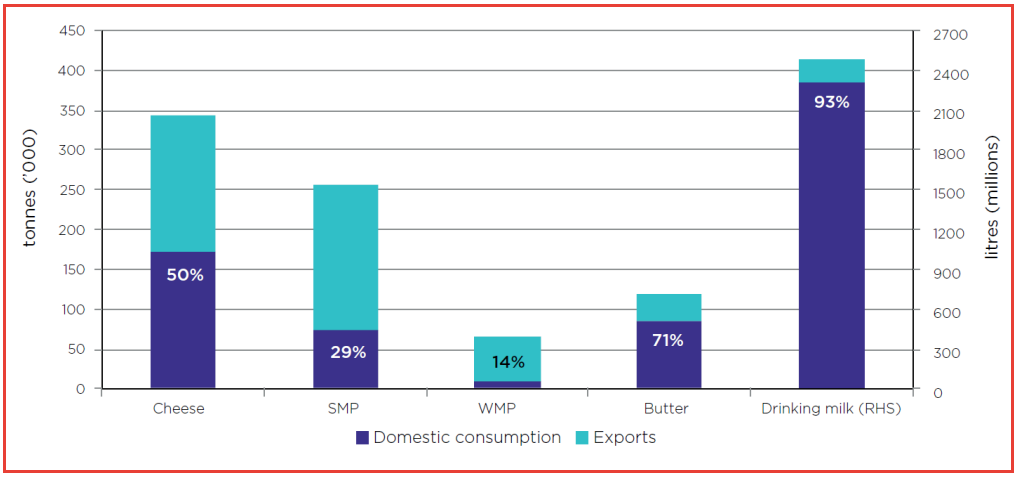
and is primarily used for domestic consumption, as seen in Figure 87, while a large proportion of cheese and milk powder is exported.

Figure 86: Total milk production by Australian state



Source: Dairy Australia, Dairy in Focus 2017*, 2017, p. 15*

Figure 87: Share of production consumed domestically by major product, 2015-16

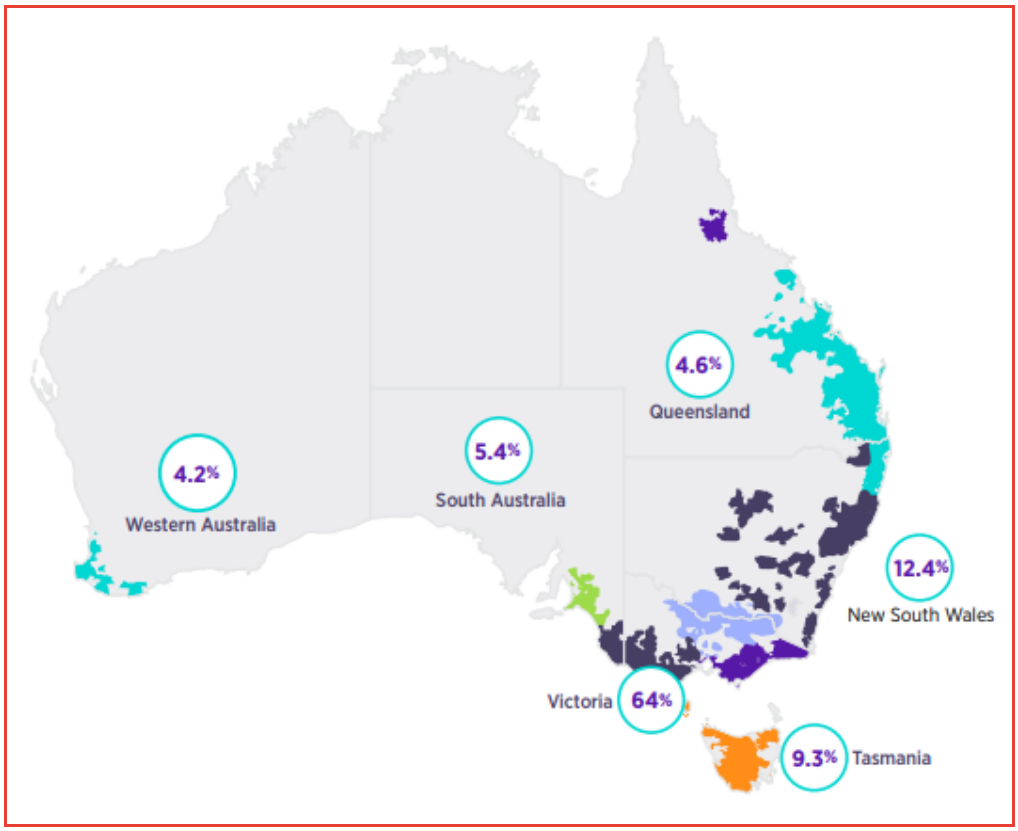


Source: ACCC, Dairy Inquiry: Final Report*, April 2018, p16*

Notes: SMP = skim milk powder, WMP = whole milk powder

Although the dairy sector is widespread across Australia, most of the production and processing is focused in Victoria and south east South Australia due to the higher rainfall in these areas, as seen in Figure 88. Victoria accounts for nearly two thirds of milk production in Australia and the majority of Australia's dairy exports, as discussed in more detail later in this section.

Figure 88: Distribution of dairy farms, with production%



Source: Dairy Australia data, processor's purchase data and ACCC analysis

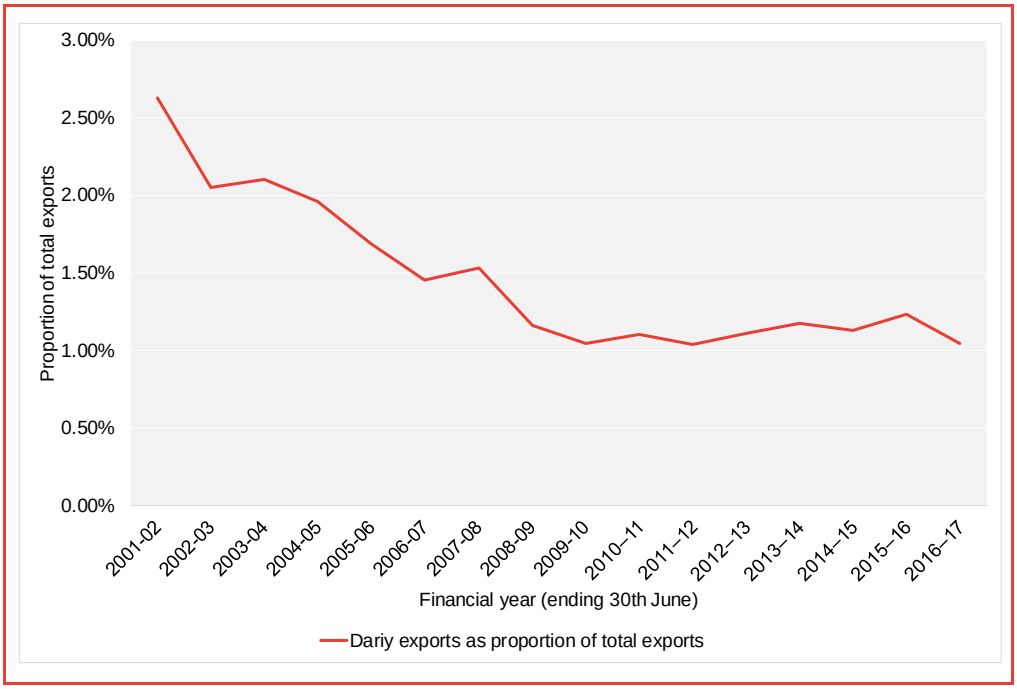
Exports

Around 37% of Australia's milk production was exported in 2016/17, which made up about 1% of Australia's total exports.[115] The value of Australia's dairy exports has decreased slightly from about A$3.2 billion in 2001/02 to just over A$3 billion in 2016/17.

Figure 91 shows fresh milk exports have increased significantly in recent years, displacing cheese and whole milk powder. In order to see how the product mix has changed more clearly, we compare 2004/05 and 2016/17 export shares by product in Figure 92. Cheese contributed 28% of our dairy exports in 2004/05, falling to 21% in 2016/17. The share of fresh milk has increased from 11% to 24%. The share of whole milk powder has decreased by 5%, with the share of skim milk powder and other powders growing.

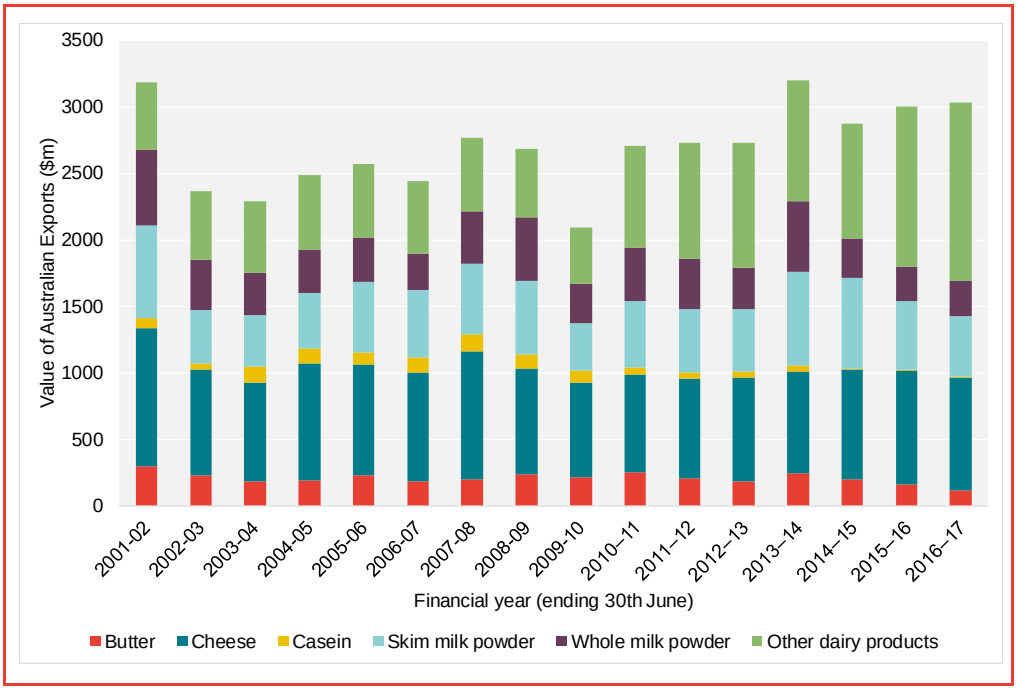
115 ACCC, Dairy Inquiry: Final Report, April 2018, p1.

Figure 89: Dairy exports as a proportion of total exports



Source: DAWR, ABARES, ABS

Figure 90: Value of dairy exports by category



Source: DAWR, ABARES

As seen in Figure 90, butter, cheese, casein and milk powders have all seen a fall in their export volumes, while other dairy products have seen quite a large increase

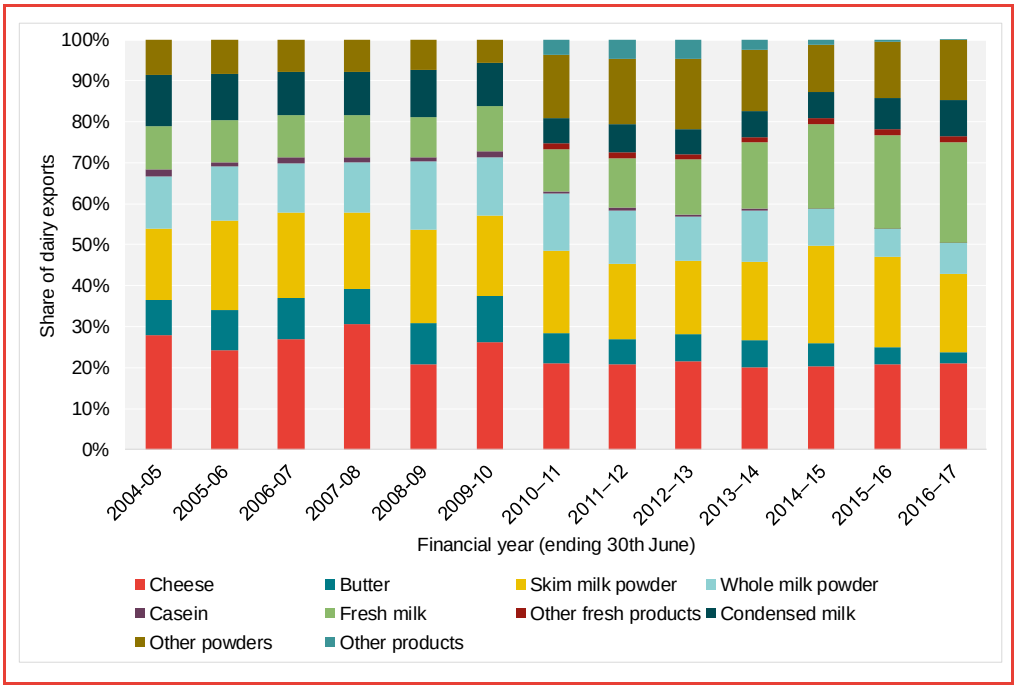
in export volumes. This is likely due to the fresh milk export industry which has seen expansion recently, with milk being flown to China (see Box 3).

Box 3: Exporting fresh milk to China

Historically China had quite lengthy testing and quarantine procedures for fresh milk imports, which previously deterred the fresh milk market, due to the relatively short shelf life. In May 2014 Norco began exporting commercial amounts of fresh milk to China by air. They were able to negotiate, through their export consultant, a change to import clearance procedures to get milk from the Australian farm to the supermarket shelf in China in eight days. This fuelled the large growth in fresh milk exports, with other Australian dairy companies exploring the idea.

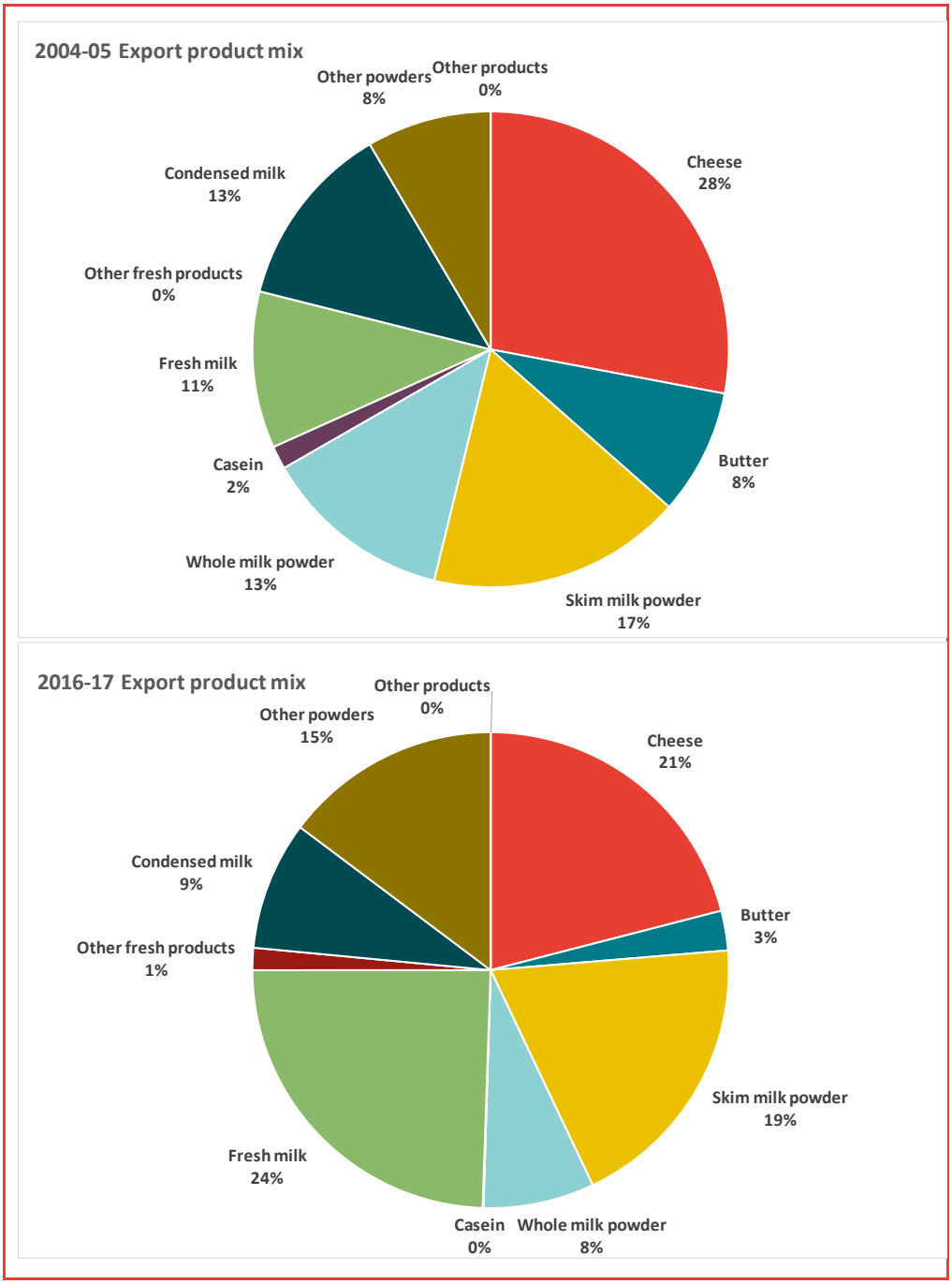
Source: Productivity Commission, Relative Costs of Doing Business in Australia: Dairy Product Manufacturing*, Research Report, September 2014, p59*

Figure 91: Share of dairy exports by volume



Source: ABARES

Figure 92: Dairy export product mix by volume comparing 2004-05 proportions to 2016-17

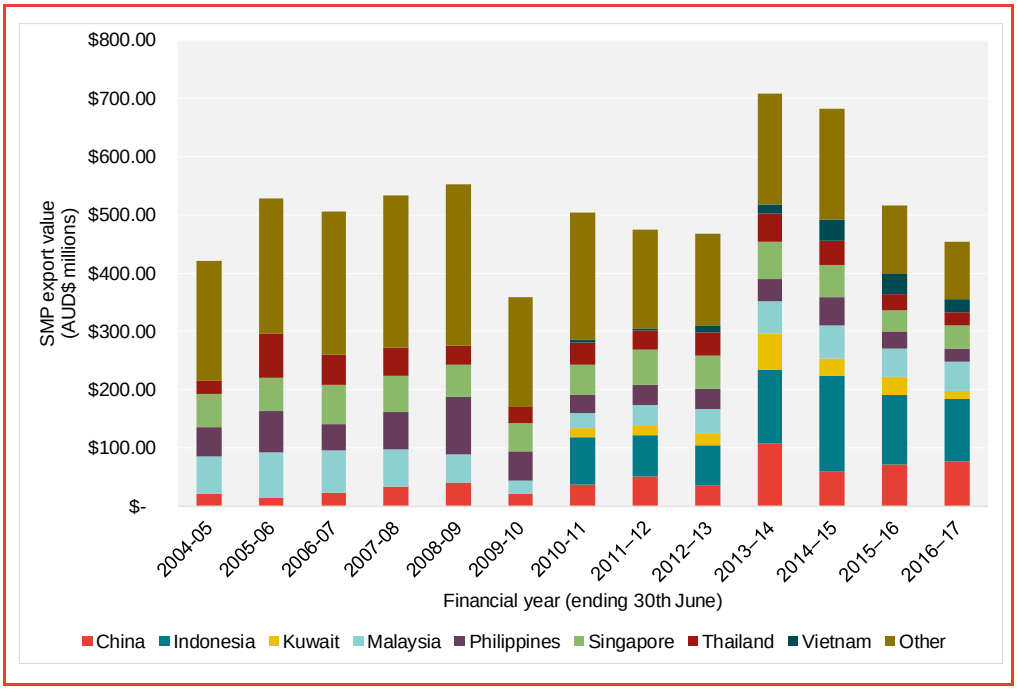


Source: ABARES

Japan, Singapore, Malaysia, Indonesia, Singapore and China are Australia's main export markets, with Chinese demand growing significantly in recent years. The value of Australia's skim milk powder exports has increased since 2004/05 levels, but has decreased significantly lately. Figure 93 shows Indonesia has become an

important market in recent years, along with a slight growth from China and Malaysia, while exports to Singapore and Thailand have fallen slightly.

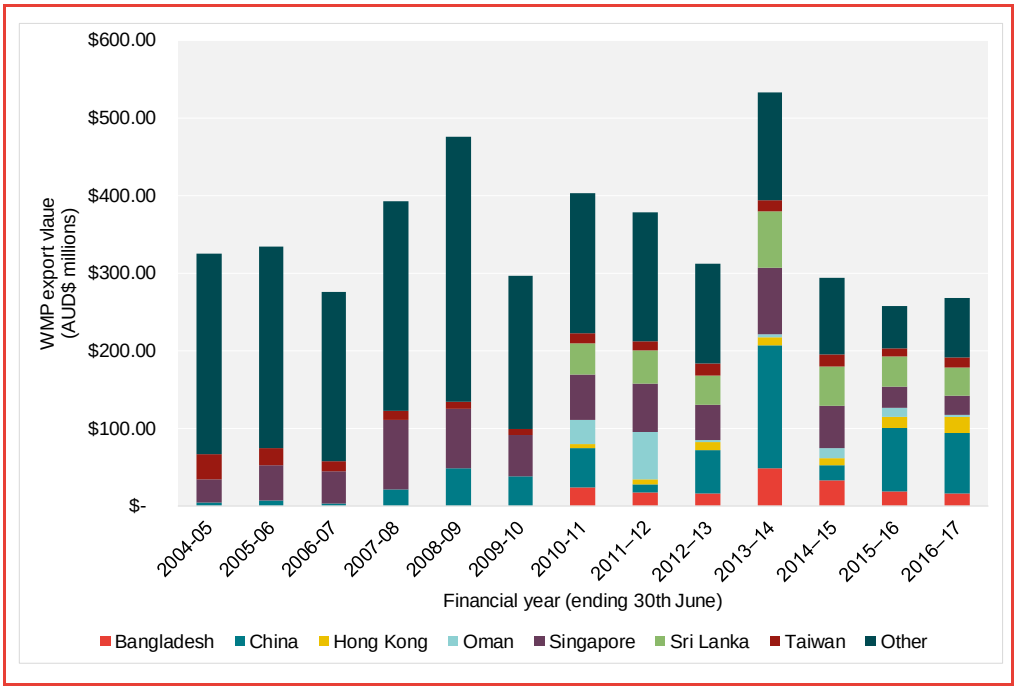
Figure 93: Skim milk powder volume exports, by country of destination



Source: DAWR, ABARES

Although export of skim milk powder have grown slightly, whole milk powder exports have fallen (in contrast to whole milk powder exports from New Zealand). Figure 94 shows this decrease, with the value of exports to almost all countries in decline.

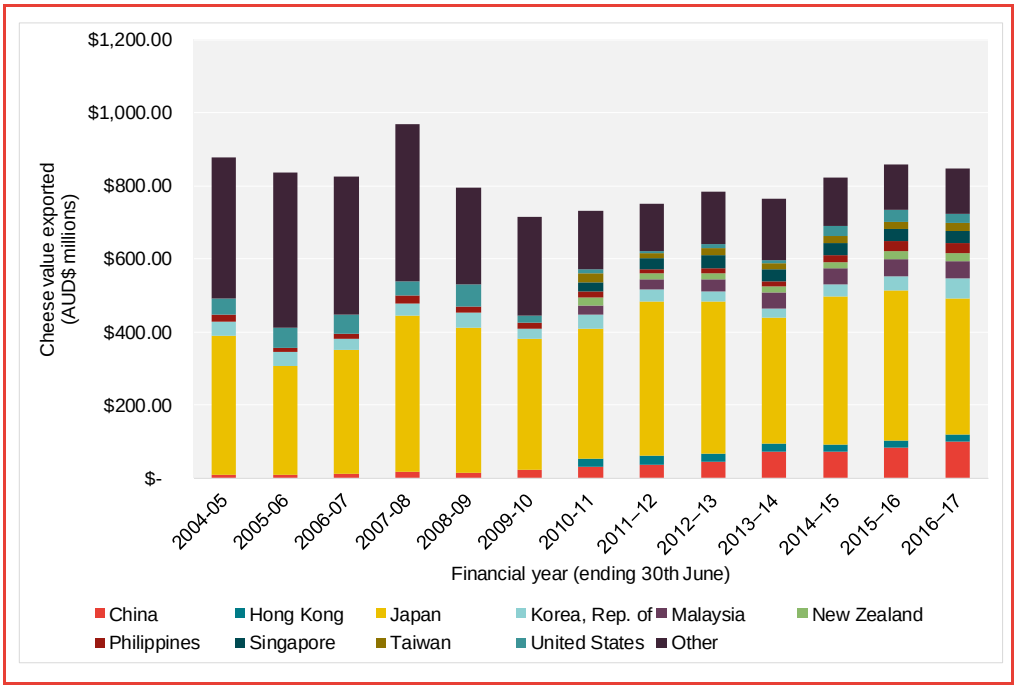
Figure 94: Whole milk powder volume exports, by country of destination



Source: DAWR, ABARES

Similar to whole milk powder, cheese exports have seen a fall in export quantities as well. Japan, the largest importer of Australian cheese, has not seen major growth for several years, while Chinese demand has grown steadily.

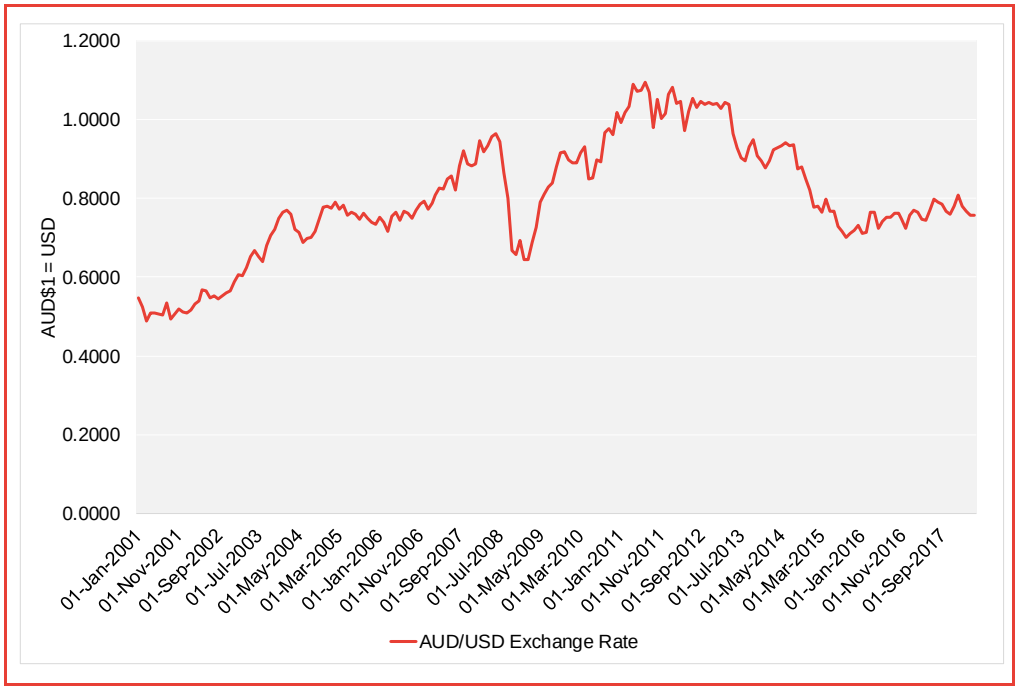
Figure 95: Cheese value exports, by country of destination



Source: DAWR, ABARES

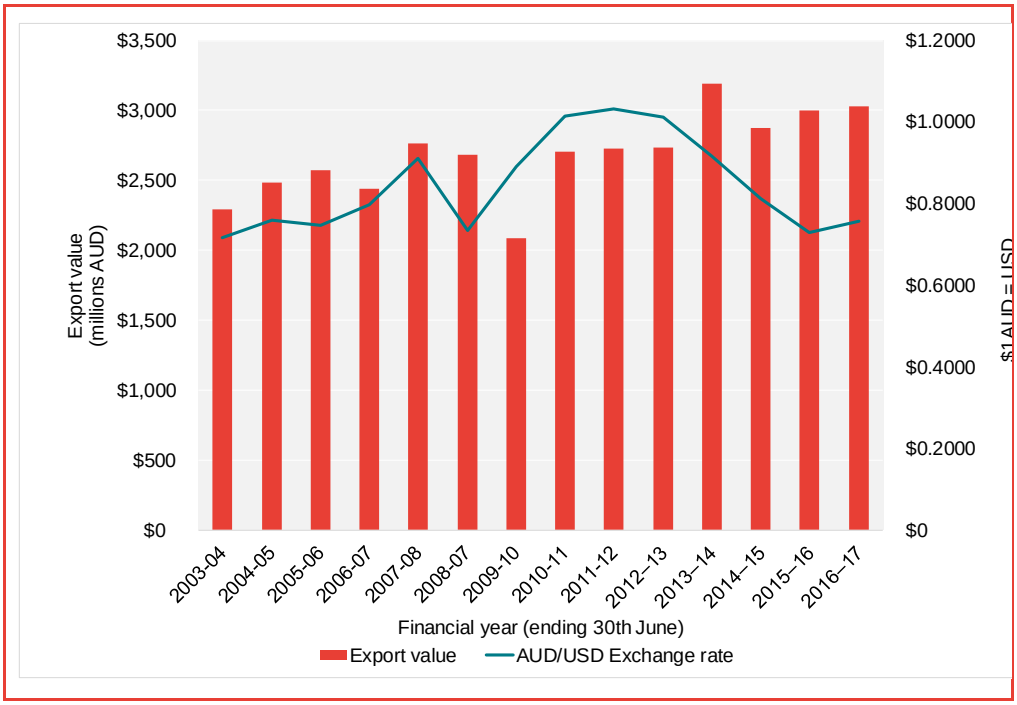
The peak output of the Australian dairy sector in 2013/14 coincided with a high AUD/USD exchange rate. Figure 96 shows the AUD/USD exchange rate, with a steady downwards trend from 2013 to 2015, improving export returns (see Figure 97).

Figure 96: AUD/USD exchange rate since 2001



Source: RBA

Figure 97: Average exchange rate per year with dairy export value, Australia

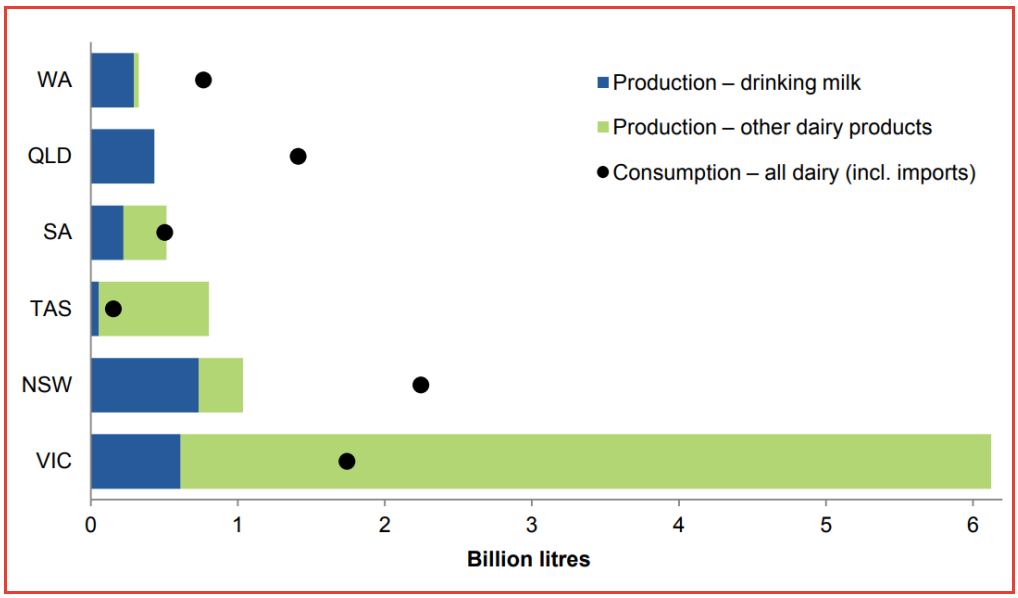


Source: RBA, DAWR ABARES

Victoria

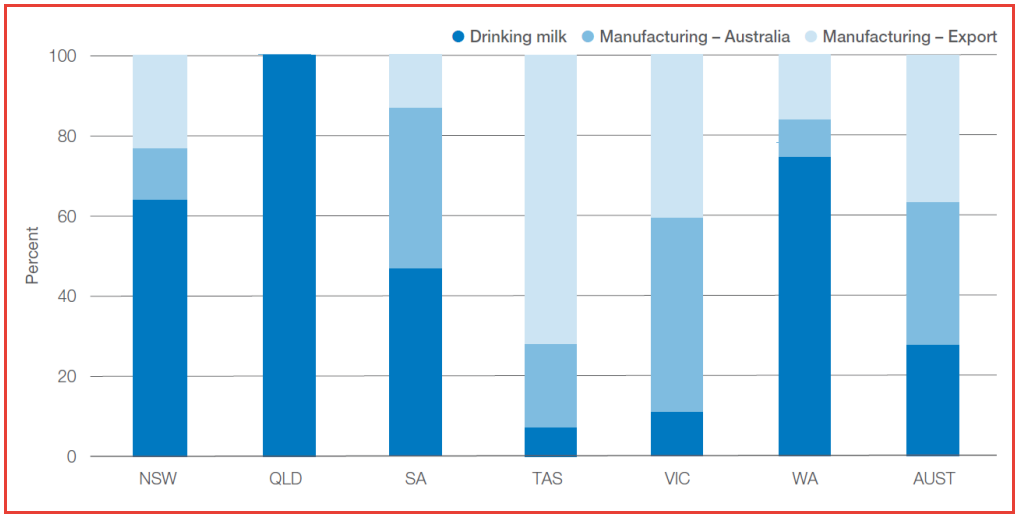
Victoria produces by far the majority of Australia's milk supply, as seen in Figure 98, producing almost six times more than the next largest producing state, NSW. Production in Western Australia, Queensland, and NSW is focused in supplying drinking milk to the domestic market. Victoria exports about 40% of its milk production, with only Tasmania exporting a larger proportion of their production (see Figure 99). However, Tasmanian milk production volumes are much smaller – around 14% of Victorian milk production.

Figure 98: Production and consumption of dairy goods, by state, milk equivalent terms, 2013-14



Source: Productivity Commission, Relative Costs of Doing Business in Australia: Dairy Product Manufacturing*, Research Report, September 2014, p10*

Figure 99: Use of Australian milk by State, FY2015/16

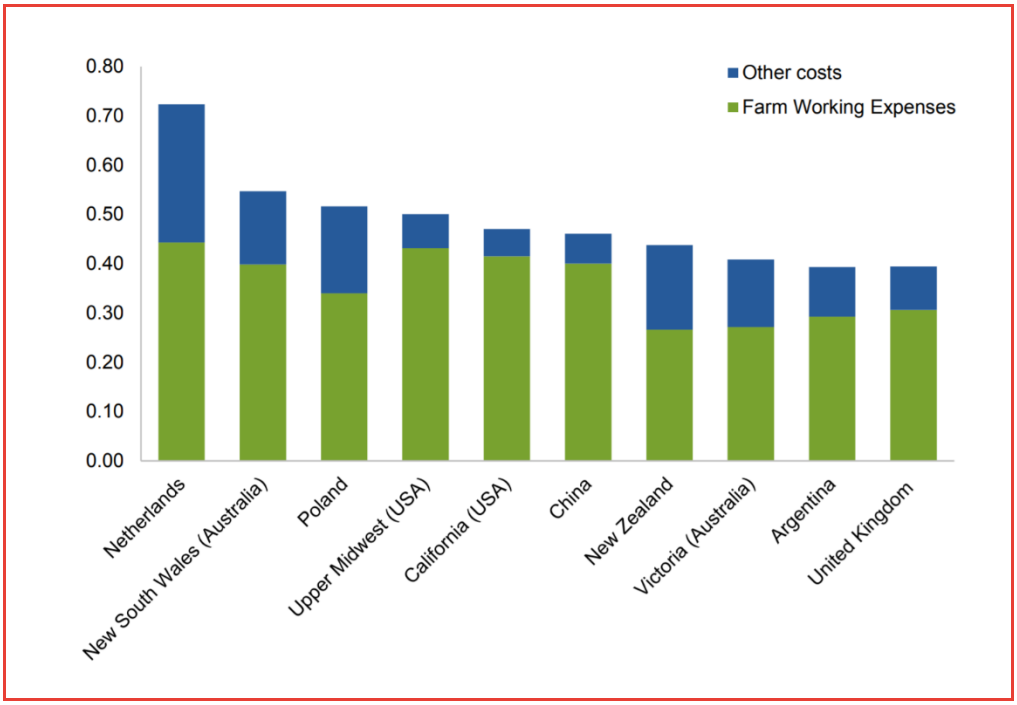


Source: Dairy in Focus, 2017, p. 9

Victoria is a relatively low cost producer by international standards, as shown in Figure 100. The cost of producing 1 kg of a standardised unit of milk was around US30 to US35 cents in 2010 for a representative farm in Australia, compared to US35 cents a kilogram in Ireland and between US25 and US35 cents per kilogram

in New Zealand.[116] However, processing costs including labour, packaging and utilities offset this cost advantage.[117]

Figure 100: Raw milk production costs ($US per litre)



Source: Productivity Commission, Relative Costs of Doing Business in Australia: Dairy Product Manufacturing*, September 2014, p92*

Seasonality of milk production

Regions which need to supplement their own pastures with other fodder, such as Queensland and Western Australia, have much less seasonal variation in production compared with the non-irrigated but rainfall dependent regions. This can be seen in Figure 101 where Tasmania and eastern Victoria have quite high seasonal variation, both due to their reliance on rainfall. The regions subject to seasonal variation tend to be more export focused, while the regions subject to less seasonal variation mostly produce for domestic use.

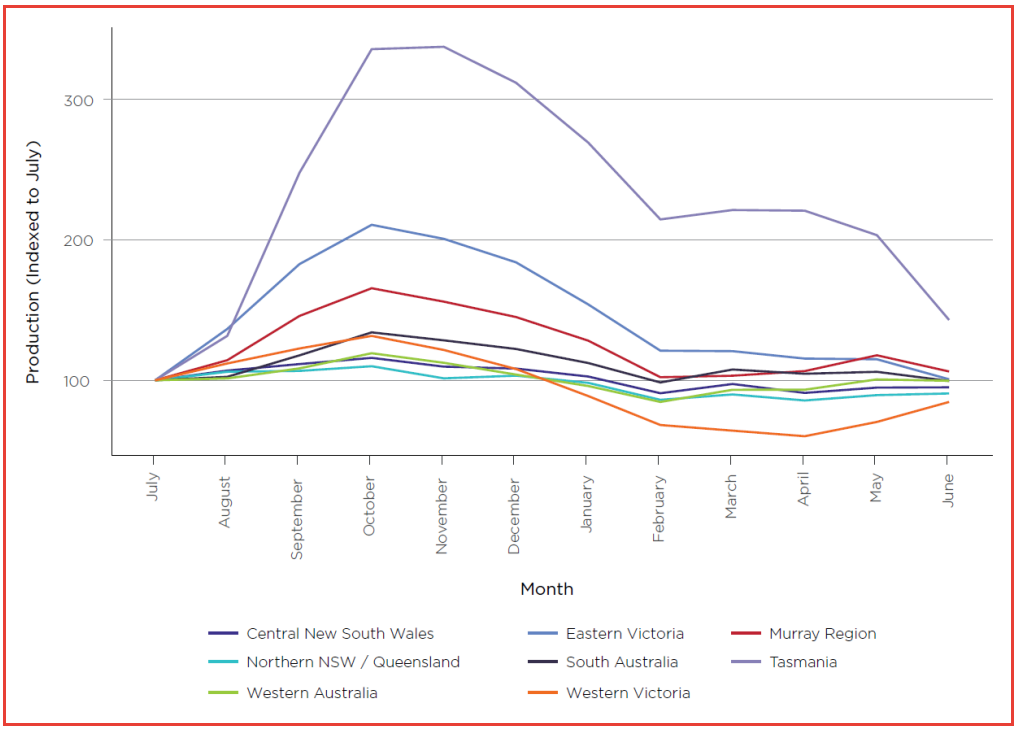
The seasonality in milk production has been decreasing in Victoria (see Figure 102). Since deregulation in 2000 the seasonal variation, defined as the difference between minimum and maximum production month volumes as a percentage, has fallen from approximately 180% to 90%. Processors have encouraged flatter milk production by:

116 ACCC, Dairy Inquiry: Final Report, April 2018, p22.

117 ACCC, Dairy Inquiry: Final Report, April 2018, p22.

- Increasing the price premium for autumn milk and reducing the price paid for spring milk
- Offering higher overall prices conditional upon certain milk supply volumes at certain times of the year.[118]

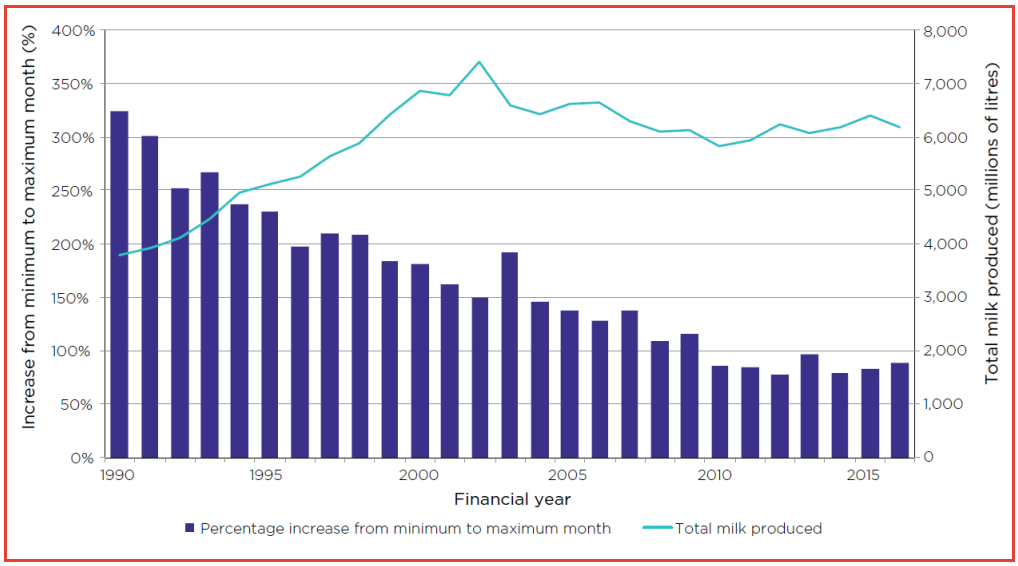
Figure 101: Relative variation in raw milk production throughout the season



Source: ACCC, Dairy Inquiry: Final Report, *April 2018, p11*

118 ACCC, Dairy Inquiry: Final Report, April 2018, p44.

Figure 102: Seasonality of milk production in Victoria



Source: ACCC, Dairy Inquiry: Final Report*, April 2018, p45*

7.3.2 Market structure of processing industry

Prior to deregulation four of the largest dairy manufacturers (Dairy Farmers Group, Murray Goulburn, Bonlac and Bega Cheese) in Australia were farmer-owned cooperatives. Following the deregulation of the dairy industry in 2000, the processing companies entered a stage of consolidation (see Figure 103), resulting in six major dairy manufacturers: Bega Cheese, Fonterra, Lion, Murray Goulburn, Parmalat and WCB. These processors purchase nearly 90% of Australia's raw milk supply, as shown in Figure 104.[119]

Fonterra and Murray Goulburn are the two largest processors in Australia, processing over 1 billion litres of milk a year. Other key players in the processing industry include Lion, Parmalat and Bega, with many other smaller processing plants taking in less than 500 million litres of milk (see Figure 105). There is significant foreign ownership in dairy processing in Australia, via WCB (controlled by Canadian-based Saputo with a 10% share from Lion), Lion (a subsidiary of Japanese Kirin), Parmalat (a subsidiary of French Lactalis) and Fonterra. The sale of Murray Goulburn to Saputo has recently been announced.

119 Productivity Commission, *Relative Costs of Doing Business in Australia: Dairy Product Manufacturing*, Research Report, p40

Figure 103: Consolidation in the Australian dairy product manufacturing industry

The Australian dairy product manufacturing industry has undergone an extended period of consolidation, beginning with the first stages of industry deregulation in the 1980s. Some of the major acquisitions since 2000 are outlined below.

Key dairy acquisitions

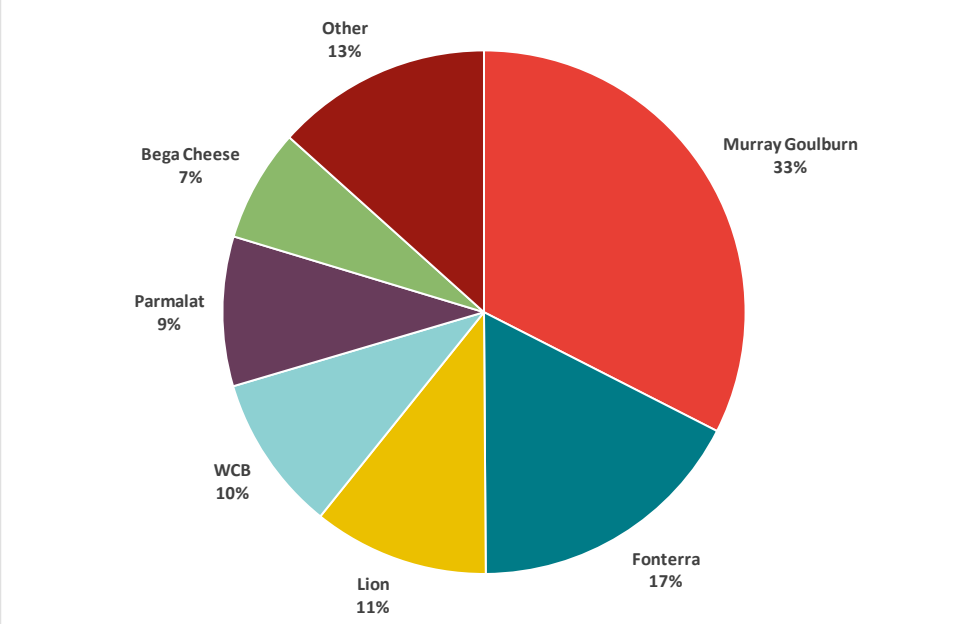
Year	*Activity*
2001	Fonterra purchases 25 per cent of Bonlac
2003	Fonterra purchases a further 25 per cent of Bonlac
2006	Fonterra completes its acquisition of Bonlac
2007	Bega Cheese acquires 70 per cent of Tatura Milk
2008	National Foods acquires Dairy Farmers Group
2011	Bega Cheese completes its acquisition of Tatura Milk
2013	Fonterra purchases Tamar Valley Dairy
2014	Canadian firm Saputo assumes majority ownership of Warrnambool Cheese and Butter
2014	United Dairy Power purchased by private investor
2014	Parmalat acquires Harvey Fresh

One of the most significant recent events to have occurred in the Australian dairy manufacturing industry concerns the competing bids (made throughout 2013 and early 2014) for ownership of Warrnambool Cheese and Butter, mounted by Bega Cheese, Murray Goulburn, and the Canadian-based dairy company Saputo. By February 2014, Saputo had acquired a majority of Warrnambool Cheese and Butter shares.

Sources: Binsted (2014); Dairy Australia (2013a); Fonterra (2013a); Lion (2014b); Saputo (2014); Tatura Milk (2011); UDP (2014).

Source: Productivity Commission, Relative Costs of Doing Business in Australia: Dairy Product Manufacturing*, Research Report, September 2014, p42*

Figure 104: Major dairy processing share of raw milk purchased, 2014



Source: Productivity Commission, Relative Costs of Doing Business in Australia: Dairy Product Manufacturing*, Research Report, September 2014, p41*

Figure 105: Major dairy product manufacturing companies in Australia

Table 2.1 **Major dairy product manufacturing companies in Australia, 2012-13[a]**

Company	*Quantity of raw milk purchased*	*Share of total raw milk purchased*	*Revenue*	*Employees*	*Major dairy products*	*Major dairy brands*	*Collection States[b]*						*Number of plants[b]*
	Million litres	Per cent	A$ million				NSW	Vic	Qld	SA	WA	Tas	
Murray Goulburn	2 990	33	2 385	2 268	Cheese, butter, milk powder, drinking milk, cream	Devondale, Liddells	✓	✓		✓		✓	8
Fonterra	1 600	17	2 500	2 000	Cheese, butter, milk powder, drinking milk, yoghurt	Mainland, Western Star, Nestle Ski	✓	✓				✓	10
Lion	1 000[c]	11	2 536[d]	2 300[d]	Drinking milk, cheese, yoghurt	Pura, Coon, Dairy Farmers, Yoplait	✓	✓	✓	✓	✓	✓	16
Warrnambool Cheese and Butter	890	10	497	424	Cheese, butter, milk powder, drinking milk	Sungold Milk, Warrnambool Cheddars, Great Ocean Road		✓		✓			2
Parmalat	850[c]	9	1 233[e]	1 847	Drinking milk, yoghurt, custard, cream	Pauls, Vaalia, Harvey Fresh	✓	✓	✓	✓	✓		9
Bega Cheese	641	7	1 010	1 700	Cheese, drinking milk	Bega Cheese	✓	✓					6
Other	1 229[c]	13	3 271[c]	7 013[c]	..	..	..	..	..	..	..	..	430[c]
Total	**9 200**	**100**	**13 432**	**17 552**	..	..	..	..	..	..	..	..	**481[c]**

[a] Data are for 2012-13 except where specified. [b] As at August 2014. [c] Estimate. [d] Lion 'Dairy & Drinks' business (includes juice and soy products). Year ended 30 September 2011. [e] Total sales in Australia. 2013.

Sources: ABS (2014b, 2014c); Bega Cheese (2012, 2013); Binsted (2014); Fonterra (2013b, 2014a); IBISWorld (2014); Lion (2011, 2014a); Murray Goulburn (2013, 2014a); Parmalat (2011b, 2014); Warrnambool Cheese and Butter (2013, 2014).

Source: Productivity Commission, Relative Costs of Doing Business in Australia: Dairy Product Manufacturing, *Research Report, September 2014, p41*

There has not been large scale entry into dairy processing in Australia for some time, but there is recent evidence of entry to small scale processing, including the construction of milk processing plants in South Australia and western Victoria, producing milk powder for export and yoghurt for domestic and export markets.[120] There is some limited evidence of vertical integration involving farmers establishing onsite processing facilities to produce small volumes of branded milk, including an organic dairy processing plant in Victoria.[121] There is ongoing evidence of large scale processors expanding, and in some cases closing, processing facilities.

The ACCC recently undertook an investigation of the dairy industry in Australia, motivated in part by recent industry events (see Box 4).[122] The review found the market for the acquisition of raw milk is highly concentrated across Australia, with the exception of central NSW; although there is price competition between processors switching costs and other barriers, including loyalty bonuses, and raw milk swaps and trades soften competition.[123] The ACCC review concluded processors have significant bargaining power in contractual negotiations with farmers, and recommended a mandatory code of conduct to address this market failure. The ACCC found that the contracts offered to farmers by cooperatives and

120 ACCC, Dairy Inquiry: Final Report, April 2018, p96.

121 ACCC, Dairy Inquiry: Final Report, April 2018, p97.

122 ACCC, Dairy Inquiry: Final Report, April 2018, pxii.

123 ACCC, Dairy Inquiry: Final Report, April 2018, pp 65, 74.

corporate processors were not materially different, with similar pricing components and supply clauses.[124]

Box 4: Farmgate price adjustments in 2016

In April and May 2016 Murray Goulburn and Fonterra Australia announced adjustments to the farmgate milk price for the 2015/16 season in response to challenging global market conditions:

- Murray Goulburn announced a retrospective reduction from A$6.05 kg/MS to between $4.75-5.00 kg/MS and outlined a plan to collect between A$140-190 million in overpayments to farmers over three years
- Fonterra Australia announced a reduction from A$5.60 kg/MS to A$5 kg/MS. This adjustment was not applied retrospectively, but to achieve the desired annual average price Fonterra Australia announced the milk price for the remainder of the season would be reduced to A$1.91 kg/MS.

The ACCC issued proceedings against Murray Goulburn in April 2017, alleging it engaged in unconscionable conduct and made false or misleading representations that contravened Australian Consumer Law. The matter is still being considered by the Australian Federal Court.

Source: ACCC, Dairy Inquiry: Final Report*, April 2018, p50*

7.3.3 Innovation and value add

There is evidence a range of value-added products have emerged in recent years in response to changing consumer preferences, including:

- Milk products with added health benefits including high calcium, low fat and added omega-3.
- New packaging and flavour combinations and the use of probiotic cultures in yoghurts, as well as the introduction of new products such as drinking yoghurts.
- Flavoured milk products.
- Organic milk products.
- Premium ice-cream, including stick lines and smaller-sized take-home tubs.
- Skim milk powder.

Product innovation provides an entry strategy for small scale processors, often targeting niche markets.[125]

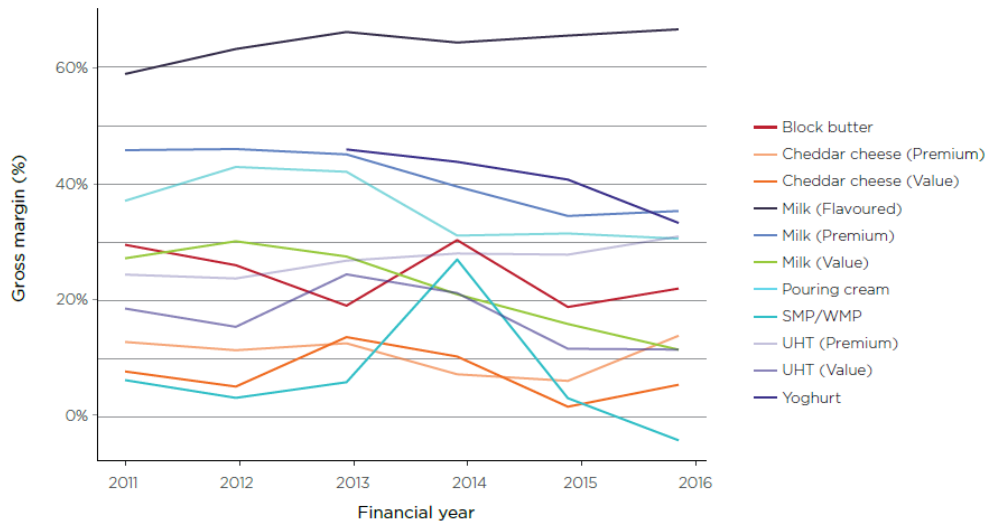
The yoghurt category enjoys one of the higher gross margins in the value added dairy products, as shown in Figure 106. In contrast the margin on milk has steadily

124 ACCC, Dairy Inquiry: Final Report, April 2018, p39.

125 ACCC, Dairy Inquiry: Final Report, April 2018, p99.

declined, likely due to the introduction of A$1 per litre milk at supermarkets as we discuss in Section 7.5.

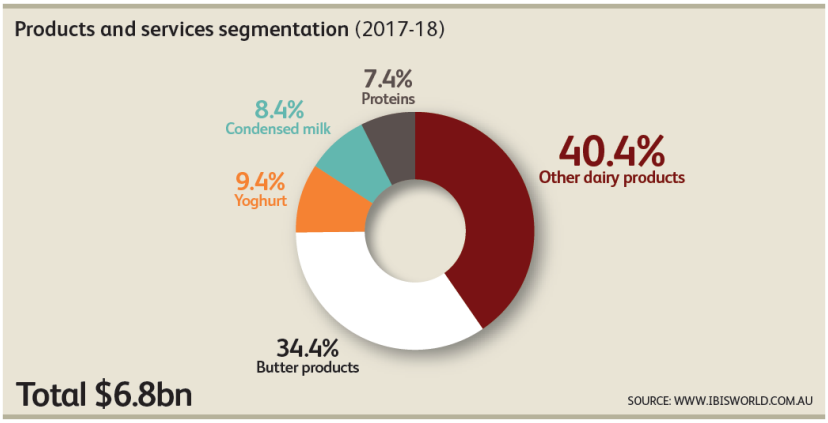
Figure 106: Gross margin on value added products



Source: ACCC, Dairy Inquiry: Final Report*, April 2018, p. 130*

The number of industry products has increased in line with the general expansion of food manufacturers' product offerings. These products include buttermilk, canned cream, lactose, flavoured milk, ice cream mix and skim milk-based stockfeed[126]. These dairy products make up 40 per cent of the value of manufactured dairy products, as seen in Figure 107.

Figure 107: Products and services segmentation, FY2017/18



Source: IBISWorld Butter and dairy product manufacturing in Australia industry report, p12

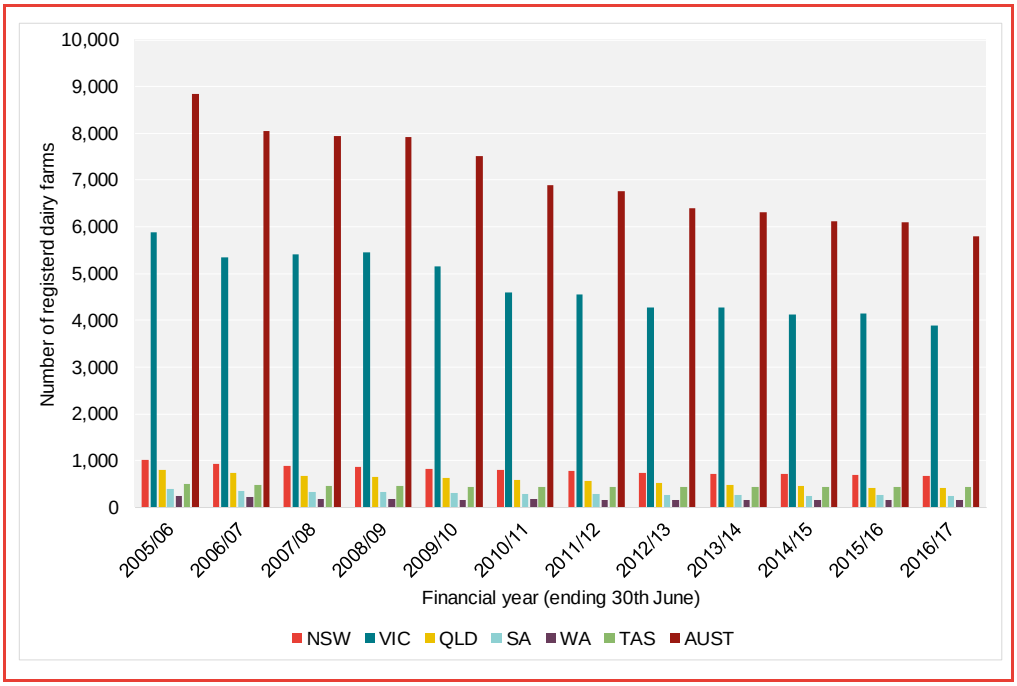
126 IBISWorld, Butter and dairy product manufacturing in Australia, Industry report, p12.

7.4 Environmental performance

7.4.1 Land use and intensification of farming

The number of dairy farms in Australia has fallen by 35% since 2005/06 to 5,789, as seen in Figure 108. This reduction has been relatively consistent across most states of Australia, but largest in Queensland (a 49% reduction) and smallest in Tasmania (a 12% reduction). Small scale farms (with total capital of less than A$3 million) accounted for the entire decline in dairy farm numbers; other farms expanded with the number of farms with total capital of between A$3 and A$8 million accounting for the majority of milk produced in Australia.[127] In the 16 years since deregulation, the return on capital for dairy farms averaged 2.2% per year, compared to 2.1% per year in the decade prior to deregulation.[128]

Figure 108: Number of dairy farms by state



Source: State milk authorities, Dairy in Focus 2017

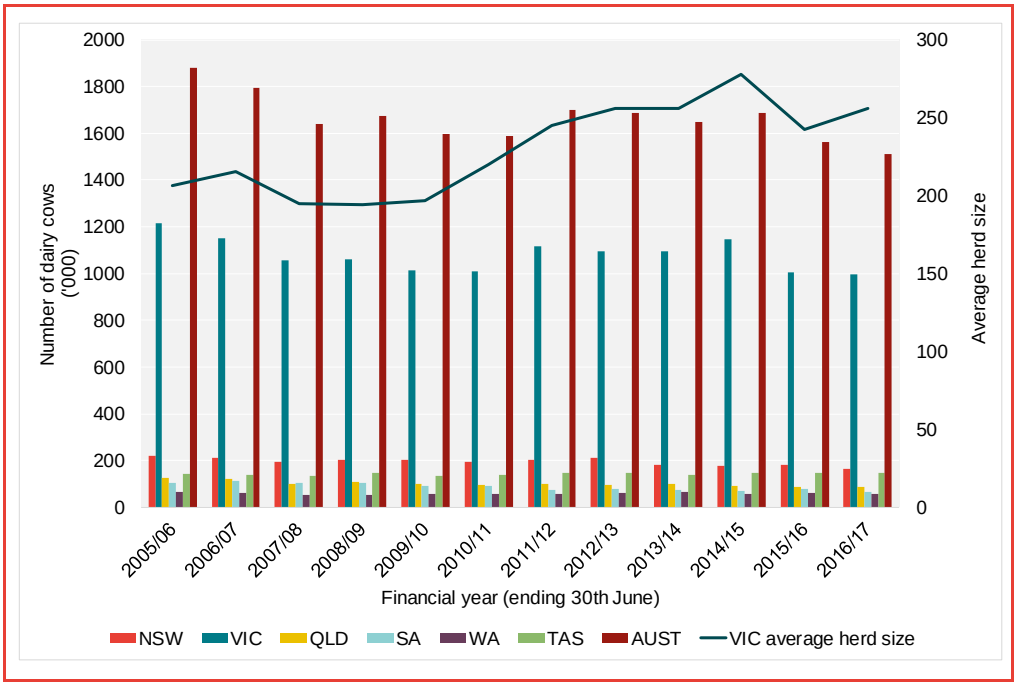
Despite the steady decrease in the number of dairy farms the number of dairy cows has been more volatile. As seen in Figure 109, the number of cows decreased from 2005/06 to 2010/11, recovering slightly over the period to 2014/15 before falling again. The number of dairy cows has fallen by 20% on average across Australia from 1.9 million in 2005/06 to 1.5 million in 2016/17, with Victoria mirroring the

127 ACCC, Dairy Inquiry: Final Report, April 2018, p23.

128 ACCC, Dairy Inquiry: Final Report, April 2018, p5.

national trends. The average herd size in Victoria has increased by 24% to 256 over the period from 2005/06. The average number of dairy cows per hectare for Victoria is the highest at 0.93, closely followed by Tasmania (see Figure 110).

Figure 109: Number of dairy cows by state, with average herd size for Victoria

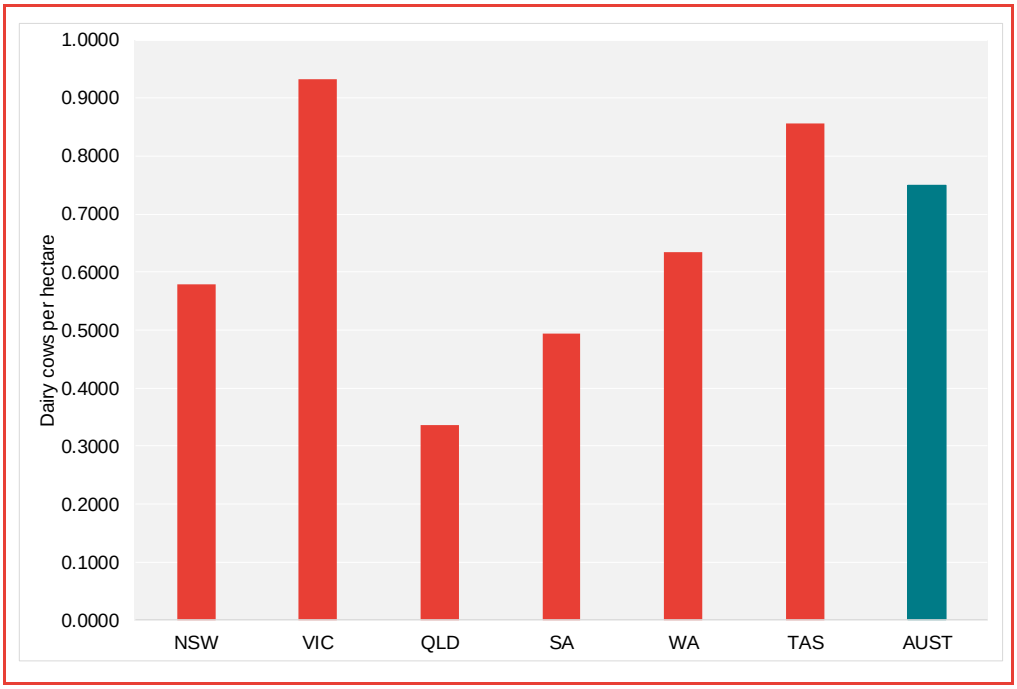


Source: Dairy in Focus 2017

Despite the reduction in the number of farms and cows, average raw milk production has increased for all states over the same time frame (see Figure 111). Pressure to achieve improved productivity and efficiency resulted in this consolidation of farms, particularly in states producing for domestic raw milk consumption.[129]

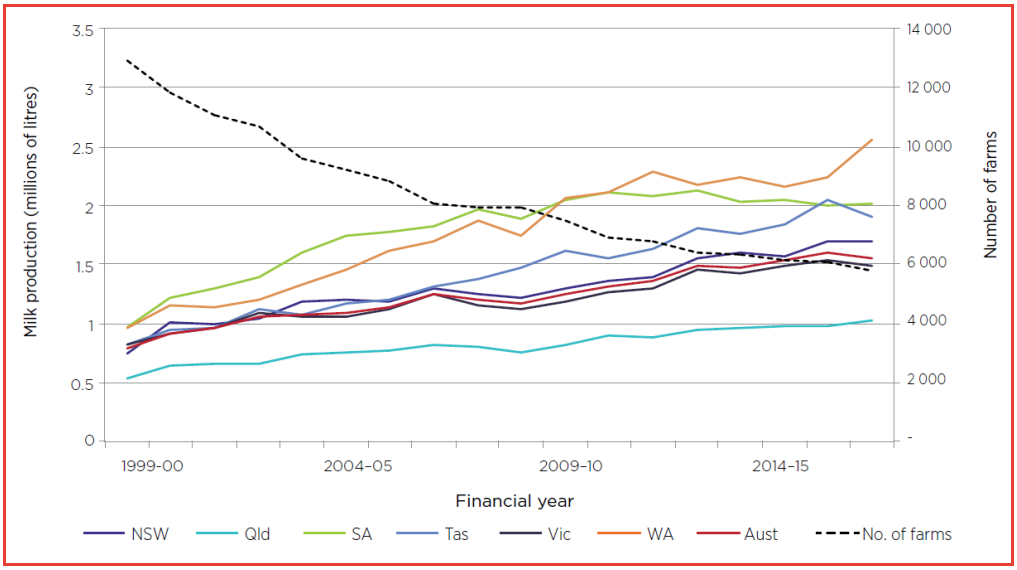
129 ACCC Dairy Inquiry, p5

Figure 110: Average number of dairy cows per hectare by State (2015-16)



Source: ABS

Figure 111: Average raw milk production (per farm)



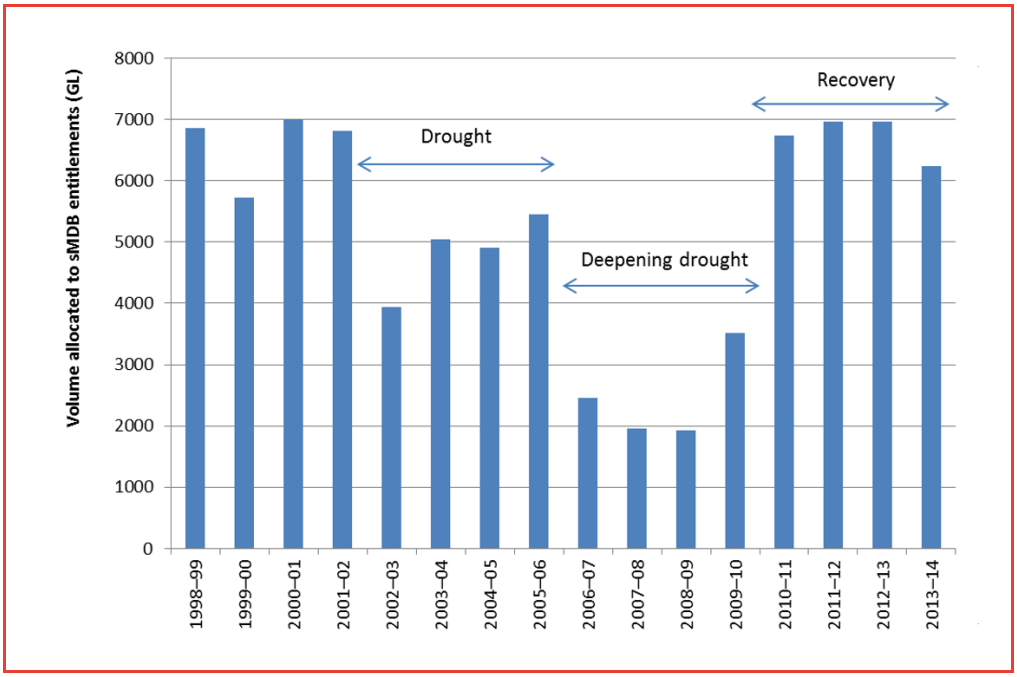
Source: ACCC, Dairy Inquiry: Final Report, *April 2018, p. 6*

7.4.2 Run off and waterway impact

Milk production in Victoria relies on a combination of rainfall (in the south of the state) and irrigation (in the north of the state). Victoria experienced a severe and prolonged drought during the early 2000s, which constrained Australia's dairy output (see Figure 99). This drought coincided with the development of the

Murray Darling Basin Plan (MDBP) and reform of Australia's water rights in the mid-2000s. The MDBP allocated water to the environment, reducing water entitlements, while the water rights reform separated entitlements from land, facilitating water trading. A significant proportion of the water allocated to the environment was bought from dairy farmers in the Goulburn Murray irrigation district in Northern Victoria. As Figure 113 shows this had a significant impact on the capacity to produce milk in the Goulburn Murray irrigation district, reducing the annual production for this district by an estimated $200 million per annum compared to what is likely to have been produced in the absences of the MDBP.[130]

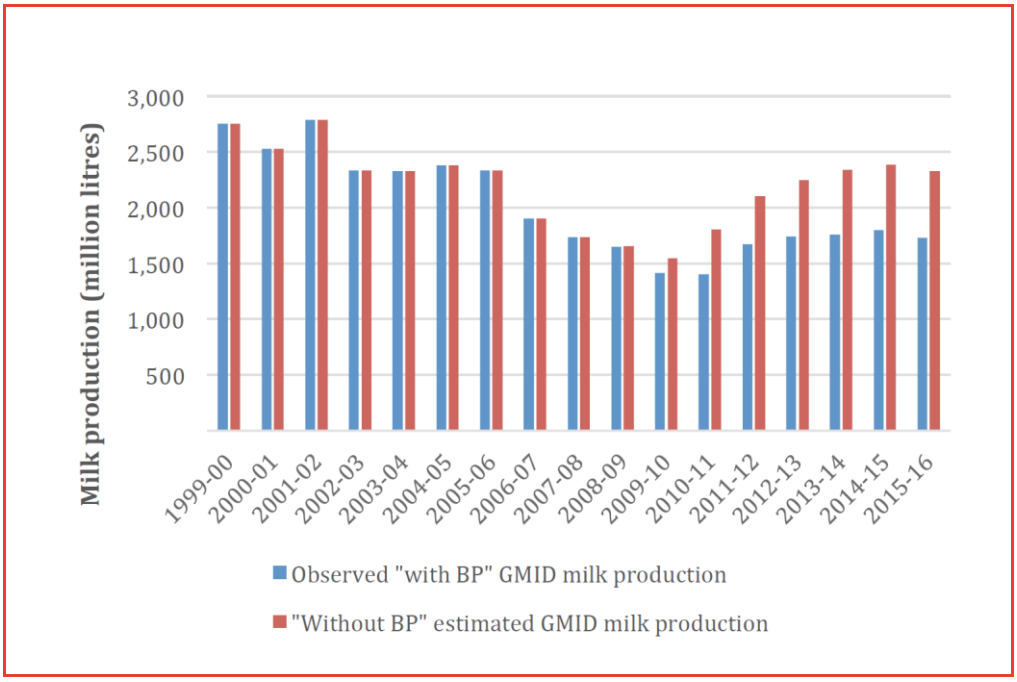
Figure 112: Volume allocated to Murray Darling Basin water entitlements



Source: Frontier Economics

130 Tim Cummins & Associates and Frontier Economics, Social and economic impacts of the Basin Plan in Victoria, February 2017, p9.

Figure 113: Impact of the Murray-Darling Basin Plan on milk production in the Goulburn Murray Irrigation District



Source: Tim Cummins & Associates and Frontier Economics, Social and economic impacts of the Basin Plan in Victoria, February 2017, p9

Notes: BP =Basin Plan, GMID = Goulburn Murray Irrigation District

The available monitoring data suggests that across Victoria state-wide, inland surface water quality has remained substantially unchanged from 2005 to the latest available information, published in 2013.[131] There are no consistent trends in nitrogen or phosphorus concentrations across Victoria, although there have been notable increases and decreases within particular basins as a result of climatic events. Studies have found the historical relationship between nitrogen and phosphorus concentrations and milk production weakened over the period 2000 to 2011, potentially as a result of changes in farming systems.[132] The prolonged, extreme, dry period (the Millennium drought) that ended in 2009 was followed by two years of above average rainfall and severe flooding in some areas. The largest changes in nitrogen and phosphorus levels across Victoria were recorded following the post-drought flood events at various locations.[133]

131 Department of Environment and Primary Industries, Victorian Water Quality Trends 1991 – 2010, August 2013.

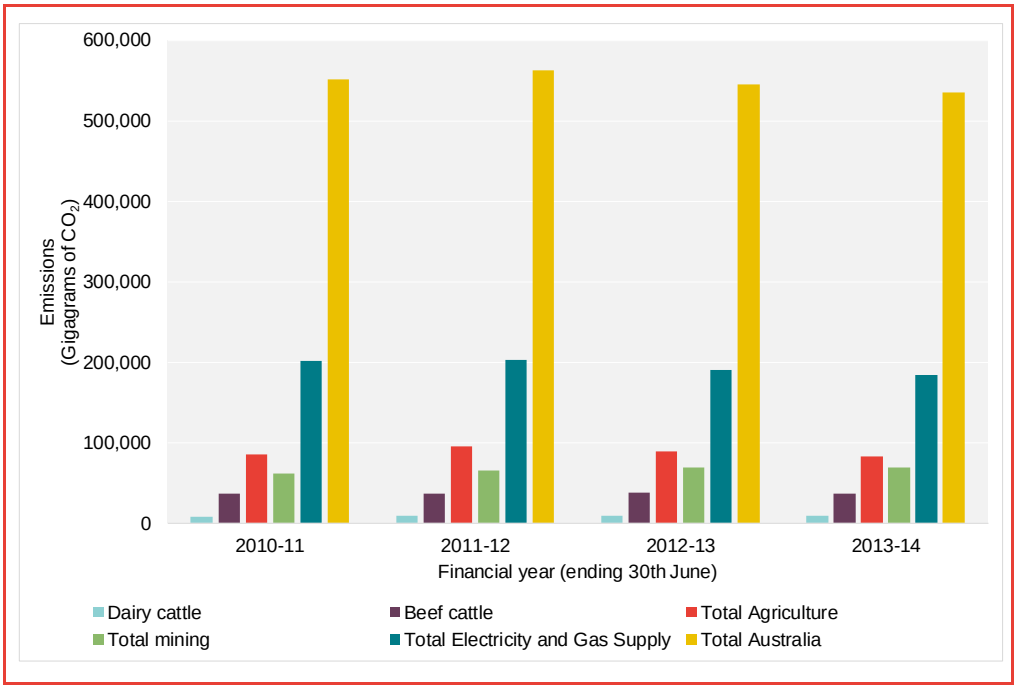
132 Andrew P. Smith, Andrew W. Western, Murray C. Hannah, "Linking water quality trends with land use intensification in dairy farming catchments", Journal of Hydrology, 476 (2013), pp1-12.

133 Department of Environment and Primary Industries, Victorian Water Quality Trends 1991 – 2010, August 2013.

7.4.3 Emissions

Greenhouse gas emissions from dairy cattle increased by 5% over the four years from to 8,722 gigagrams of CO2 2013/14, compared to a 3% reduction in total emissions across Australia to 534,818 gigagrams of CO2 (see Figure 114). However, total emissions from dairy compare favourably to other major industries in Australia, including electricity and water supply and mining. Coal fired generation dominates supply in the Australian National Electricity Market, accounting for 52% of registered capacity and supplying 76% of output in 2015/16.[134] Gas powered plant accounted for 19% of registered capacity in 2015/16, but supplied only 7% of output.[135] Greenhouse gas emissions from dairy cattle accounted for 1.6% of total greenhouse gas emissions in Australia in 2013/14, compared to 34% for electricity.

Figure 114: Greenhouse gas emissions for major industries in Australia



Source: ABS

7.5 Consumer outcomes

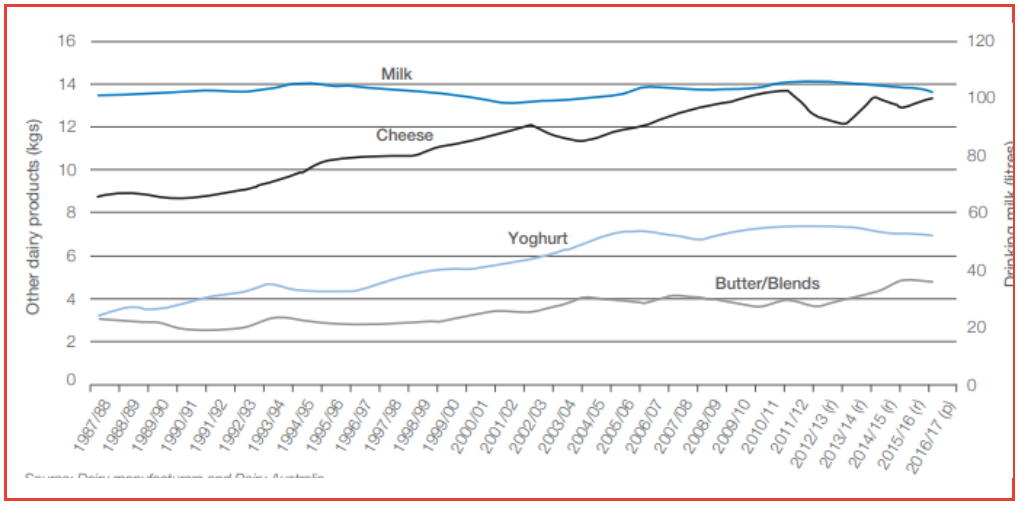
The consumption of dairy products in Australia over time has varied by product, reflecting changing consumer preferences. Figure 115 demonstrates that milk

134 Australian Energy Regulator, State of the Energy Market, May 2017, p29.

135 Australian Energy Regulator, State of the Energy Market, May 2017, p29.

consumption has remained relatively steady in recent years, while consumption of cheese, yoghurt and butter have increased. These trends have been influenced by a range of factors including multicultural influences on food trends, health perceptions, new product development, and flavour and packaging innovations.[136]

Figure 115: Australian consumption of dairy products (1997/98-2016/17)



Source: Dairy Australia, Dairy Industry in Focus 2017, p22.

Supermarkets are the most important channel for the supply of dairy products to consumers in Australia, accounting for around 38% of sales, followed by convenience stores (33%) and food services/hospitality (27%).[137] Coles and Woolworths are the major full-line supermarkets in Australia, accounting for 36% and 33% of total sales, respectively.[138]

Supermarkets in Australia have been following a strategy of discounting milk and block cheese to attract customers. As a result price competition between supermarkets on the supply of private brand milk and block cheese has been intense in recent years; resulting in declining retail prices for dairy products. Private label milk retails at A$1 per litre, representing a 12% decline in real terms since its introduction in 2011, a trend also reflected in the price of branded drinking milk (see Figure 116).[139] Similarly, private label cheese currently retails for as little as A$6/kg, which is equivalent to selling milk at A$0.6 per litre (see Figure 117). More generally, the prices for both branded and private label dairy products have decreased in retail terms since 2010. The relatively inelastic nature of the demand

136 Dairy Australia, Dairy Industry in Focus 2017, p22.

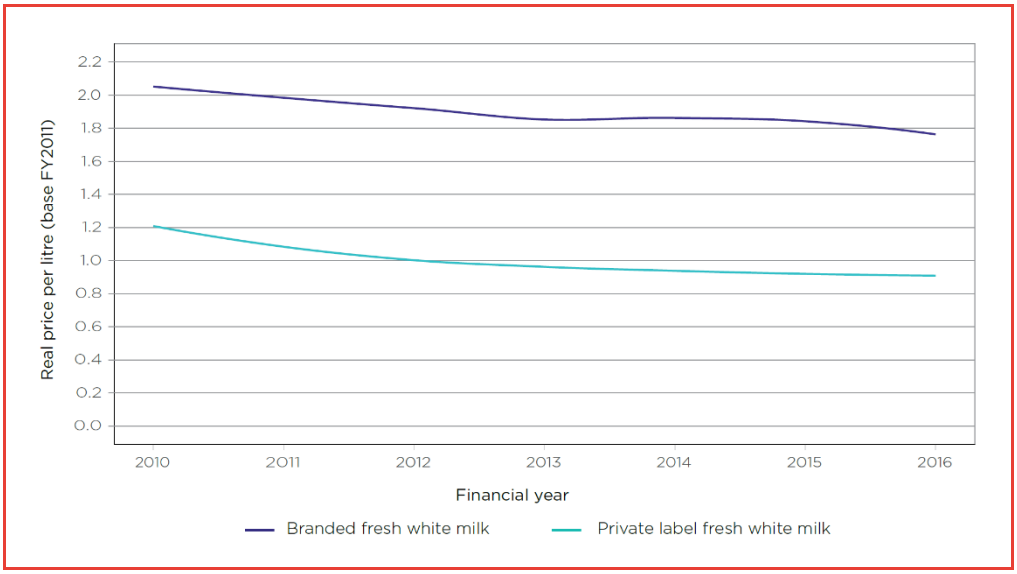
137 ACCC, Dairy Inquiry: Final Report, April 2018, p110.

138 Roy Morgan Research, Aldi hits new high in supermarket wars, 17 May 2017, Accessed 12 June 2018, http://www.roymorgan.com/findings/7234-woolworths-coles-aldi-iga-supermarket-market-shares-australia-march-2017-201705171406

139 ACCC, Dairy Inquiry: Final Report, April 2018, p124.

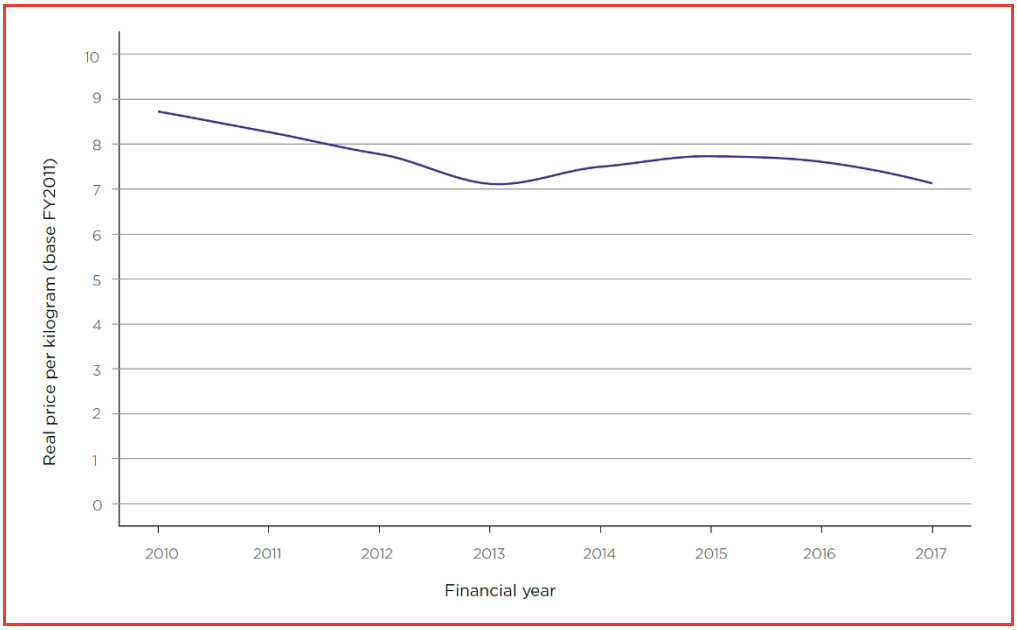
for dairy products (particularly staples) means these price reductions have had limited effect on consumption.

Figure 116: Retail prices of private label and branded label milk in real terms (2011-2016)



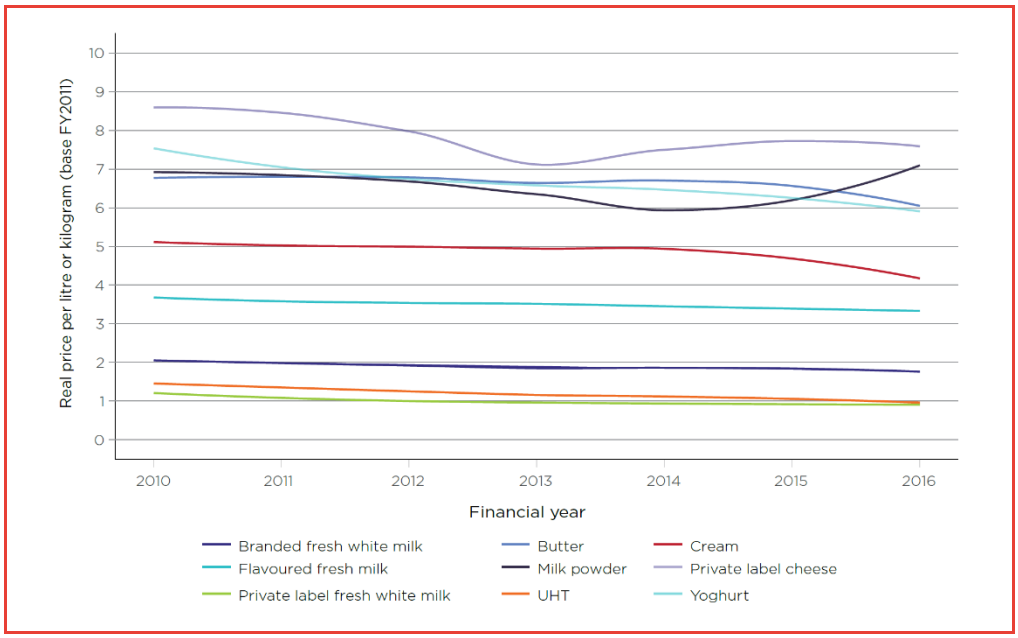
Source: ACCC, Dairy Inquiry: Final Report, April 2018, p112.

Figure 117: Retail prices of private label cheese in real terms (2011-2016)



Source: ACCC, Dairy Inquiry: Final Report, April 2018, p113.

Figure 118: Average real prices for dairy products (2011-2016)



Source: ACCC, Dairy Inquiry: Final Report, April 2018, p113.

There has been considerable concern in recent years over whether the A$1 per litre private label milk represents predatory pricing. In 2011 the ACCC investigated the discounting of private label milk by Coles. It found the intent was to win market share from competing supermarkets, rather than engage in anti-competitive conduct, and that the major impact was a reduction in supermarket profit margins for private label milk, benefiting consumers.[140] In its recent Dairy Inquiry the ACCC found the A$1 per litre price "… is an arbitrary 'cap' imposed by retailers on private label milk which does not reflect the costs of production and supply."[141] Supermarkets practice uniform national pricing for most dairy products, despite differences in the cost of production and transportation across regions, benefiting consumers in remote or regional areas.[142] The ACCC found private label milk is typically sold at a gross profit, although once distribution costs are taken into account it is at times sold at a gross loss in Tasmania and Queensland.[143] It found supermarkets have leveraged their bargaining power to reduce wholesale prices at the expense of processing profit margins, rather than farm gate prices.[144]

140 ACCC, Dairy Inquiry: Final Report, April 2018, p126.

141 ACCC, Dairy Inquiry: Final Report, April 2018, p106.

142 ACCC, Dairy Inquiry: Final Report, April 2018, p110.

143 ACCC, Dairy Inquiry: Final Report, April 2018, p126.

144 ACCC, Dairy Inquiry: Final Report, April 2018, pxii.

7.6 Social performance

The dairy sector in Australia has undergone a period of significant restructuring since 2001. The substantial reduction in the number of dairy farms and increasing corporatisation and internationalisation of processing have significantly changed the character of the sector. While the deregulation of the Australian dairy sector is likely to have precipitated much of this change, climate conditions, water reform and developments in international dairy markets have influenced outcomes.

There have been several major reviews of the dairy sector in Australia in recent years, highlighting ongoing political interest in, and public concern about, the sector over this period of adjustment:

- The Productivity Commission's 2014 report on the cost of dairy manufacturing, motivated by concerns that cost pressures may be placing Australia at a competitive disadvantage and interest in pursuing a model similar to Fonterra in New Zealand;[145]
- The ACCC's 2011 investigation on retail milk prices, motivated by concerns that supermarkets were engaging in predatory pricing at the expense of farm profit margins; and
- The ACCC's 2018 dairy industry inquiry, responding to government concern over the "industry crisis" resulting from the step down in farmgate prices by Murray Goulburn and Fonterra Australia in 2016.

From the consumer perspective, the range of product types and varieties has broadened considerably, and the price of private label milk and block cheese has fallen in real terms, but the ACCC found reports that there remains concern that A$1 per litre milk devalues the public perception of the industry.[146] Animal welfare, environmental degradation and the foreign ownership of Australian farms and brands have become topical issues in the Australian agricultural sector generally in recent years. Dairy farming has not been singled out particularly in relation to these issues.

However, the relative size and contribution of the Australian dairy sector limits its exposure to scrutiny to some extent. Other industries that make a more material contribution to the economy and have more significant environmental impact, such as energy and mining, attract greater prominence and critical examination in the Australian context.

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145 Productivity Commission, *Relative Costs of Doing Business in Australia: Dairy Product Manufacturing*, Research Report, September 2014, piii.

146 For example, milk is cheaper than water.

8 Appendix 2: Performance of Irish dairy sector

8.1 Overview

Key findings:

- The value of milk production in Ireland in 2016 was approximately €1.8 billion ($NZ3 billion) in 2016, substantially lower than the NZ$8 billion produced in New Zealand.
- Ireland has a seasonal-based on-farm production system like New Zealand, and the seasonality has increased in recent years as export-focused production has increased.
- Milk production was historically constrained by EU milk quotas. Ireland produced 7.23 billion litres of milk in 2017, a 13.3% increase since EU milk quotas were abolished in 2015.
- Over 90% of Ireland's dairy production is exported. Dairy exports grew by 19% in 2017 to NZ$6.7 billion.
- Ireland's top five export markets are the EU, China, USA, Algeria and Nigeria (compared to China, the USA, Australia, Japan and Philippines for New Zealand).
- Ireland's export product mix is quite different to New Zealand, with cheese and butter accounting for 27% and 25% of exports respectively (compared to 19% and 13% respectively for New Zealand).
- The constraints imposed by the EU milk quotas resulted in Irish cooperatives focusing on the premium EU market and diversifying into new products and markets. The two largest cooperatives – Kerry and Glanbia – are listed on the stock exchange, with this capital funding diversification (Kerry) and moving up value chain (Glanbia into nutritionals). Their debt ratios are now significantly below Fonterra's.
- Glanbia currently invests a similar proportion of its revenue in R&D as Fonterra; whereas Kerry Group's R&D intensity is about 4 times Glanbia's and Fonterra's.
- Other dairy cooperatives specialise in milk collection, primary production and domestic supply. They typically export via Ornua (the former Irish dairy board) and supply downstream processors, such as infant milk formula producers.
- The top performing dairy herds have stocking rates of 2.5 cows per hectare, similar to New Zealand.
- There is little evidence yet to suggest that expansion in dairying has resulted in significant environmental degradation, especially waterways. There are various regulatory measures (including subsidies) in place to minimise environmental impact.
- Retail dairy prices have decreased since their peak in 2008, compared to the relatively constant retail dairy prices observed in New Zealand.

8.2 Brief overview of policy and historical context

This section briefly summaries the policy context within which the Irish dairy sector operates, which is important to contextualise its performance over the last two decades.

The Irish dairy sector operates under the European Union's (EU's) Common Agricultural Policy (CAP), which comprises:

- **Direct support to farmers.** Farm subsidies under the CAP have been a feature of European farming since the formation of the EU. In 2018, Ireland's direct payments to farmers under CAP is capped at about $2 billion. In recent years, direct payments to farmers have moved away from production-based subsidies to payments focused on environmental outcomes, food safety and public health, animal health and plant health, and animal welfare.[147]
- **Restrictions on output.** The EU milk quota was a regulatory intervention that has had significant impact on the development of the dairy sector both in Ireland, and across Europe. Introduced in 1984, milk quotas sought to restrict CAP expenditure on dairy by imposing restrictions on milk production volumes in each member state. The corollary of this was that the Irish dairy sector was limited in its ability to expand to serve growing export markets.

  Milk quotas began to be phased out in 2009 and were eliminated completely by 2015. This has led to an expectation of significant milk production growth in Ireland – with the Government's Food Harvest 2020 strategy targeting a 50% growth in milk production between 2011 and 2020.[148] (As discussed below, the sector is on track to meet this target.)
- **Protecting EU markets.** The CAP also contained a number of other market support levers in relation to the dairy sector. In particular, market access arrangements have included high import tariffs on dairy products from outside the EU, thereby limiting the ability of imported dairy products to compete with and displace domestically produced dairy products. The CAP also provided for export subsidies, so excess dairy production could be exported to third countries rather than depressing local prices and therefore local farm incomes. Under pressure in trade reform negotiations, interventions to protect the domestic market have been reduced and export subsidies effectively eliminated by 2005.[149]

147 Regulation (EU) No 1306/2013 of the European Parliament and of the Council of 17 December 2013 on the financing, management and monitoring of the common agricultural policy.

148 Department of Agriculture, Food and the Marine, (2011), Food Harvest 2020.

149 Teagasc, 2015, The End of the Quota Era: A History of the Dairy Sector and Its Future Prospects.

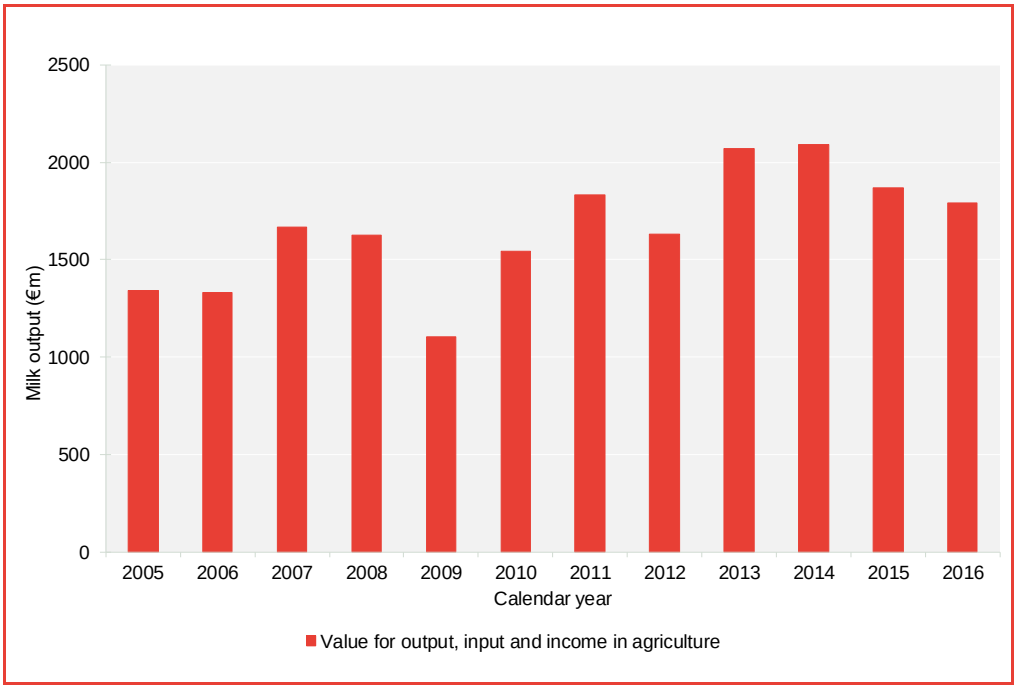
8.3 Economic performance

8.3.1 Value of sector

Output value

The value of the milk production in Ireland was approximately €1.8 billion in 2016 (Figure 119), or $NZ3 billion. This value has grown by 2.9% per annum over the period from 2005, a cumulative increase of 33.4% over the 11 years to 2016.

Figure 119: Value of raw milk in Ireland, 2005-2016

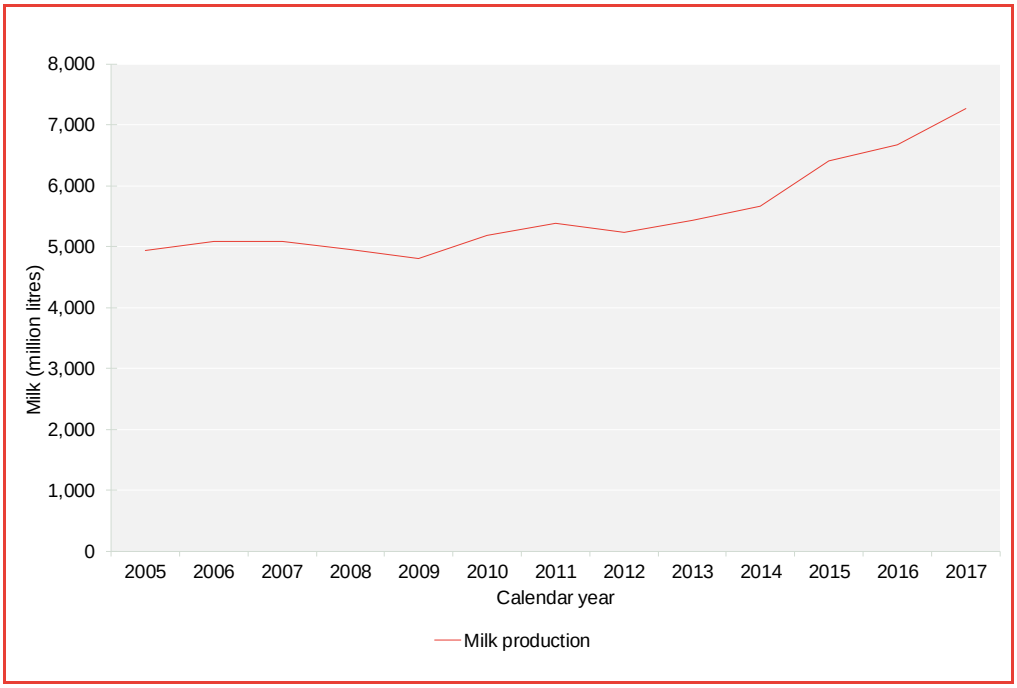


Source: Frontier analysis of CSO data

While GDP figures are not available for the dairy sector alone, the agri-food sector is estimated to contribute 7% of Ireland's GDP. The dairy sector accounts for one third Ireland's food and drink exports, and therefore is a substantial part of the broader agri-food sector.

Historically quotas restricted Irish milk production, and the sector has experienced significant production growth since the quotas were removed (see Figure 120). During the phasing out period from 2009 to 2013, there was a slight increase in volumes after stagnant volumes in previous years. Following the abolition of the quotas, production volumes increased by 13% to 6.4 billion litres in 2015. The volume increases have continued in recent years, with 4% and 7% increases in 2016 and 2017, respectively, to 7.23 billion litres in 2017. Irish milk production is forecast to continue to grow, with volumes expected to be 50% higher in 2020 compared to 2010.

Figure 120: Irish milk production, 2005-2017



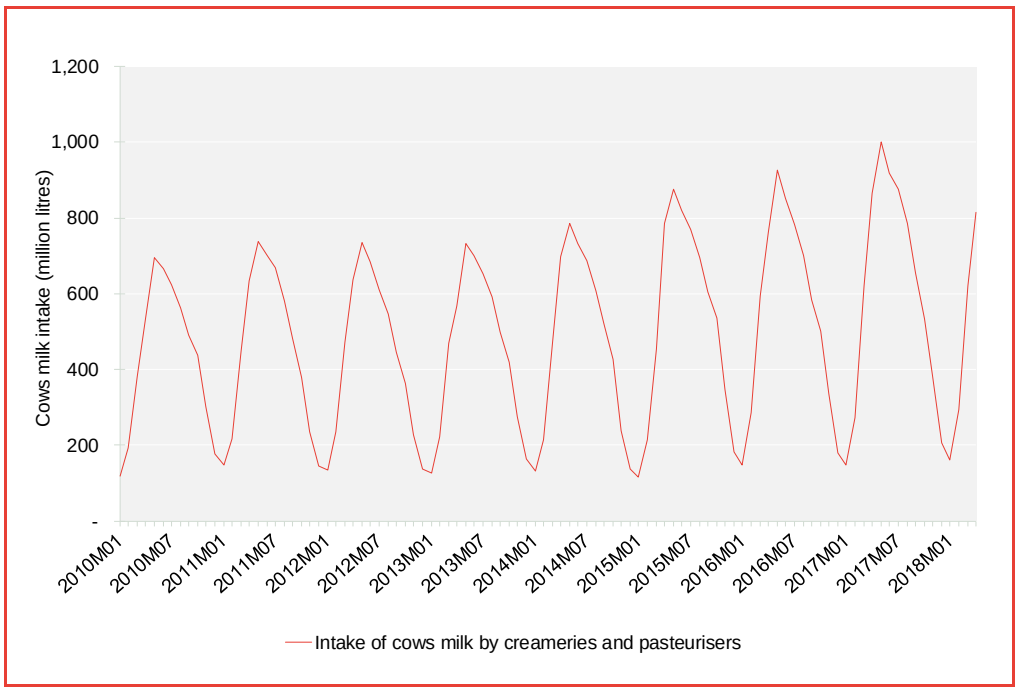
Source: Frontier analysis of CSO data

Seasonality

The Irish dairy sector is a pastoral based system, similar to New Zealand. Milk production is highly seasonal, with a peak-to-through ration of 6:1.[150] Figure 121 below shows that the level of seasonality has increased with the abolition of quotas, with the trough remaining relatively constant while the peak has increased significantly.

150 Teagasc, 2015, The End of the Quota Era: A History of the Dairy Sector and Its Future Prospects.

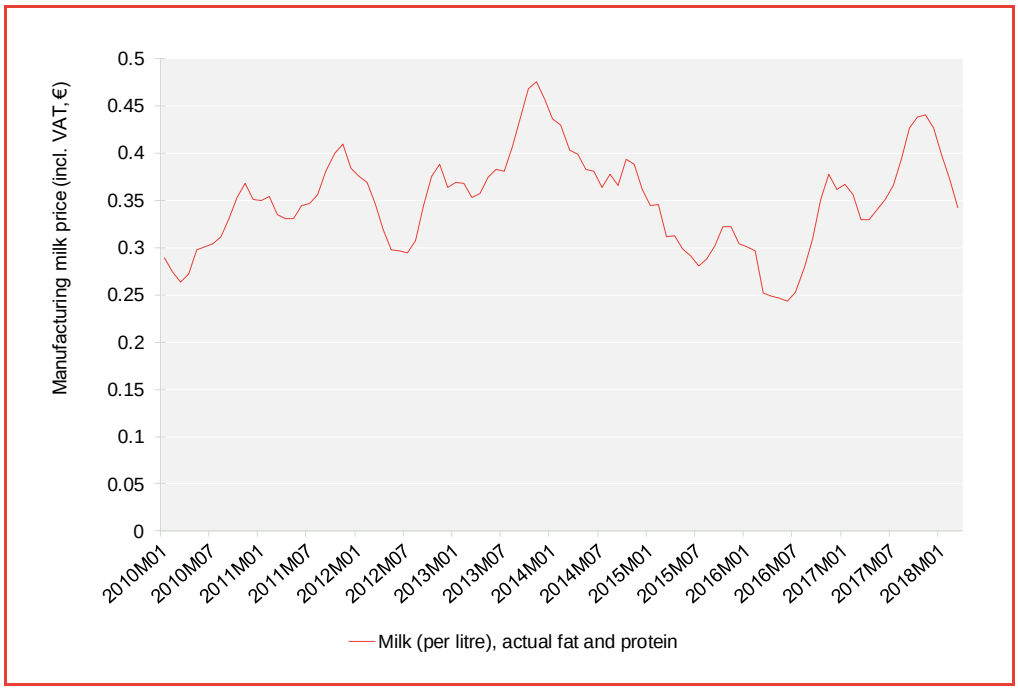
Figure 121: Intake of domestic cow's milk by creameries and pasteurisers in Ireland, 2010-2018



Source: Frontier analysis of CSO data

This seasonality is also reflected in the manufacturing milk price, which peaks in the winter months when production is lowest (Figure 122).

Figure 122: Ireland's manufacturing milk price, actual fat and protein, 2010-2018

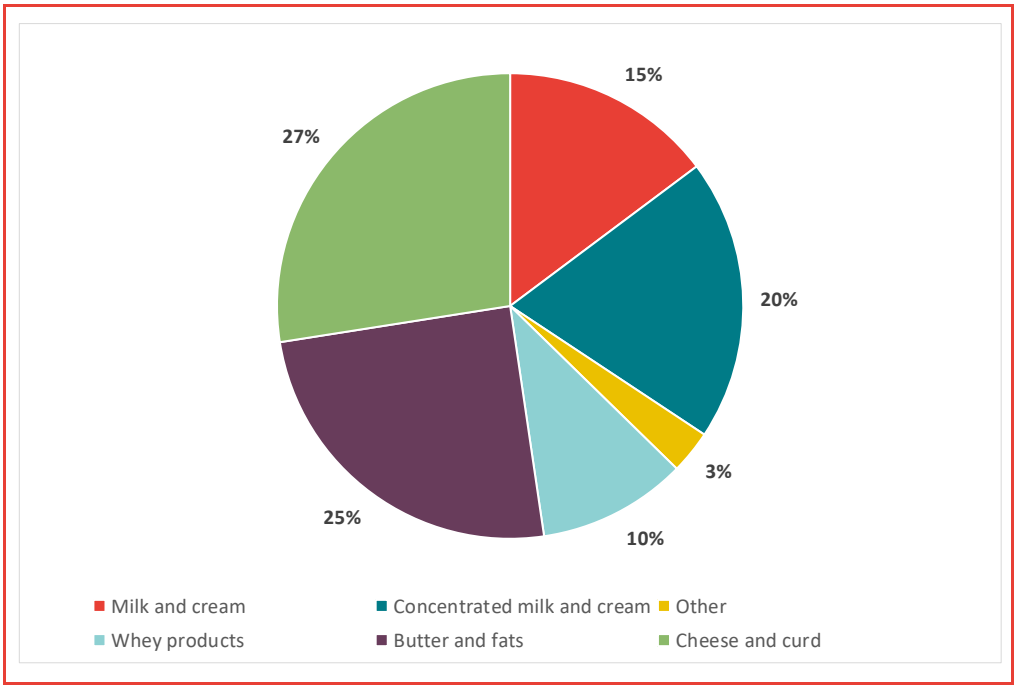


Source: Frontier analysis of CSO data

Exports

Over 90% of Ireland's dairy production is exported[151]. Dairy exports grew by 19% in 2017 to €4.02 billion (NZ$6.7 billion). Specialised nutritional powders, such as infant formula, are the leading dairy export with a value of €1.3 billion. Products such as cheese and butter also account for a significant proportion of exports, both with export values of around €850 million.

Figure 123: Proportion of Ireland's dairy exports by product type, 2017



Source: Frontier analysis of Comtrade data

Historically, Ireland's dairy product mix was based around serving EU markets and providing commodity outputs, in particular butter and cheese.[152] Over time, Ireland's dairy sector's product mix has become more diversified, with growth in higher value products, such as infant formula and nutritional products.[153] Ireland currently produces approximately 10% of the entire global exports of infant milk formula.[154]

The non-European Economic Area (non-EEA) market is becoming increasingly important for the Irish dairy sector. As seen in Figure 124 below, non-EEA

151 Bord Bia.

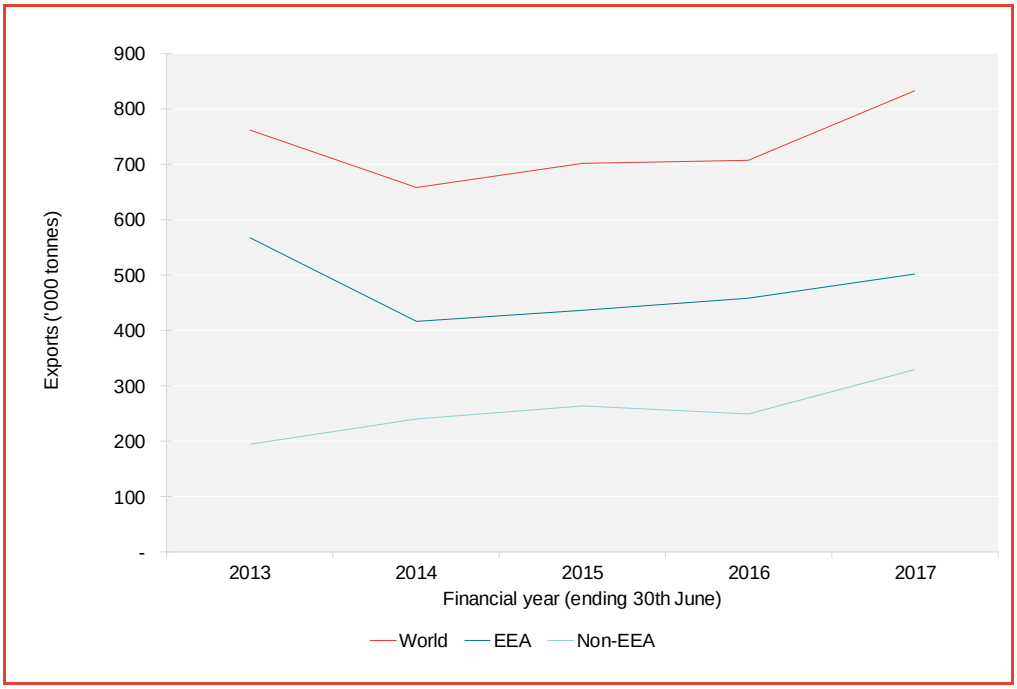
152 Department of Agriculture, Food and the Marine, (2015), Food Harvest 2025.

153 Department of Agriculture, Food and the Marine, (2015), Food Harvest 2025.

154 Enterprise Ireland website, Dairy and Ingredients, https://www.enterprise-ireland.com/en/Start-a-Business-in-Ireland/Food-Investment-from-Outside-Ireland/Key-Sectors/Dairy-and-Ingredients/, accessed 13 June 2018.

markets have driven total export growth in recent years. Exports to EEA markets in 2017 were 11% below their 2013 volumes. Exports to non-EEA countries, on the other hand, have increased by 69% from 2013 to 2017. This has led to an overall increase in Irish dairy exports of 9% over the period, despite the decline in the largest export market.

Figure 124: Irish dairy export volume by destination, 2013-2017



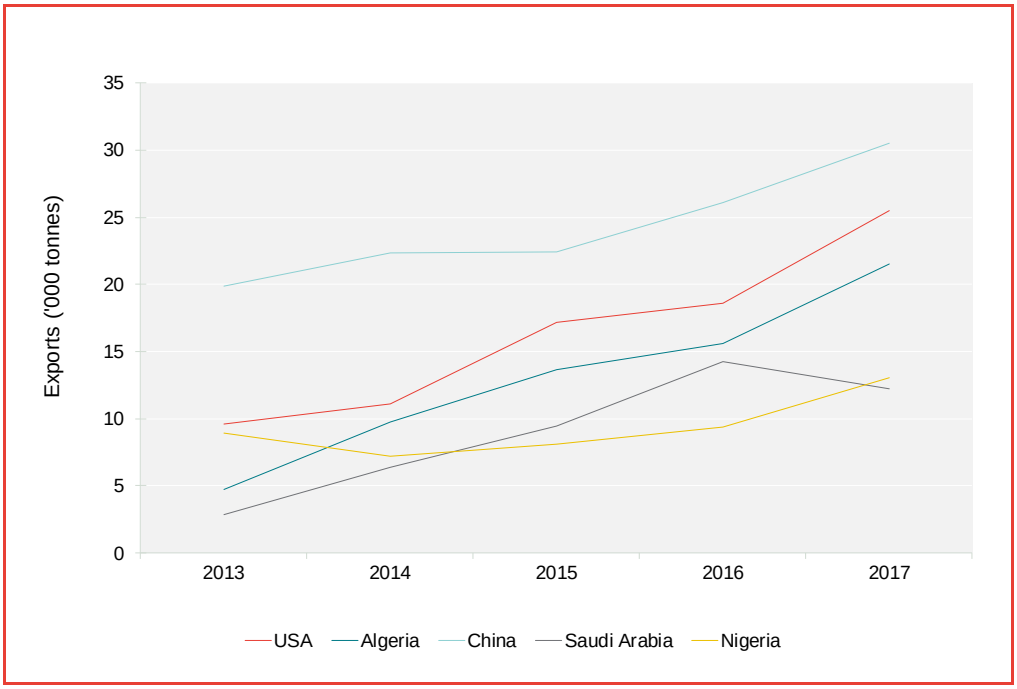
Source: Frontier analysis of Comtrade data

Export data show that there are five key countries which are driving growth in the non-EEA segment – China, the USA, Algeria, Nigeria, and Saudi Arabia – with the proportion of exports going to these five countries doubling from 2013 to 2017 (see Figure 125). Collectively, exports to these five countries experienced volume growth of 124% from 2013 to 2017, with individual market growth ranging from 45% in Nigeria to an exceptional 359% in Algeria (see Figure 126). More generally, the proportion of total dairy exports to non-EEA countries increased from 26% in 2013 to 39% in 2017.

Figure 125: Total dairy exports by destination, 2013-2017

Source: Frontier analysis of Comtrade data

Figure 126: Top five non-EEA export volumes, 2013-2017



Source: Frontier analysis of Comtrade data

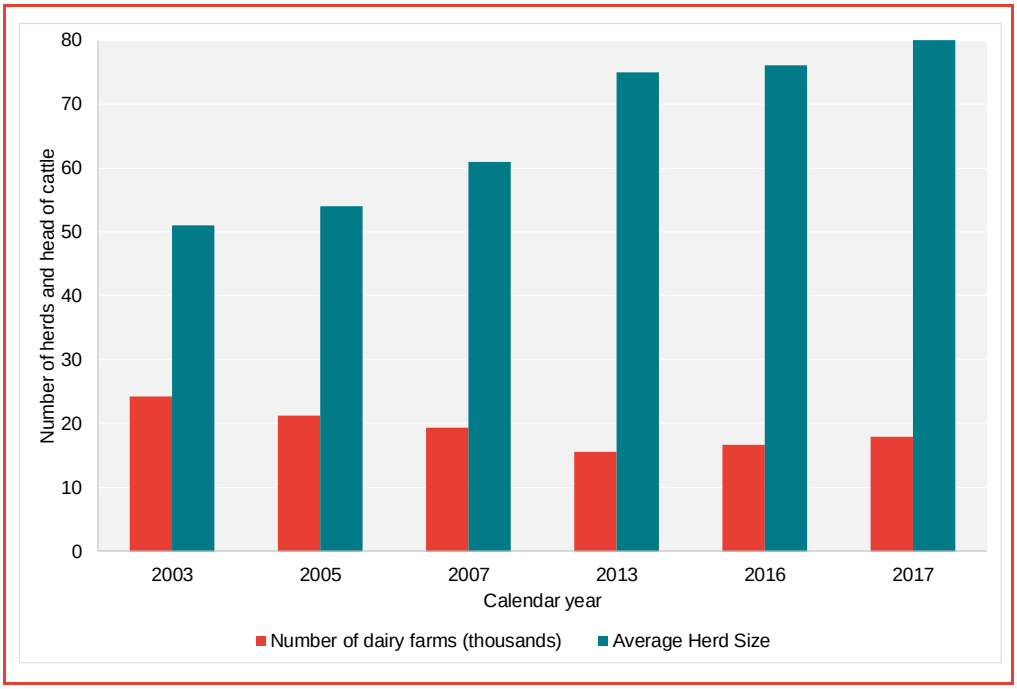
It is expected that as Irish dairy production continues to grow in the coming years, exports to non-EEA markets will become increasingly important to the Irish dairy sector.

8.3.2 Market structure of processing industry

Structure of Irish farmgate market

At the farmer level there has been ongoing consolidation as the average herd size has increased and the number of dairy farms has decreased over the last 15 years (see Figure 127 below). The average herd size has increased by 56.8% over the period since 2003, to 80 cows. In contrast, the number of dairy farms fell by 25.9% over the 10 years; a trend that has been reversed in the last two years, as the removal of milk quotas has led to an increase in the number of dairy farms.

Figure 127: Dairy farms and average dairy herd size in Ireland 2003-2017



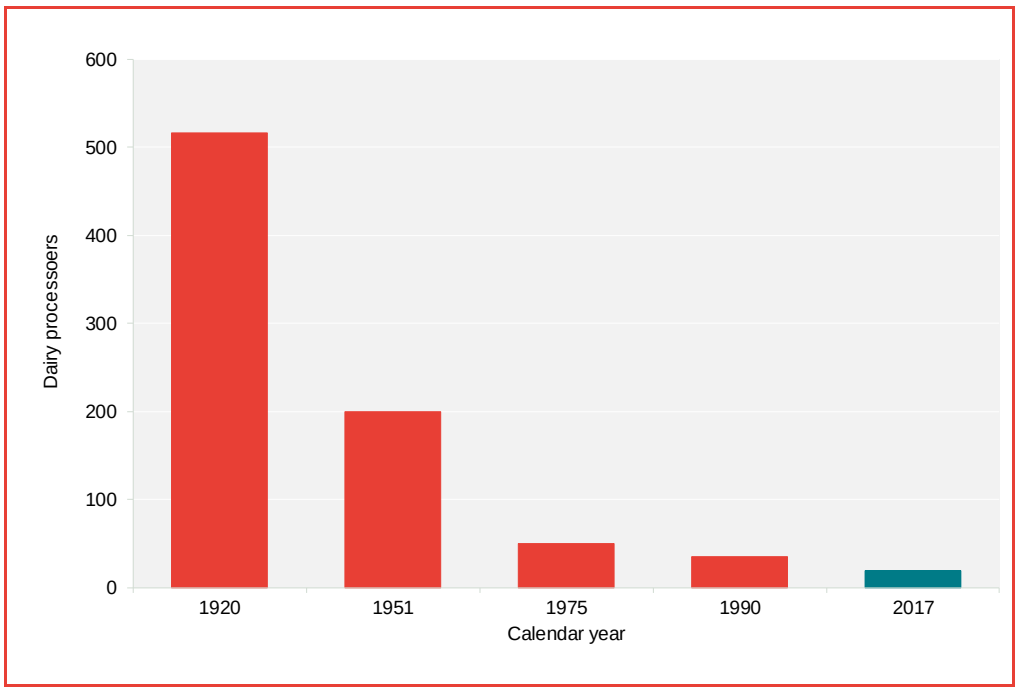
Source: Frontier analysis of Irish Central Statistics Office and Teagasc (Agriculture and Food Development Authority) data

At the processor level cooperatives have dominated historically, as a means to protect farmer incomes and increase bargaining power.[155] The cooperatives were predominantly regionally based, with the largest cooperatives in Ireland's key traditional dairying regions. Over time there has been significant rationalisation at

155 Breathnach, P. (2000), "The evolution of the spatial structure in the Irish dairy processing industry"

the processor level, driven by increased economies of scale (in part due to decreased cost of transportation over time), as shown in Figure 128. The history of this aggregation between the main dairy cooperatives in shown in Figure 129.[156]

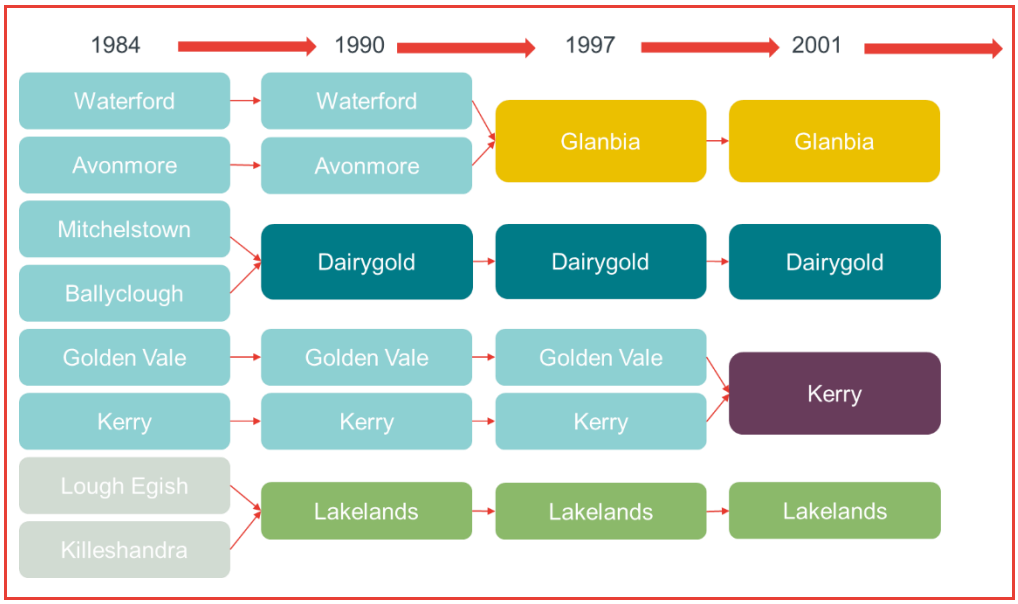
Figure 128: Number of Irish dairy processors over time



Source: Breathnach, P. (2000), The evolution of the spatial structure of the Irish dairy processing industry; Frontier analysis of Teagasc (Agriculture and Food Development Authority) data

156 Note there were numerous other smaller acquisitions in the processor, and related, markets that we have not shown in this simplified figure

Figure 129: History of key dairy cooperative amalgamations in Ireland since 1984

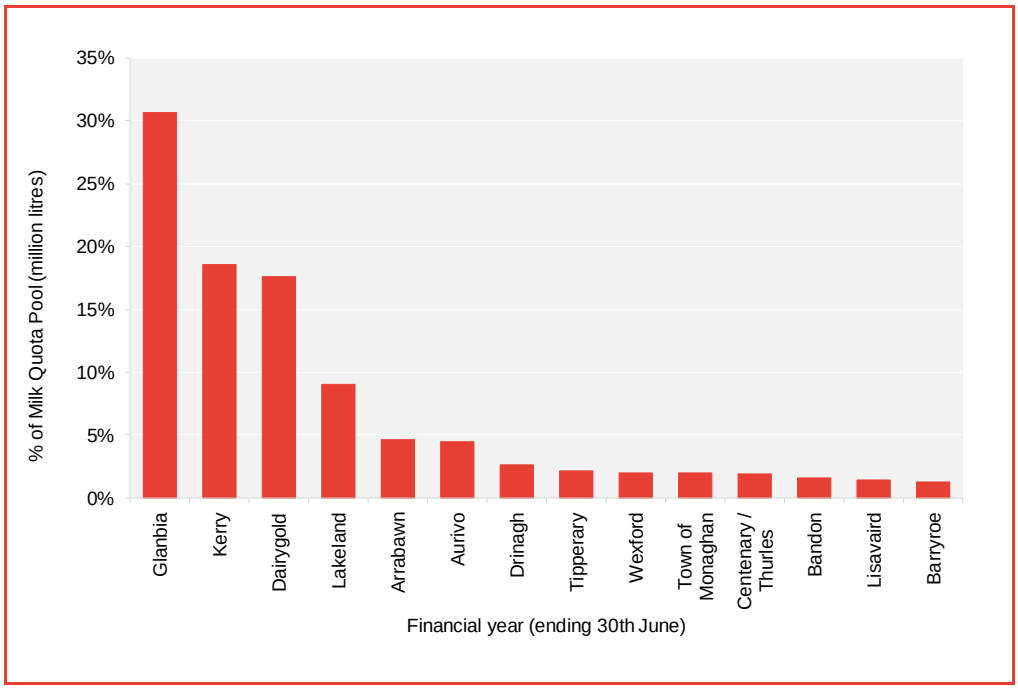


Source: Frontier Economics

Market share of processors

There are 19 cooperatives remaining in 2015, with the largest four cooperatives (Glanbia, Dairygold, Kerry Group, Lakelands) accounting for around three quarters of production volumes (see Figure 130 below).

Figure 130: Estimated processor market share based on 2014 Milk Quota allocation



Source: Frontier analysis of Teagasc (Agriculture and Food Development Authority) data

There has been substantial industry commentary over the last two decades about the need for further consolidation and the creation of a processor with a market share of around 70%. For example, in 2003 the Irish government and dairy processing sector published the "Prospectors Report" that set out a proposed strategic development plan for the Irish dairy processing sector.[157] Amongst other things, this report recommended that a need for a change in the industry configuration to create greater specialisation and scale in the production, and improve overall efficiency, which has not yet been pursued.

Ownership

As discussed above, the dairy processor sector is dominated by cooperatives, but there has been an increased use of external equity raised via the private stock market.[158] Kerry, Avonmore and Waterford (which merged to form Glanbia) were all listed on the stock market. The general model has been for the cooperative to retain ownership and control of the core primary processing business, and the private investment to be in a separate entity, which the cooperative also part owns. That separate entity then invests in potentially higher return (and higher risk areas), such as diversifying into different markets and moving up the value chain, as we discuss in the context of Kerry and Glanbia below.

While privatisation of parts of the dairy processing sector were justified on the basis of needing more capital to expand given the capital constraints of cooperative ownership, the majority of capital employed in expansion was from retained profits and increased borrowings.[159]

Ireland's primary dairy cooperatives remain in domestic ownership.[160] While there is no public data available on the degree of overseas ownership in the sector more generally, there does appear to be significant outside investment in:

- listed companies of Kerry and Glanbia; and
- downstream or secondary processing (for example, infant formula producers).

There is also significant investment from Irish dairy companies in overseas markets. For example, Kerry operates in the UK, the US, Germany, Italy, Poland,

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157 Prospectus Report, 2003, Strategic Development Plan for the Irish Dairy Industry Processing Sector. Commissioned by the Irish Department of Agriculture and Food, and Enterprise Ireland, in conjunction with the Irish Dairy Processing Sector.

158 Breathnach, P. (2000), "The evolution of the spatial structure in the Irish dairy processing industry"

159 Breathnach, P. (2000), "The evolution of the spatial structure in the Irish dairy processing industry"

160 Dairy Industry Ireland - Ibec website, https://www.dairyindustryireland.com/dairy-industry, accessed 13 June 2018.

Australia, Canada and Mexico. Ornua, the former Irish dairy Board, also has subsidiaries in Spain, Saudi Arabia, the UK and the US.

Degree of vertical integration

The Irish dairy sector has a mix of vertical integration models. The largest two processors, Kerry and Glanbia, are fully vertically integrated businesses. Both manage their own branding, international sales and investments in further processing and innovation. Both have raised significant investment in private equity markets.

Many other Irish cooperatives collect the milk and undertake primary processing, but export via Ornua. Ornua is Ireland's largest exporter of primary dairy products, exporting to about 110 countries.[161]

There are also numerous downstream processors that are not vertically integrated, but rather purchase their milk input requirements in the "factory gate" market. For example, three of the world's biggest infant nutrition companies have secondary processing facilities in Ireland – Abbott, Wyeth and Danone.[162] These companies do not collect milk directly from farmers, but rather contract with cooperatives to supply them with milk (or milk products) in wholesale markets.

It is notable that the Irish dairy processing sector includes firms specialised in upstream (i.e. milk collection and primary processing), downstream (i.e. secondary processing and branding/exporting) or both activities.

8.3.3 Innovation and value add

Figure 131 summaries the Irish dairy sector's key products markets and investment avenues. Historically, the EU CAP has had a significant impact on the Irish dairy sector, by:

- Providing full access to a protected market, with relatively high prices
- Imposing a milk quota which limited Ireland's ability to expand production and therefore serve other markets.

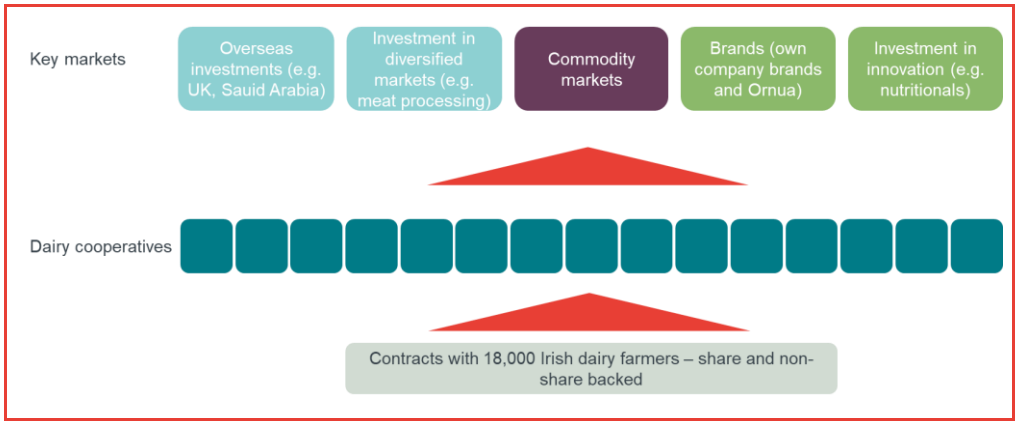
The historic inability to expand by increasing milk volume due to quotas has led to significant diversification in the Irish dairy sector. This diversification has been a combination of:

161 Ornua, 2017, Annual Report

162 Enterprise Ireland website, Dairy and Ingredients, https://www.enterprise-ireland.com/en/Start-a-Business-in-Ireland/Food-Investment-from-Outside-Ireland/Key-Sectors/Dairy-and-Ingredients/, accessed 13 June 2018.

- **Investment in product diversification:** For example, the Kerry Group invested heavily in meat and food processing, and these sectors now account for over half of the group's revenue.[163]
- **Investment in geographic diversification:** The Kerry Group began investing in the UK, the US, Germany, Italy, Poland, Australia, Canada and Mexico within a seven year span. The main focus of these acquisitions has been the food ingredients sector, which now accounts for over half of group turnover, making Kerry a major world player in the industry.[164]

Figure 131: Key markets



Source: Frontier Economics

There has been significant investment made in developing brands. In particular, as discussed above, Ornua exports on behalf of a number of Irish dairy cooperatives, therefore providing for economics of scale in branded products. Kerrygold is now considered to be Ireland's first €1billion dairy brand.

Other dairy companies invested directly in their own fast-moving consumer goods brands. For example, Kerry developed Cheesestrings in the 1990s – a children's cheese snack – which has grown to be a brand with a value of more than €100m per annum.[165]

There has also been significant investment made by Irish dairy processors in innovation to move up the value chain. The Kerry Group and Glanbia are two useful case studies in this regard (see Box 5 and 6).

Box 5: Kerry Group

The Kerry Group is a food company headquartered in Ireland. It employs 24,000 people and currently trades at a market capitalisation of €15.8bn. Figure 1 presents a breakdown of the

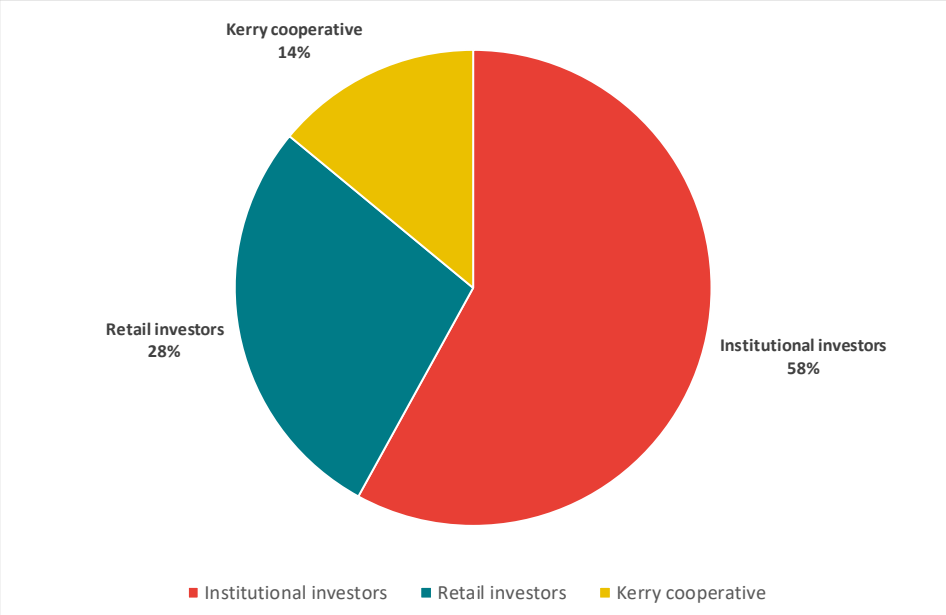
163 Breathnach, P. (2000), "The evolution of the spatial structure in the Irish dairy processing industry"

164 Breathnach, P. (2000), "The evolution of the spatial structure in the Irish dairy processing industry"

165 Irish Times, 12 December 2017, "Mr Cheestrings: 'We went from nothing to €100m in 20 years'"

group's ownership structure, by investor type. Initially fully owned by a co-operative of farmers, the cooperative share has since declined to 14%.

Figure 132: Kerry Group ownership structure



The group has exhibited stable growth across revenue, EBITDA, profit and earnings per share (EPS) for the past 5 years.

Table 12: Kerry Group Key performance indicators (€ million)

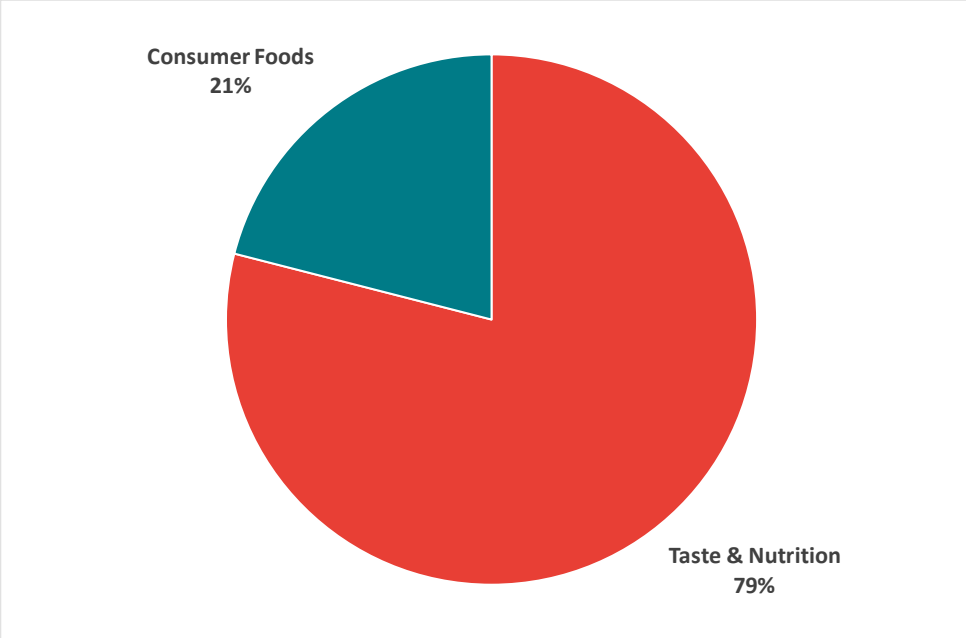
Business KPIs	2013	2014	2015	2016	2017
Revenue	5836.7	5756.6	6104.9	6130.6	6407.9
EBIT	583.3	608.4	662.7	703.2	733.4
Profit (net of taxation)	84.4	479.9	525.4	533.1	588.5
EPS (cent)	257.9	278.9	301.9	323.4	341.2
Total assets	5209.6	5967.8	7013	7421.9	7400.2
Return on assets	11.2%	10.2%	9.4%	9.5%	9.9%

Source: Annual reports

Initially a dairy producer, Kerry Group has expanded into a wide variety of markets across the consumer staples sector, including meat, meals, cereal, snacks, bakery, confectionary, beverages and pharma. Kerry divide its revenue into two segments – taste/nutrition and consumer foods. Figure 133 provides a breakdown of the group's revenue across these two business segments, with the taste/nutrition segment generating €5.2bn in revenue in 2017, and the consumer foods segment generating €1.33bn. Kerry Group has also diversified its

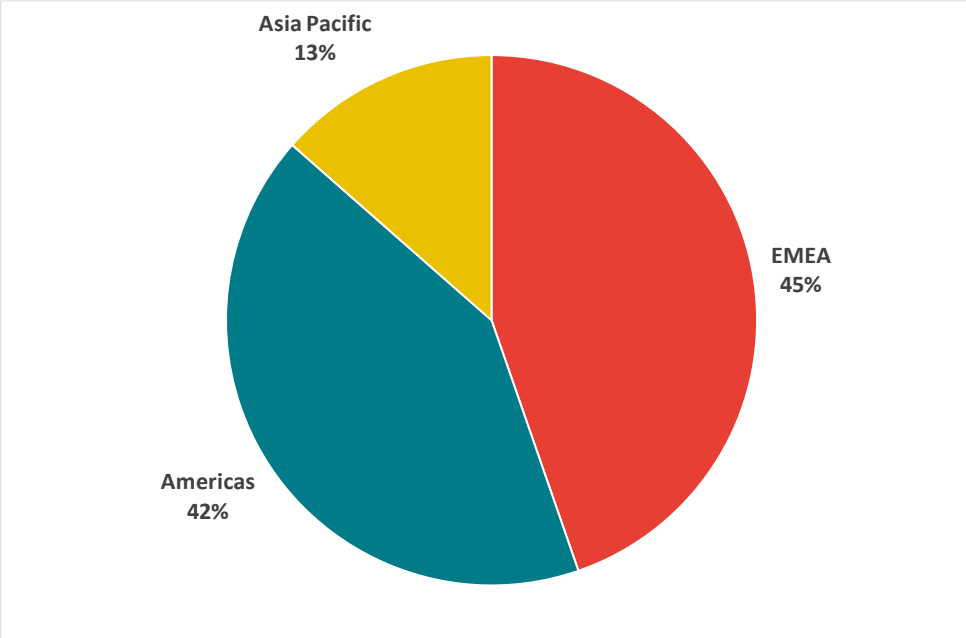
revenues geographically – Figure 134 contains an illustration of how taste/nutrition revenues are broken down across the three broad geographic regions in which Kerry Group operates.

Figure 133: Kerry Group revenue by business segments



Source: Kerry Group Annual Report

Figure 134: Kerry Group taste/nutrition revenue by geography



Source: Kerry Group Annual Report

These product and geographic diversifications are the result of Kerry Group's expansive investment and acquisition program. Since July 2000, the company has completed 62 acquisitions across a range of food product categories. For illustrative purposes, details on a selection of these acquisitions are presented in Table 13.

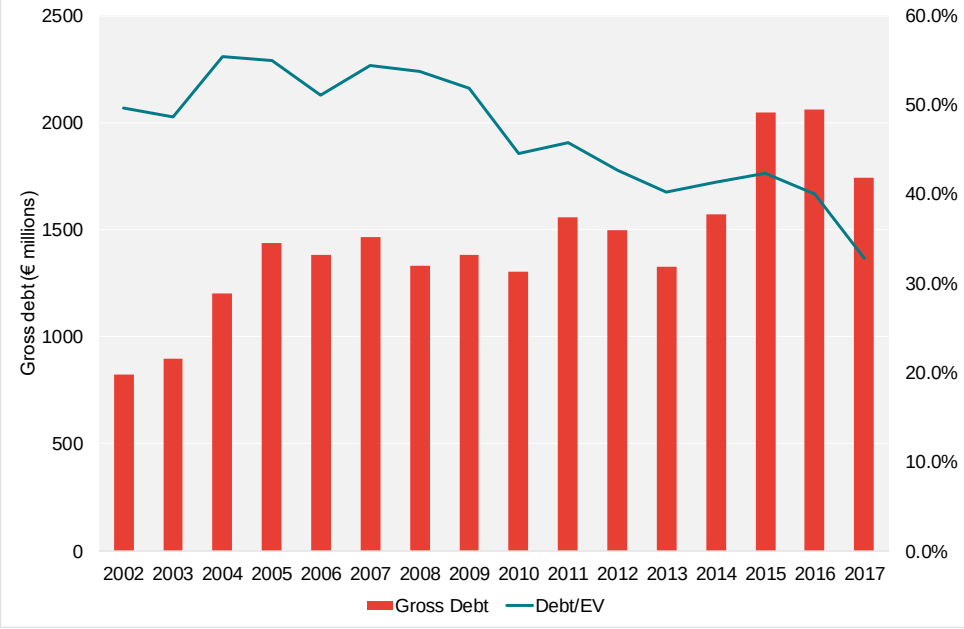
Table 13: Kerry Group selected acquisition history

Target	Product category	Date	Cost
Quest Food Ingredients Group		Mar-04	$440m
Noon Products	Indian/Thai ready meals	Aug-05	£124m
Cargill Flavour Systems	Food flavourings	Sep-11	$230m
Rollover	Hotdogs	Feb-15	
Ganedea	Probiotic ingredients	Aug-17	
Hasenosa	Taste and nutrition	Apr-18	

Source: Annual reports

Kerry Group's debt ratio has decreased over the last 10 years to 33%, primarily driven by an increase in equity value over time.

Figure 135: Kerry Group debt ratio over time



Box 6: Glanbia

Glanbia is a global nutrition group headquartered in Ireland. Glanbia was the name given to the Avonmore Waterford Group (AWG) – an Irish food and dairy company, which had previously grown out of a merger of two large dairy co-operatives – in a change of corporate identity in 1999. It operates in 32 countries, employs a staff of 6,200, and trades at a market capitalisation of €4.75bn. It specialises in sports nutrition, cheese and dairy ingredients.

Its ownership structure is summarised in Figure 136 below. Similar to Kerry Group, farmers own shares in the cooperative, and the cooperative then partially owns the larger group, alongside external investors.

Figure 136: Glanbia ownership structure

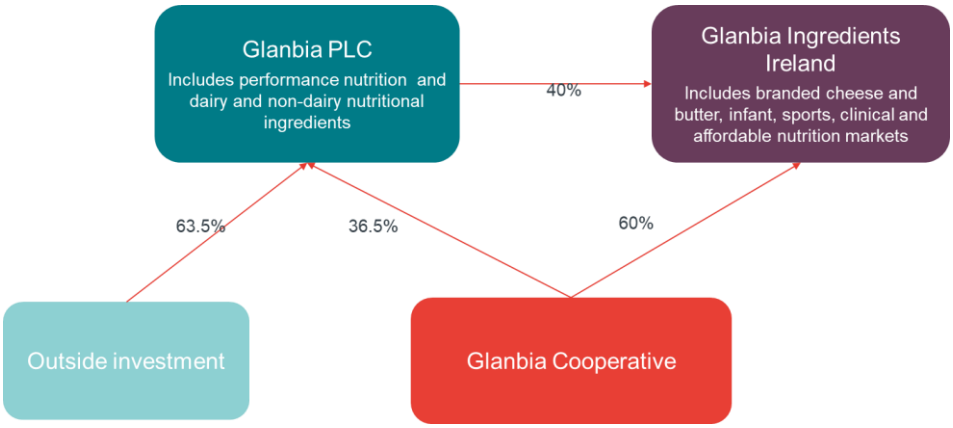


Table 14 contains six of Glanbia's key performance indicators, over a five-year period, demonstrating relatively consistent performance.

Table 14: Glanbia's key performance indicators (€ million)

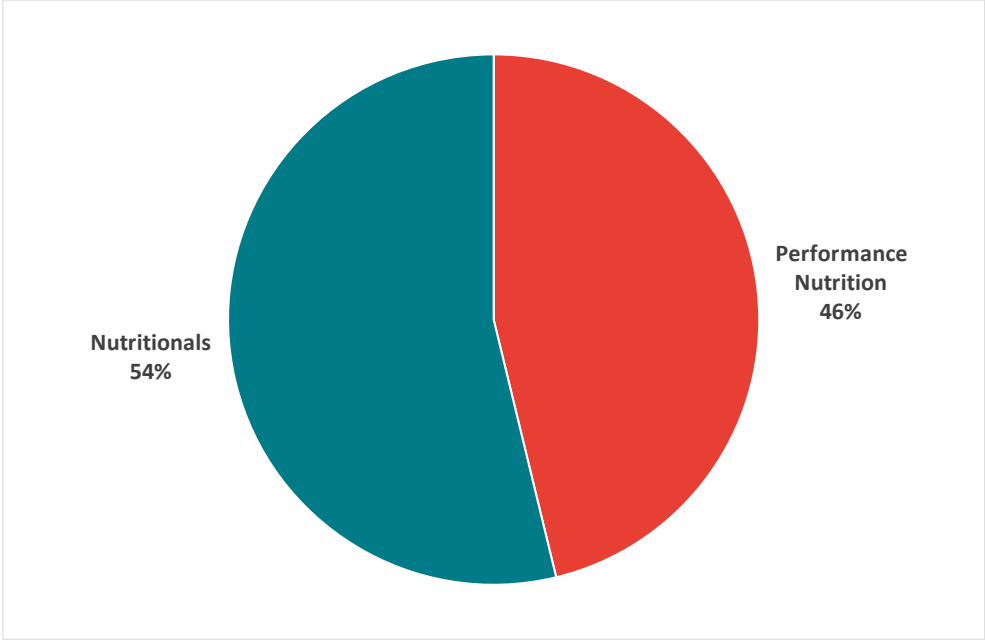
	2013	2014	2015	2016	2017
Revenue	2382.1	2538.3	2774.3	2231.7	2387.1
EBIT	172.5	170.2	213.5	221.5	215.2
Profit (net of taxation, pre-exceptionals)	145.5	161.3	207.7	226.9	231.4
EPS (cent)	50.66	49.32	61.87	80.4	87.11
Total assets	1692.9	2106.1	2651	2708.7	2483
Return on assets	10.2%	8.1%	8.1%	8.2%	8.7%

Source: Annual reports

The firm generates its revenue from two primary business segments – Glanbia nutritionals, and Glanbia performance nutrition. The (2017) revenue breakdown across these two segments is illustrated in Figure 137. The Glanbia nutritionals segment is further broken down into nutritional solutions, which is a provider of customised nutrient premixes, advanced technology protein

solutions, and functional beverages (42% of Glanbia nutritionals revenue in 2017), and US cheese, which produces American style cheddar cheese (58%).

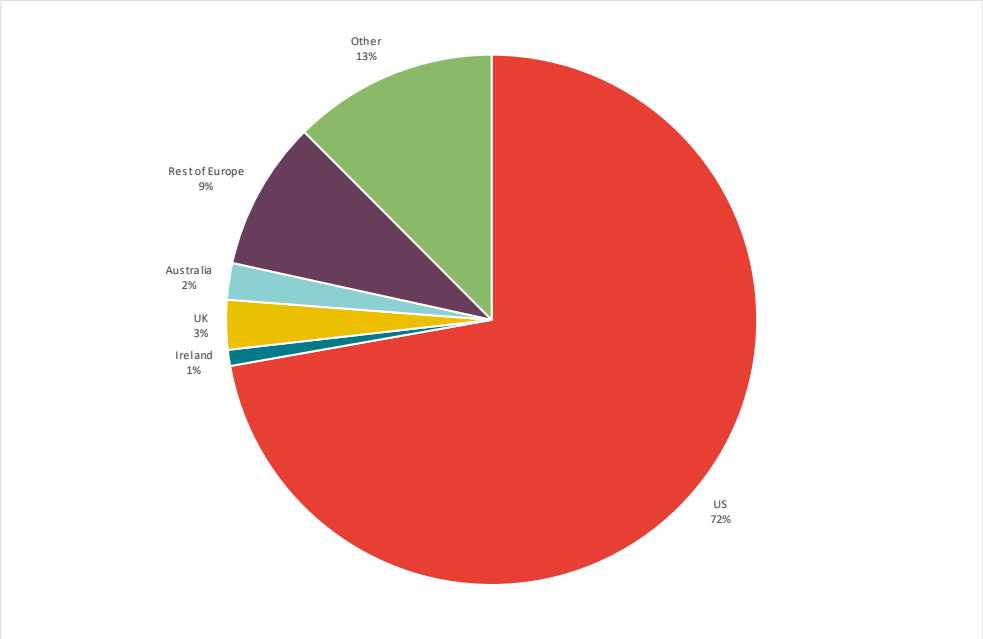
Figure 137: Glanbia business segments



Source: Glanbia Annual Report

Despite its origination in Ireland, Glanbia has diversified geographically to the extent only 1% of its 2017 revenue was earned in Ireland. The group's primary market is the US, which generated 72% of its 2017 revenues. Indeed, despite the fact that Glanbia reports in euros, 80% of its revenues are dollar-denominated. A full breakdown of Glanbia's geographical exposure is available in Figure 138.

Figure 138: Geographical breakdown of revenue



Source: Glanbia Annual Reports

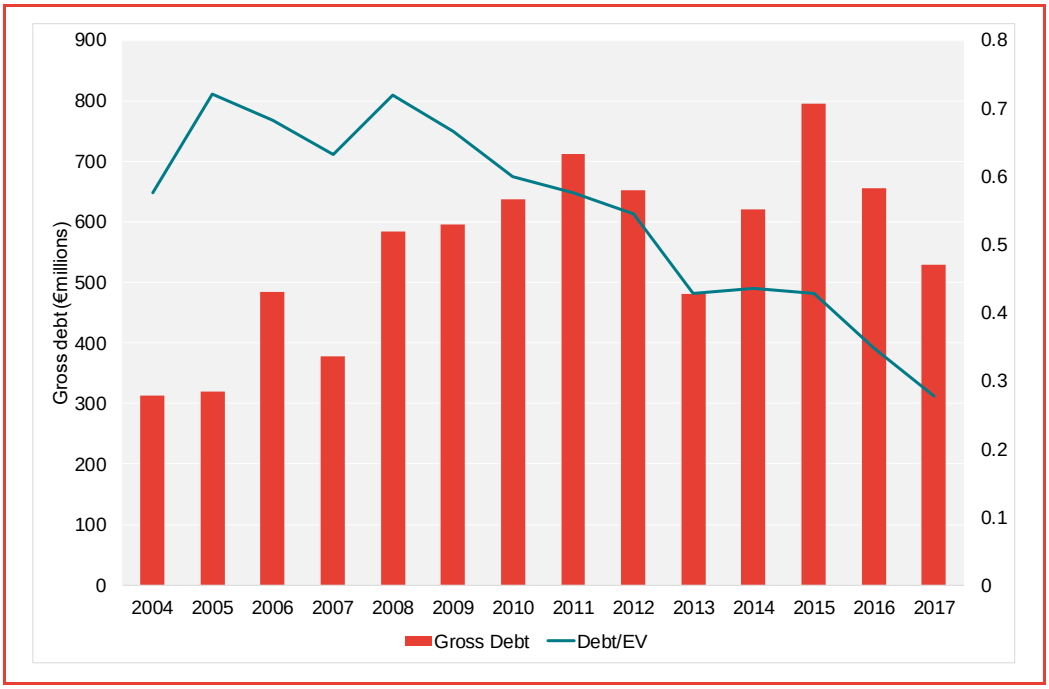
Glanbia expanded its international presence throughout the early part of the 21st century via international joint ventures, with firms such as Leprino Foods in the US and PZ Cussons in Nigeria. Glanbia initiated its move into the nutritionals food segment with the acquisition of German-based Kortus Food Ingredients Service (KFIS) in 2004. It continued in 2006 with the purchase of California-based micronutrient premixer Seltzer Companies, in 2007 with Canada-based nutritional business Pizzey's Milling, and in 2008 with Illinois-based sports supplement firm Optimum Nutrition. A number of Glanbia's more recent acquisitions are presented in Table 15.

Table 15: Glanbia's recent acquisition history

Target	Location	Product category	Date	Cost
Nutramino	Denmark	Sports nutrition	Jan-14	€20m
Isopure	US	Sports nutrition	Sep-14	$153m
thinkThin	US	Protein bars	Dec-15	$217m
Amazing Grass	US	Organic, plant-based nutrition	Jan-17	
Body & Fit	Netherlands	Sports nutrition	Mar-17	

Glanbia's debt ratio has decreased over the last 10 years to 28%, primarily driven by an increase in equity value over time similar to Kerry Group.

Figure 139: Glanbia's debt ratio over time

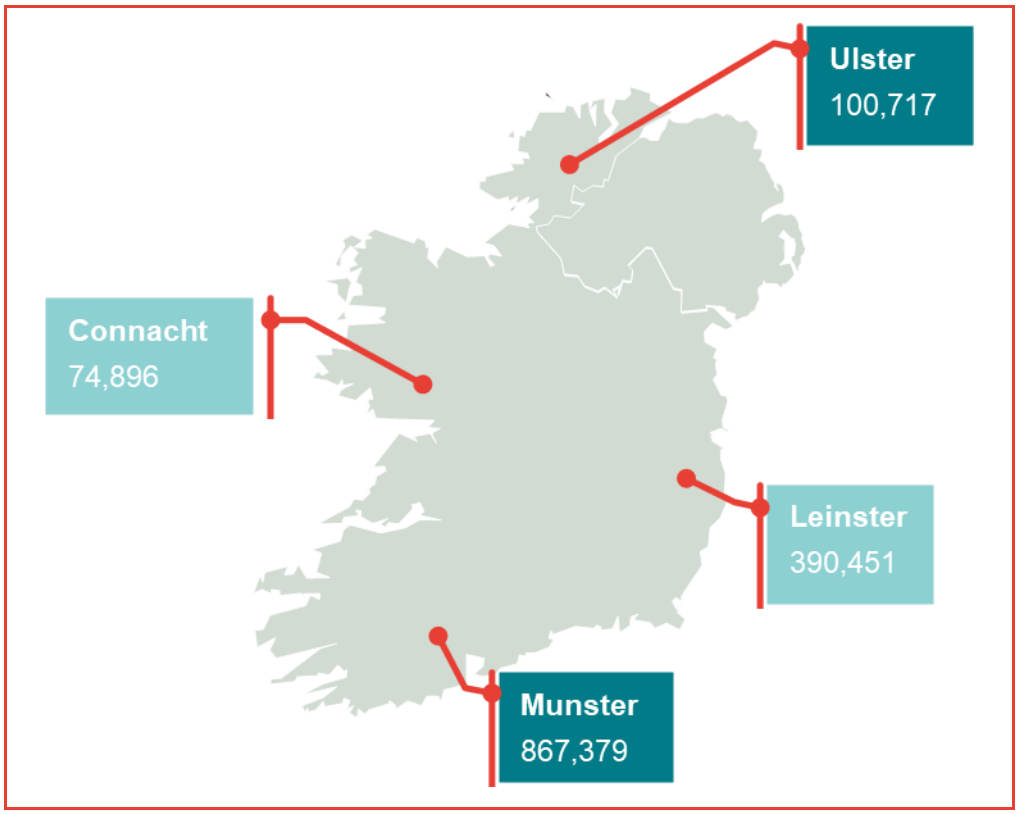


8.4 Environmental performance

8.4.1 Land use and intensification of farming

The Irish dairy industry has experienced major expansion since the EU milk quota system ended in April 2015, and is expected to continue growing in the coming years. As can be seen in Figure 140, the on-farm Irish dairy sector is concentrated in Munster and, to a lesser extent, Leinster.

Figure 140: Number of dairy cows by Irish provinces



Source: Irish Farmers Journal 2017

From 2013 to 2017, Ireland's milk production increased by 23% whilst EU 28 milk production increased by only 2.6%.[166] From 2010, the stock of dairy cows has grown from 995,800 to 1,343,300, and increase of 33% (see Figure 141).[167] From December 2016 to December 2017 alone, there was an increase in 3.7% of dairy cows.

Herd size has grown to be on average 80 cows, and the production per dairy farm is approximately 370,000L.[168] The top performing dairy herds have stocking rates of 2.5 cows per hectare, similar to New Zealand.[169]

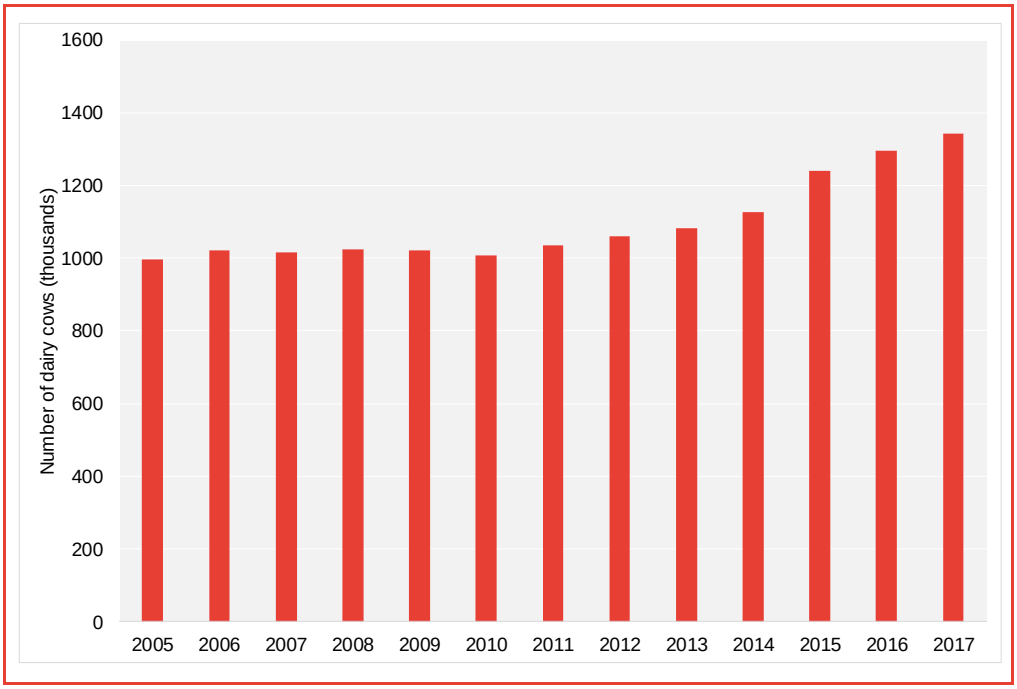
166 https://www.teagasc.ie/media/website/publications/2017/The-People-in-Dairy-Project.pdf

167 Irish CSO (Central Statistics Office), figures valid as of 2018

168 Irish Farmers Monthly, http://www.asaireland.ie/wp-content/uploads/2018/01/IFM-Agri-Review18-LoRes.pdf

169 Teagasc (Agriculture and Food Development Authority)

Figure 141: Total Number of Dairy Cows from 2005-2017



Source: Frontier analysis of Irish CSO (Central Statistics Office) data

Dairy cow numbers are predicted to increase to 1.6 million by 2025[170], while the EPA estimates that the beef herd will contract by 11% between 2020 and 2035 from 5.6 million to 4.9 million.[171] Much of dairy expansion anticipated for the near future will occur on existing dairy farms, replacing existing beef cattle herd. There is already a portion of land on most dairy farms that is either spare or is being used for non-dairy purposes. However, it is expected that after 2020, larger and higher stocked cattle farms may convert to dairy.[172] The farms that are most likely to consider moving into dairy are those with stocking rates of 1.4 LU/ha or higher and farms of at least 25 hectares – which amount to 21% of cattle farmland in the good/medium soil range and to 10% of all farmland with these soils.[173]

8.4.2 Run off and waterway impact

The government's target of increasing milk production by 50% by 2020 will increase nitrogen and phosphorus use in areas where concentrations of these

170 Teagasc, 2018, Profitability

171 Irish Cooperative Organisation Society

172 Geoghegan and O'Donoghue (2014), Drivers and Scenarios of Land Use Change in Ireland, Teagasc

173 Geoghegan and O'Donoghue (2014), Drivers and Scenarios of Land Use Change in Ireland, Teagasc

chemicals in water is already quite high.[174] Regulations have been put in place to limit chemical leakage into rivers as dairy farming expands, for example:

- The 2003 **Water Framework Directive** was established to coordinate existing water legislation. This requires river basin management districts to be established in each member state. Eight River Basin Districts have been established in Ireland, each of which has a management plan which contains standards for measurements of water (such as biological and chemical status) which must be reached within a specific time period.[175]
- The **River Basin Management Plan** for Ireland 2018-2021, outlines the measures the state and other sectors will take to improve water quality in Ireland over the next four years. Along with the plan, there will be a new Agricultural Sustainability Support & Advisory Programme, a partnership between the state and dairy industry. Advisors will work with farmers to promote best practice across the dairy sector in 190 specific "areas for action".[176]
- A new national river basin management plan was created for the current period to the end of 2021. The EPA is assessing the impact of pressures, including agriculture, on water quality in bodies of water across the country at a local and sub catchment scale. Specific areas within catchments identified with a higher potential for nutrient and pollutant runoff into waters will be targeted for interventions to protect or improve water quality.[177]
- The **Nitrates Regulations** were brought into Ireland in 2006 and updated again in 2010 and 2014. These are in place to control diffuse and point source pollution from agriculture.[178]
- **CAP subsidy payments** to Irish farmers include payments tied to environmental outcomes. These payments include Greening Payments and the Green Low-Carbon Agri-Environment Scheme.[179]

Water quality in Ireland is relatively good when compared to other European countries. Over time, there have been improvements in water quality, but since 2007 the surface water quality has remained fairly stable. Of the pollution that does

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174 Department of Agriculture, Food and the Marine, July 2010; Food Harvest 2020 (FH2020); Ten-year strategy for the development of Irish agri-food, forestry and fisheries.

175 Pat Murphy, Catherine Keena, Tim Hyde, Mark Gibson for Teagasc (2016); Key Environment Issues for Dairy Farmers

176 AgriLand (2018); "River basin plan targets water quality improvements in dairy sector"

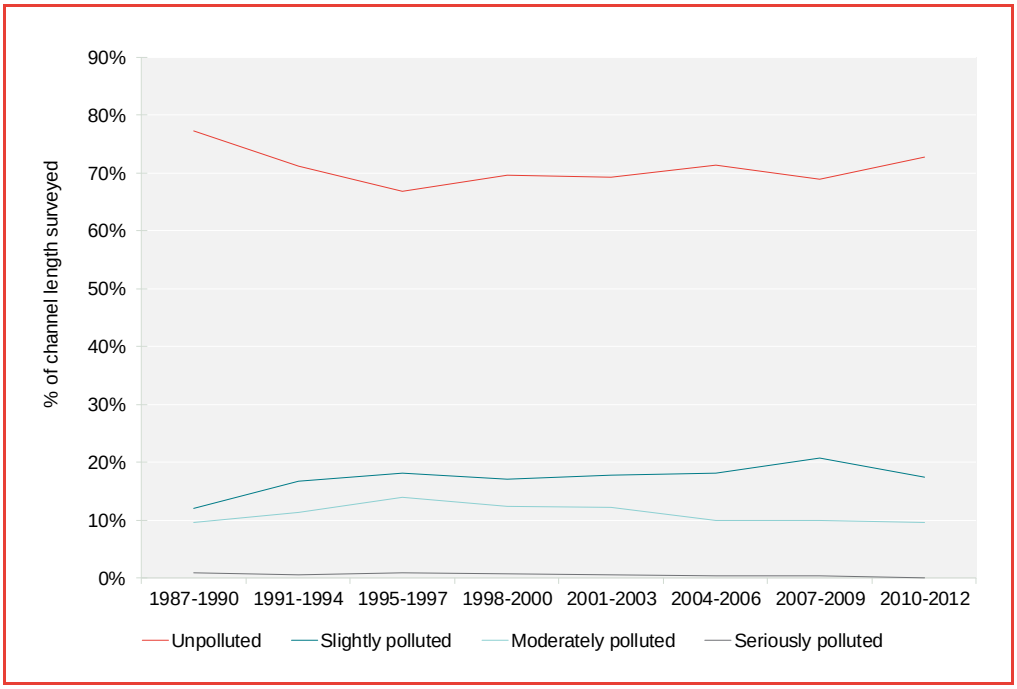
177 Irish Environmental Protection Agency (EPA) (2016); Ireland's Environment: An Assessment

178 Department of Agriculture, Food and the Marine; Nitrates Regulations (S.I. 31 of 2014).

179 We discuss this scheme in more detail in the emissions section further below.

exist in Ireland's waterways, agriculture is the suspected cause for over 50% of that in rivers, although this is not broken down further to show the impact of dairying.[180]

Figure 142: River Water Quality 1987-2012

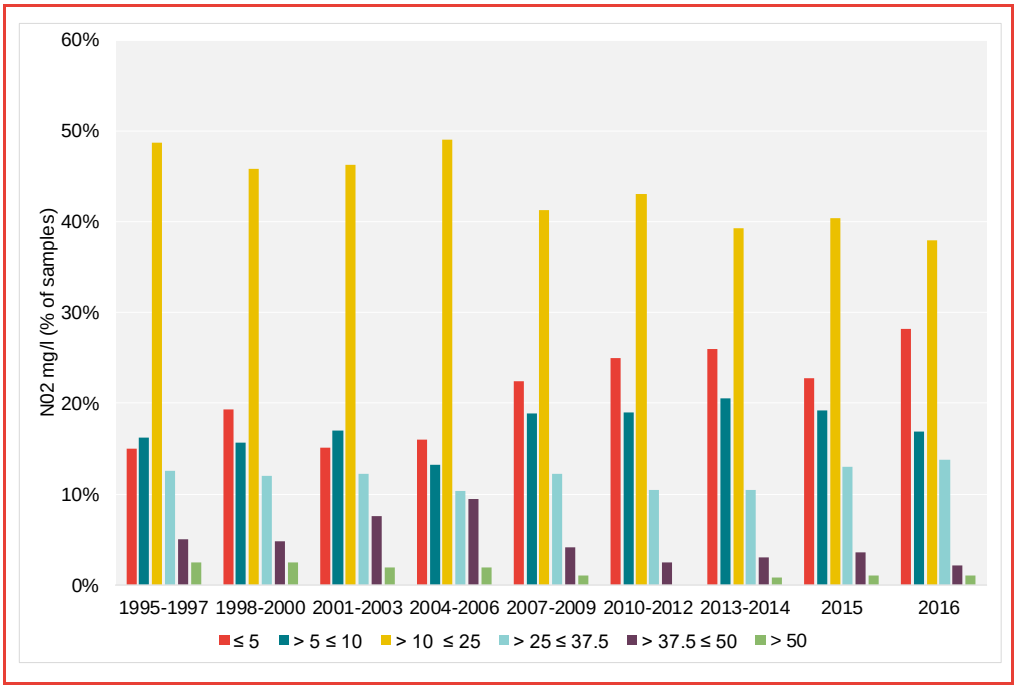


Source Frontier analysis of Irish Environmental Protection Agency (EPA) data

As shown in Figure 143, the proportion of unpolluted river water in Ireland fell from 77% in 1987-1990 to 69% in 2007-2009, and rose again to 73% in 2010-2012. The percentage of slightly polluted water has risen slowly since 1987 from 12% to 18% in 2010-2012. The percentage of moderately polluted water has fallen over time, while seriously polluted water remained at approximately 1% during 1987-2012.

180 Irish Environmental Protection Agency (EPA) (2016); Ireland's Environment: An Assessment

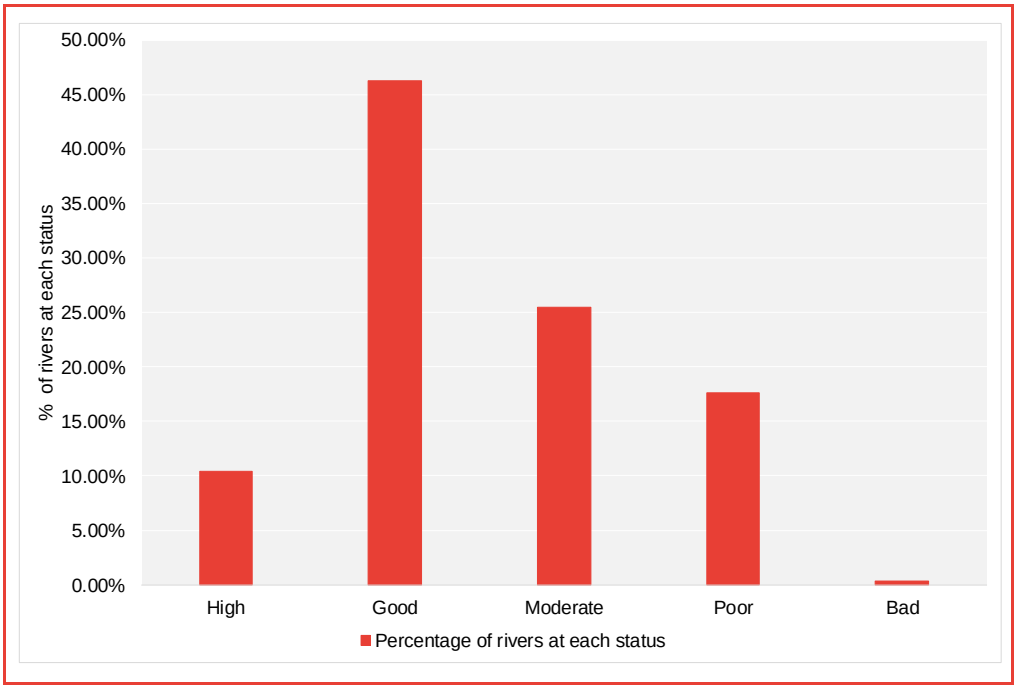
Figure 143: Nitrates in groundwater 1995-2014



Source: Frontier analysis of Irish Environmental Protection Agency (EPA) data

As seen in Figure 144 groundwater quality in Ireland improved between 1996 and 2016, as measured by the amount of nitrates detected by monitoring stations. The proportion of samples with more than 10 mg/l of nitrates decreased from 70% in 19961997 to 54% in 2013-2014.

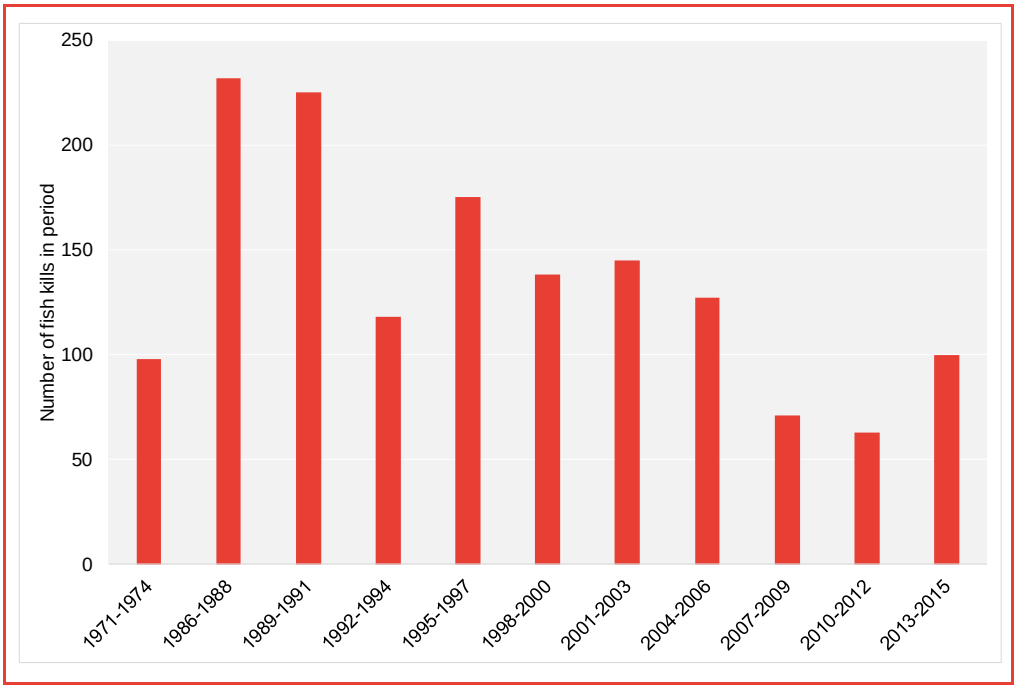
Figure 144: Ecological status of rivers in Ireland from 2010-2015



Source: Frontier analysis of Irish Environmental Protection Agency (EPA) data

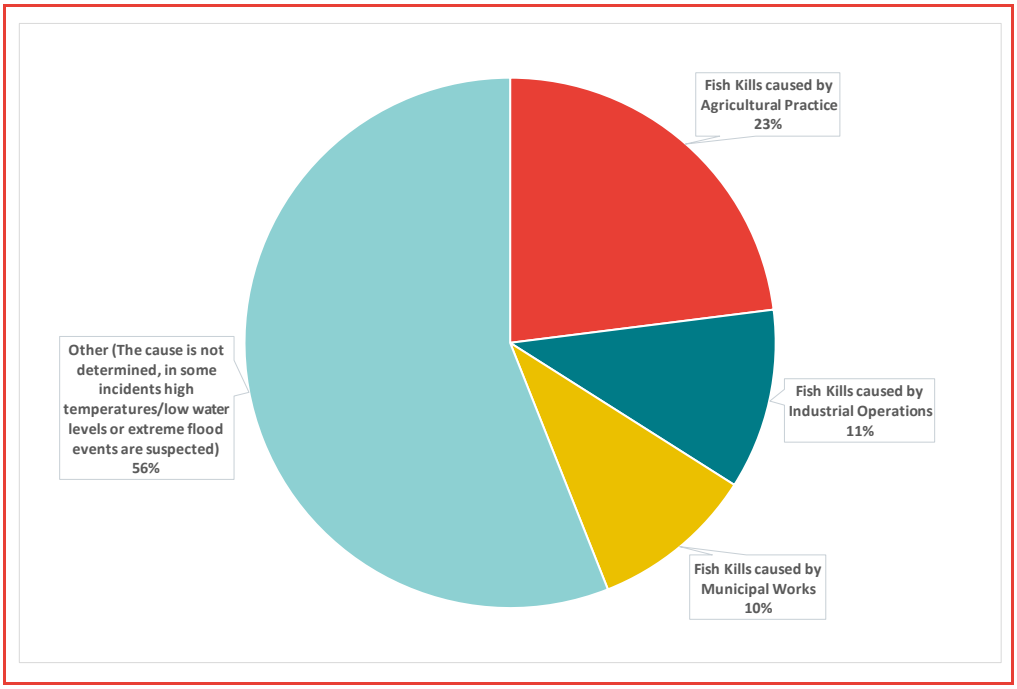
The number of reported fish kills, another measure of assessing the quality of water, has been relatively low and stable in recent years (Figure 145). Where it is possible, Ireland's Inland Fishers attribute fish kills to separate categories – but most of the time, they are caused by multiple factors and cannot be attributed to one influence. The second biggest cause (behind undetermined) is agricultural practices, at 23% as shown by Figure 146.

Figure 145: Number of reported fish kills since 1971



Source: Frontier analysis of data available from Inland Fisheries Ireland

Figure 146: Suspected causes of fish kills 2013-2015



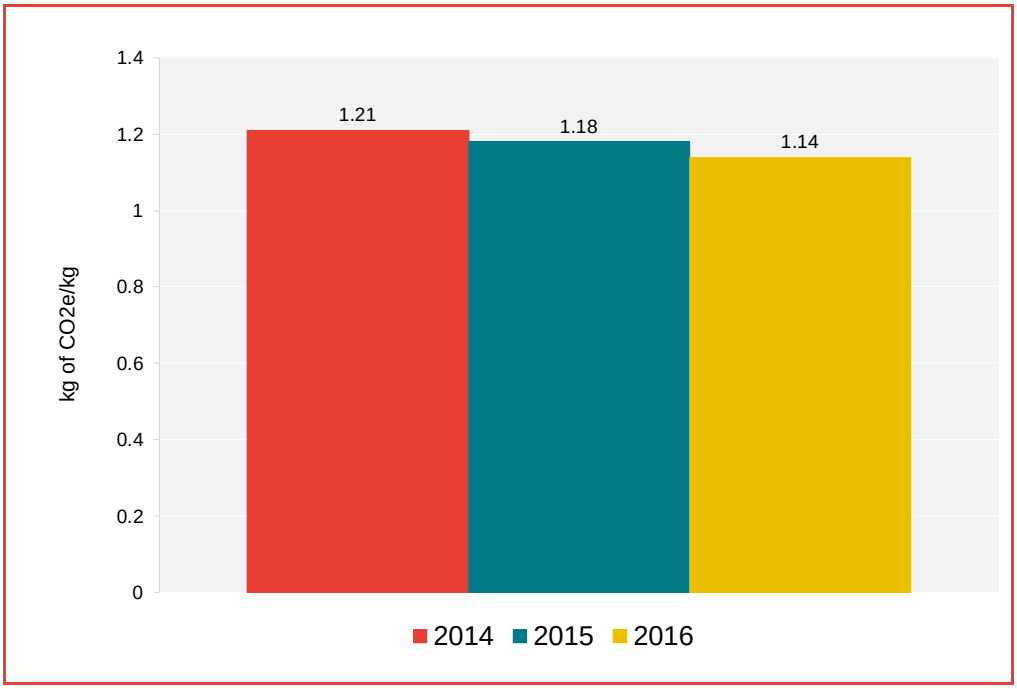
Source: Frontier analysis of data available from Inland Fisheries Ireland

8.4.3 Emissions

Agriculture is a large proportion of greenhouse gas emissions in Ireland. According to Ireland's Environmental Protection Agency, the large number of dairy cows and increased milk production in the post quota era has been the most significant driver in the growth of agricultural emissions in the last few years.

Achieving the government's targets of increased dairy production may lead to an increase of 7% in greenhouse gas emissions compared with 2010 levels.[181] As illustrated in Figure 147 there has been a consistent downward trend in the average emissions on Irish dairy farms since carbon assessments were initiated across dairy farms in Ireland in 2012. The carbon footprint of fat and protein corrected milk has reduced from 1.21kg CO2e/kg in 2014 to 1.14kg in 2016.

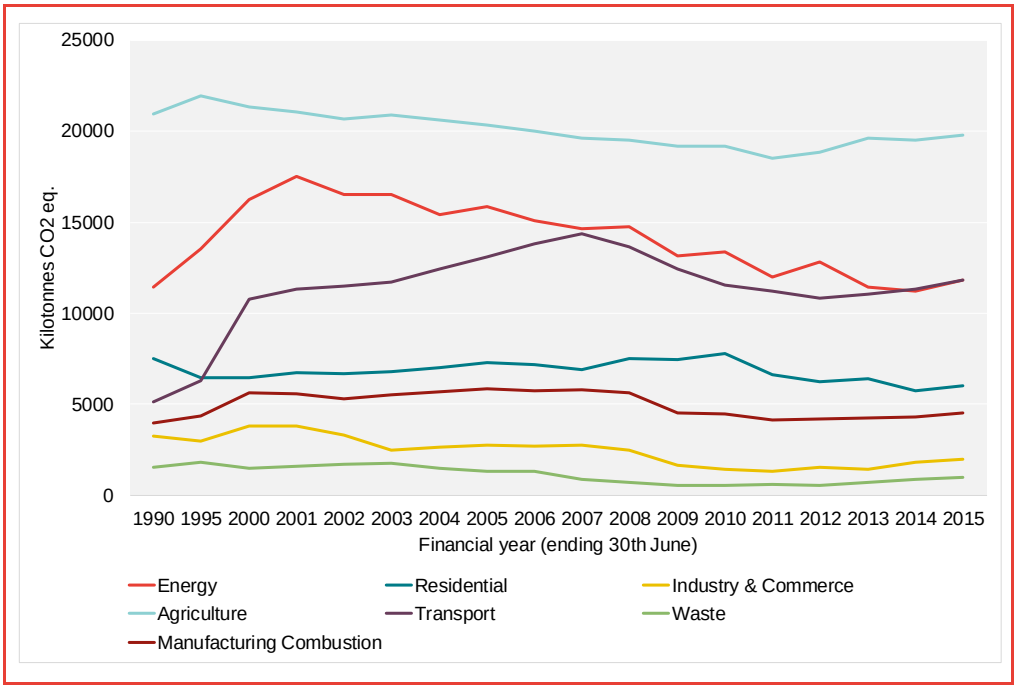
Figure 147: Average carbon-dioxide-equivalent footprint on Irish dairy farms 2014-2016



Source: Irish Cooperative Organisation Society

[181] Teagasc Dairy Manual (2016), page 164.

Figure 148: Greenhouse gas emissions by sector 1990-2015



Source: Frontier analysis of Irish Environmental Protection Agency (EPA) data

There are a number of government and industry initiatives in place to mitigate future agricultural emissions (see Table 16).

Table 16: Initiatives to manage agricultural greenhouse gas emissions in Ireland

Initiatives	Detail
Smart Farming	• Programme led by the IFA with the EPA, an initiative which focuses on ways to reduce costs within farms while also continuing to protect the environment through better resource management. • During 2014, over 600 farmers across the country participated and members were able to save an average of 6,600 euro per farm. • Carbon Navigator tool: developed by Teagasc with Bord Bia, which assists farmers in quantifying their GHG status with a focus on actions that can be taken to achieve improvements.[182]

[182] Further details in Teagasc's publicly available handbook at https://www.teagasc.ie/media/website/about/our-organisation/Bord-Bia-Dairy-Carbon-Navigator-LR5.pdf

Initiatives	Detail
Food Wise 2025 Environmental Sustainability Committee	• Established in 2016 to evaluate and assess the delivery of environmental sustainability and mitigation actions in the Food Wise Implementation Plan. • Food Wise 2025: Strategy that has been created for the development and sustainable growth in farm output – the strategy outlines several areas for growth in value added of the dairy sector.[183]
Sustainable Dairy Assurance Scheme	• Developed to assist in securing new and existing markets for Irish dairy produce as farmers look to increase milk production after the quota era. Ensures the dairy industry's environmental performance at a national scale is measured.[184]
The Green Low-Carbon Agri-Environment Scheme (GLAS)	• GLAS provides payments for those who carry out actions to enhance the rural environment. • GLAS offers a max payment of €5,000 per year to those committed to carrying out a plan of actions. Some farmers undertaking particularly challenging actions may qualify for GLAS+ which provides a top up of up to €2,000 per year. • Farmers must commit for a minimum of five years.

8.5 Consumer outcomes

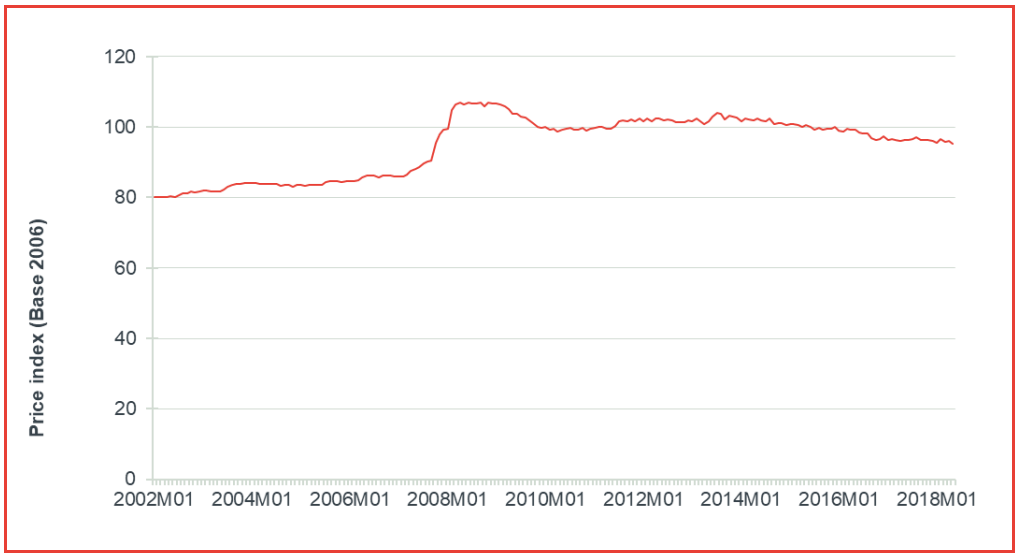
The Irish dairy retail index[185] increased significantly in 2007, but since then has been relatively flat to declining, as can be seen in Figure 149. The price index is now 11% below its peak in 2008.

183 Further details available at https://www.agriculture.gov.ie/media/migration/foodindustrydevelopmenttrademarkets/agri-foodandtheeconomy/foodwise2025/report/FoodWise2025.pdf

184 Further details available at the dedicated page on Bord Bia's website at https://www.bordbia.ie/industry/farmers/quality/pages/sustainabledairyassurancescheme.aspx

185 A bundle of milk, cheese and eggs.

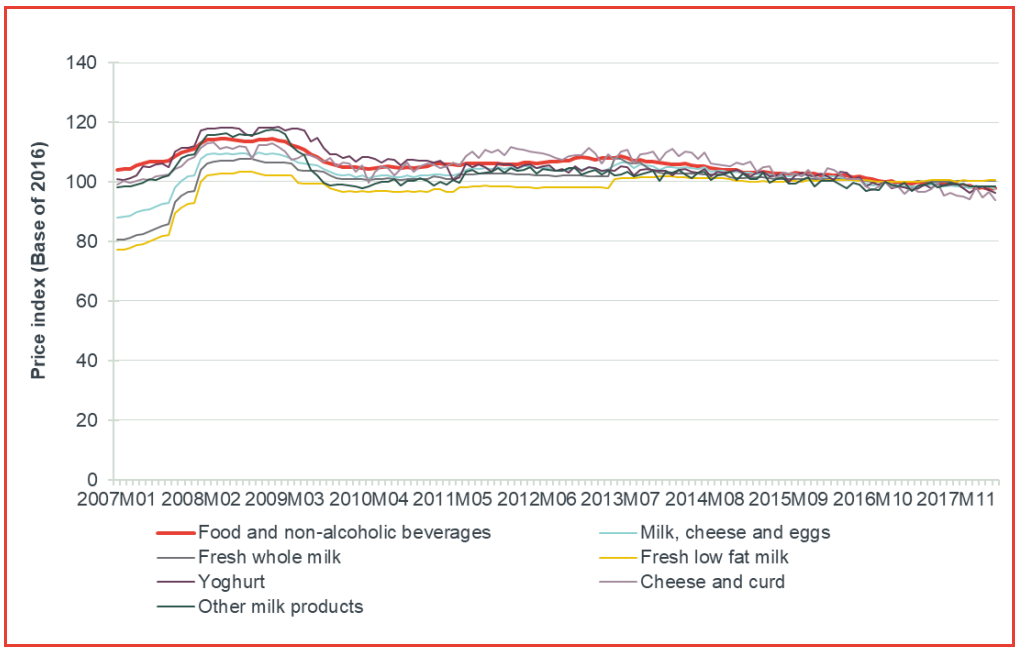
Figure 149: Irish dairy retail price index



Source: Frontier analysis of Irish CSO (Central Statistics Office) data

A similar story emerges when we look at individual dairy product prices – as can be seen in Figure 150 below. Dairy product prices are correlated with the general food and non-alcoholic drink price index, which peaked in 2008, and has been declining since 2013.

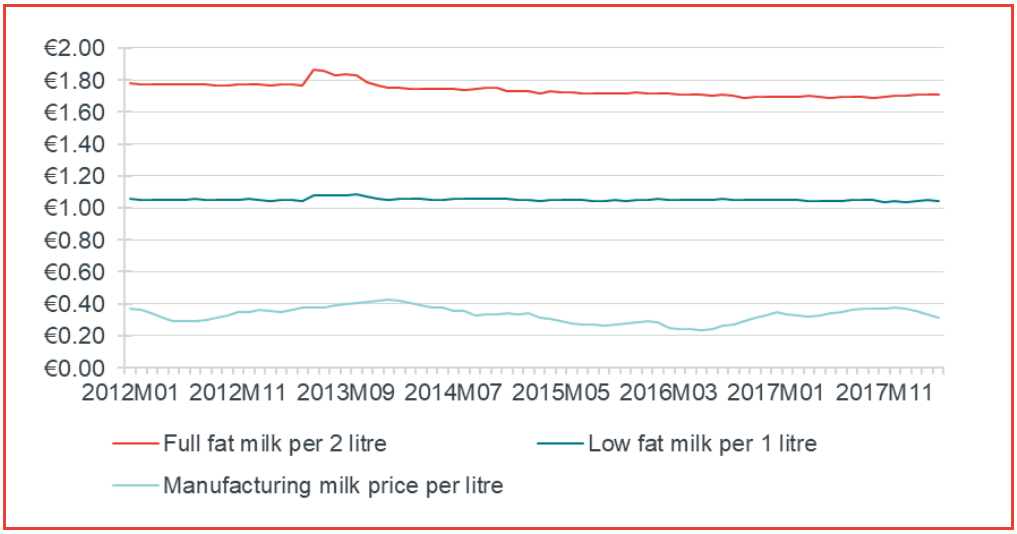
Figure 150: Price index by dairy product



Source: Frontier analysis of Irish CSO (Central Statistics Office) data

Irish milk retail prices have declined slightly over the last five years,[186] as can be seen in Figure 151. On the other hand, Irish manufacturing prices of milk over the same time have been much more volatile – fluctuating between €0.21 and €0.42.

Figure 151: Retail prices in Ireland over time



Source: Frontier analysis of Irish CSO (Central Statistics Office) data

8.6 Social performance

Farming in Ireland remains predominantly a family-owned business. The average farm size is 35 hectares and the average dairy herd is about 80 cows. A significant amount of farming income is derived from subsidies – up to 75%, although less in dairying.[187] That funding comes via the EU, rather than directly from the Irish Exchequer. Therefore, there is potential less public resistance to subsidies than if they were funded directly from Irish taxes (although Ireland is a net contributor to other overall EU budget). As discussed earlier, subsidies are also targeted at environmental performance, which may therefore alleviate some of the environmental pressures that arise due to increased agricultural and dairying activity.

The economic benefits from agriculture are spread throughout the regions. For example, Figure 152 below shows that agriculture accounts for about 6% of total employment in Ireland. However, in most regions except for Dublin and the mid-East (which includes the commuter belt around Dublin), the proportion for employment in agriculture is higher – up to 11.5% in the border region. This

186 Public data are not available before 2012.

187 Teagasc, Agriculture in Ireland, website: https://www.teagasc.ie/rural-economy/rural-economy/agri-food-business/agriculture-in-ireland/

indicates that these regional economies are likely to benefit from the continued expansion of agriculture – including dairying – whereas more recent economic growth in Ireland has been focused in and around Dublin.

Irish milk retail prices have generally increased with the price of other staples, and declined slightly over the last five years. Taken together, the scope for the dairy industry to contribute to growth at a regional level, the continued access to EU subsidies, and the relatively stable environmental performance and retail price outcomes means Irish dairy sector has not attracted a high degree of scrutiny or criticism within Ireland.

Figure 152: Regional agricultural employment as proportion of total regional employment

Source: Frontier analysis of Irish CSO (Central Statistics Office) data

9 Appendix 3: Performance of New Zealand tourism sector

9.1 Overview

Key findings:

- In 2017, tourism directly contributed NZ$14.7 billion (or 5.9%) to New Zealand's total GDP, outstripping the NZ$6.7 billion contributed by New Zealand's dairy industry (including farming and processing).
- Total tourism expenditure in New Zealand in 2017 was about NZ$36 billion, which reflected growth of 91% over the period from 2001 to 2017, compared to NZ$16.6 billion value of the dairy sector in 2016 and 111% growth over the period 2001 to 2016.
- In 2017, Australia accounted for 26% of visitor arrivals. The next largest group was New Zealanders visiting New Zealand (14%), followed by China (10%) and the USA (8%). China, the USA and Australia are also New Zealand's three largest dairy export markets (at 25%, 6% and 6%, respectively in 2016).
- Visitors with Chinese passports have grown by 394% from 2005 to 2017. China also accounted for around 40% of the growth in New Zealand dairy exports over the period 2004 to 2017. Visitors with German, Canadian, American, NZ, and Australian citizenship have all risen by over 50% from 2005 to 2017.
- Expenditure per visitor has increased significantly. German visitors remain the highest spending, but the largest growth in visitor expenditure from 2011 to 2017 was in Canadian per visitor expenditure, growing by 185% over this six year period.
- Tourism New Zealand has been explicitly targeting higher spending visitors. Tourism New Zealand's marketing expenditure is just under 1% of total expenditure by international tourists in New Zealand.
- R&D also grew threefold from 2014 to 2016, to NZ$112 million, or 7% of reported business R&D in New Zealand, compared to the NZ$81 million invested by Fonterra in R&D in 2017.
- The large increase in international tourists has put significant strain on local infrastructure, leading to concerns about degradation of public lands and waterways. Similar concerns have been raised in relation to the expansion of the New Zealand dairy industry.
- Despite this, 96% of New Zealanders believe that tourism is good for New Zealand, likely reflecting its significant economic contribution.
- Excluding international air travel, the average price of key tourist products increased by 24% over the last 10 years while CPI increased by 17%. In contrast the price of dairy products has remained relatively constant in real terms over the last 10 years.

9.2 Economic performance

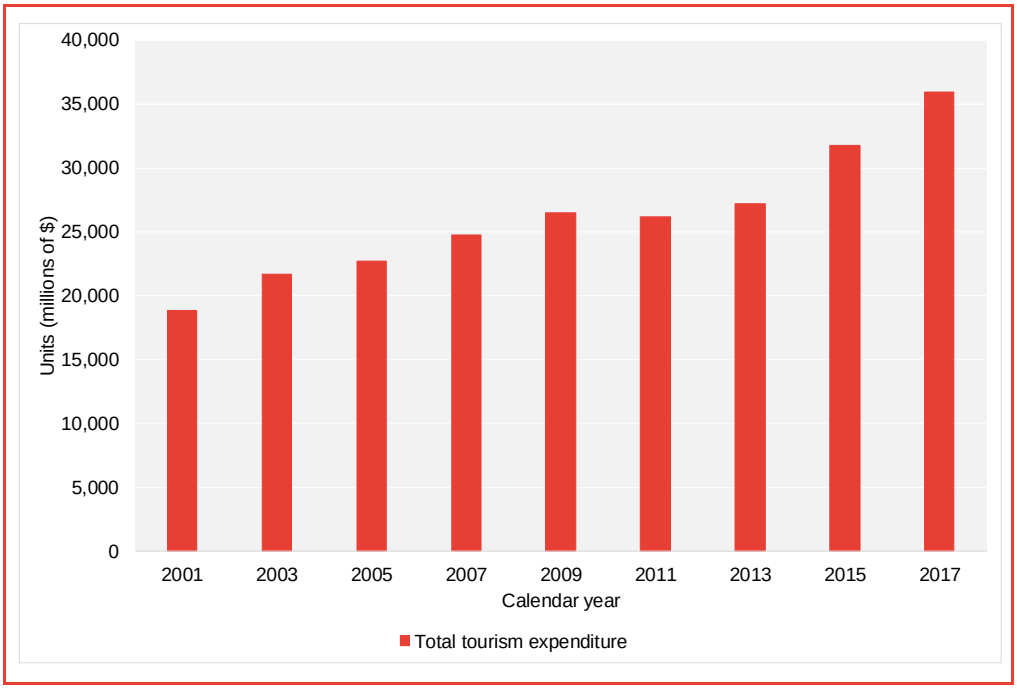
9.2.1 Value of sector

Output value

Tourism is a significant and growing component of New Zealand's economy. In 2017, tourism directly contributed NZ$ 14.7 billion (or 5.9%) to New Zealand's total GDP. Tourism is also estimated to have indirectly contributed a further NZ$ 11.3 billion (or 4.3%).

Total tourism expenditure in New Zealand in 2017 was about NZ$36 billion, which reflected growth of 91% over the period from 2001 to 2017 (Figure 153).

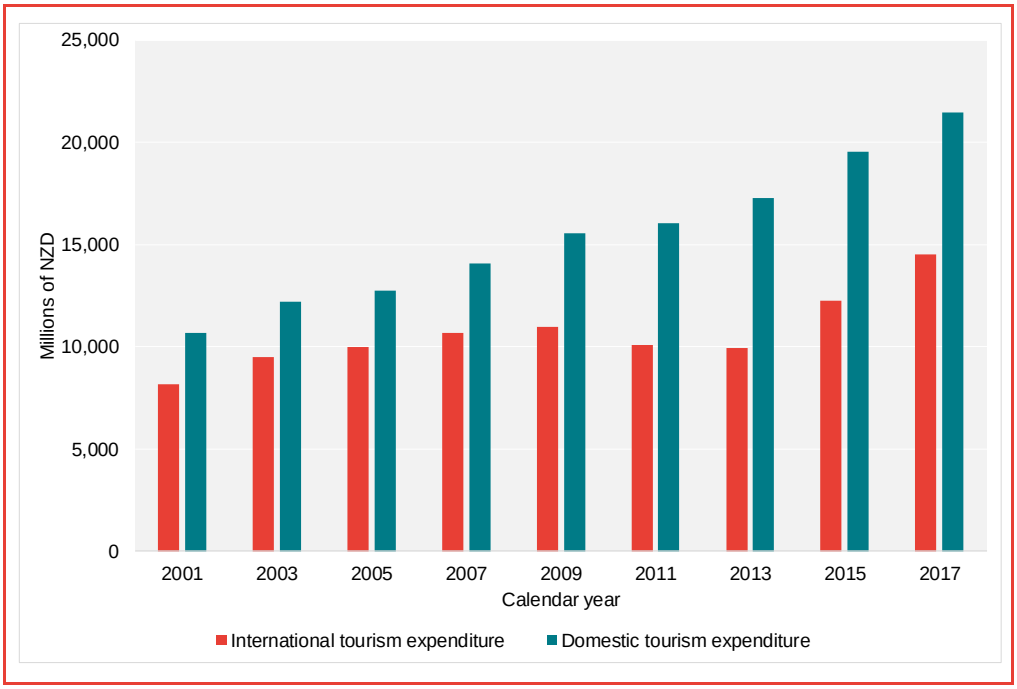
Figure 153: Expenditure in New Zealand tourism sector



Source: Frontier analysis of Tourism Satellite Account, Stats New Zealand data

This growth was a combination of increased domestic and international tourism. International tourist expenditure grew by 78% between 2001 and 2017, while domestic tourist expenditure grew by 101% (Figure 154).

Figure 154: Domestic and international expenditure in New Zealand tourism sector

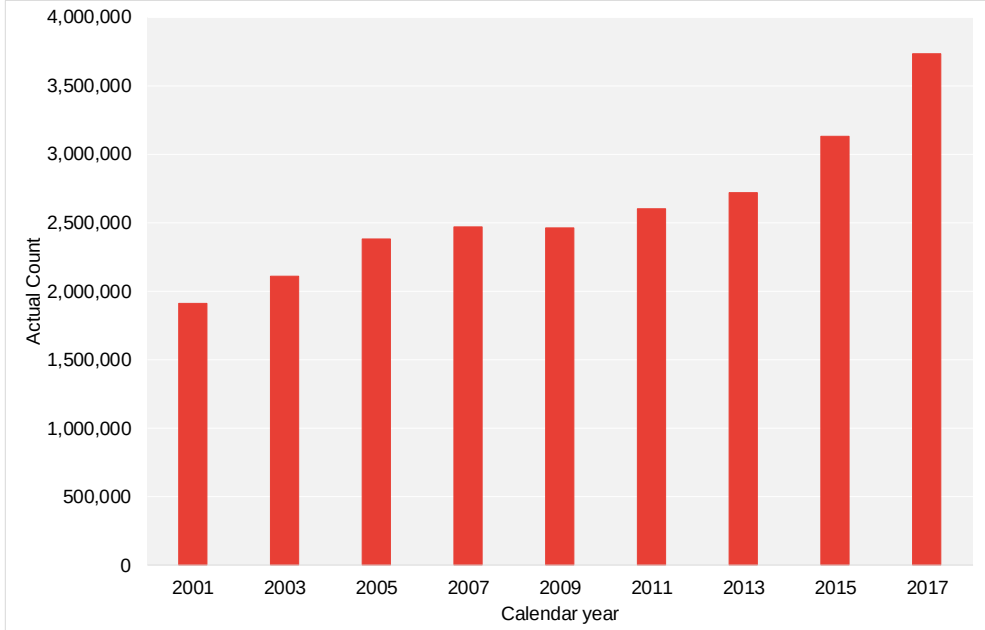


Source: Frontier analysis of Tourism Satellite Account, Stats New Zealand data

Growth in international visitors

Growth in the volume of international tourism can be partially measured by visitor arrivals. In 2017, 3.7 million visitors arrived in New Zealand. The total number of visitors arriving in New Zealand among all citizenships increased by 96% between 2001 and 2017. Between 2013 and 2017, visitor arrivals grew by over 1 million arrivals, or 37%. We discuss the key markets and the origins of this growth below.

Figure 155: Visitor arrivals to New Zealand in 2017



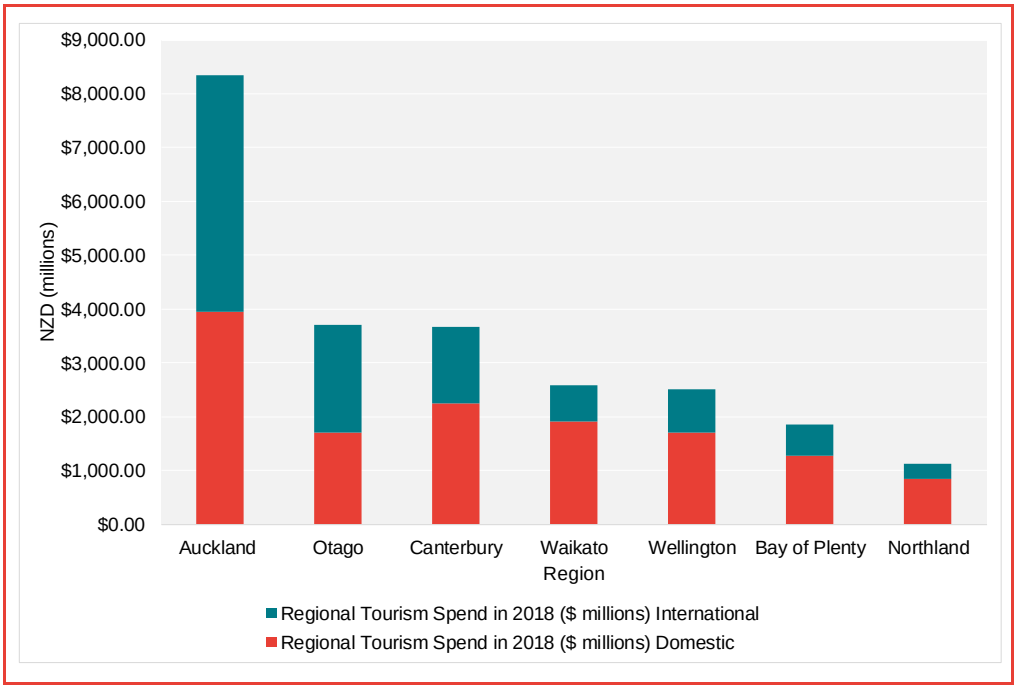
Source: Frontier Analysis of International Travel and Migration, Stats New Zealand data

Note: Visitor arrivals are overseas residents arriving in New Zealand for a stay of less than 12 months.

Tourism by region

An assessment of the regional economic impact of tourism is possible using expenditure and number of guest nights by region. Expenditure estimates are available for seven regions, which together account for an estimated 85% of tourism expenditure (Figure 156). Auckland accounts for both the largest share of domestic expenditure and the largest share of international expenditure. However, the data shows that expenditure is spread across numerous regions.

Figure 156: Tourism expenditure by region in New Zealand

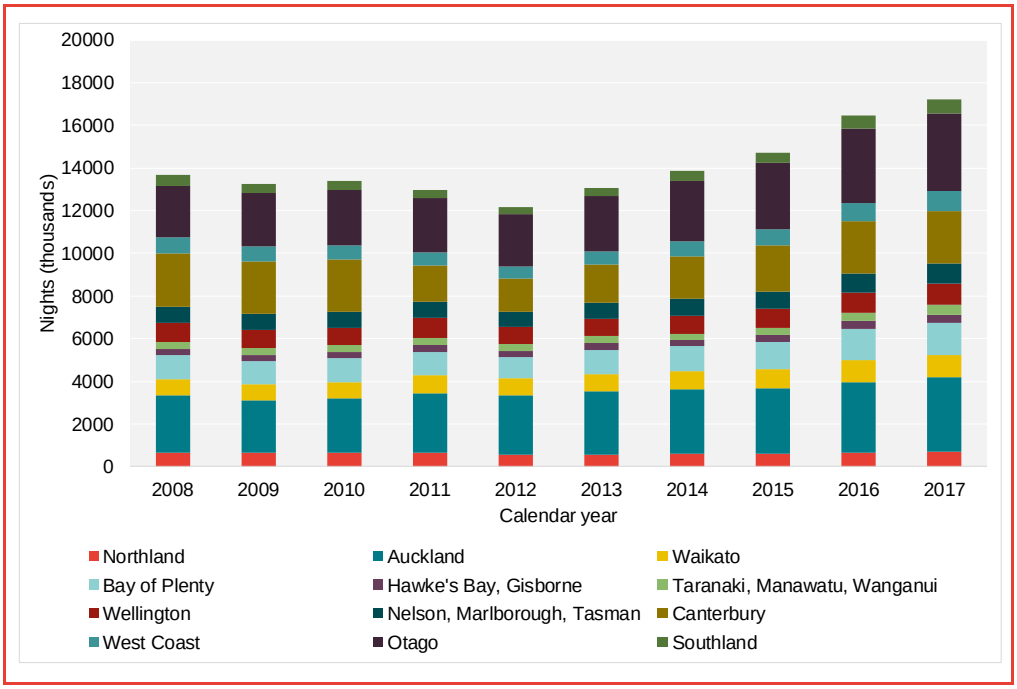


Source: MBIE: Monthly Regional Tourism Estimates

Note: Year ending February 2018

Total international guest nights in New Zealand increased by 26% between 2008 and 2017. The largest regional increase in international visitors over the period of 10 years has been in Otago, with a 50% increase in international guest nights, while Southland recorded a 42% increase in international guest nights. The only region with a drop in guest nights was Canterbury, most likely as a result of the 2011 Christchurch earthquake. This indicates that substantial tourism growth is occurring throughout the regions, therefore diversifying the economic benefit to New Zealand.

Figure 157: International guest nights by New Zealand region – 2007-2017

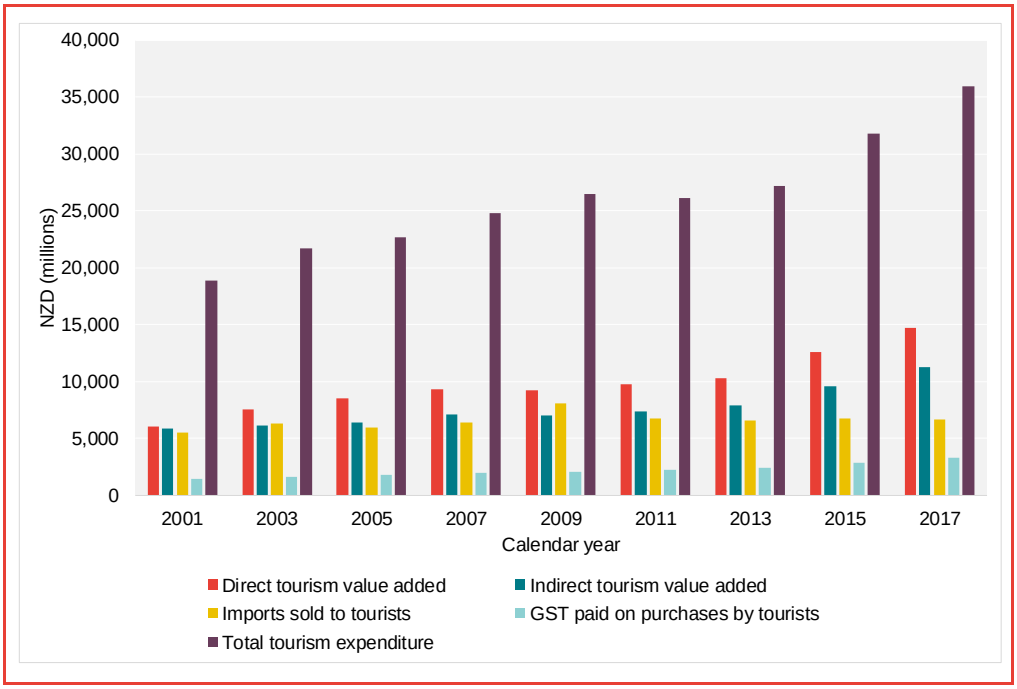


Source: Frontier analysis of Accommodation Survey, Stats New Zealand data

Tourism expenditure by component

Tourism expenditure can be broken down by component to give a better understanding of where the expenditure is being directed, and is shown in Figure 158. Direct tourism value added (e.g. income within the food and beverage, or accommodation industries) has been the largest growing component at a 144% increase from 2001 to 2017. Indirect value added (e.g. electricity, bedding, and food purchased by the above industries due to meeting tourism demand) is the second largest component, which may in part explain the general broad acceptance of the benefits of tourism, as discussed further below.

Figure 158: Tourism expenditure by component (2001 to 2017)



Source: Frontier analysis of Tourism Satellite Account, Stats New Zealand data

9.2.2 Key international tourism markets

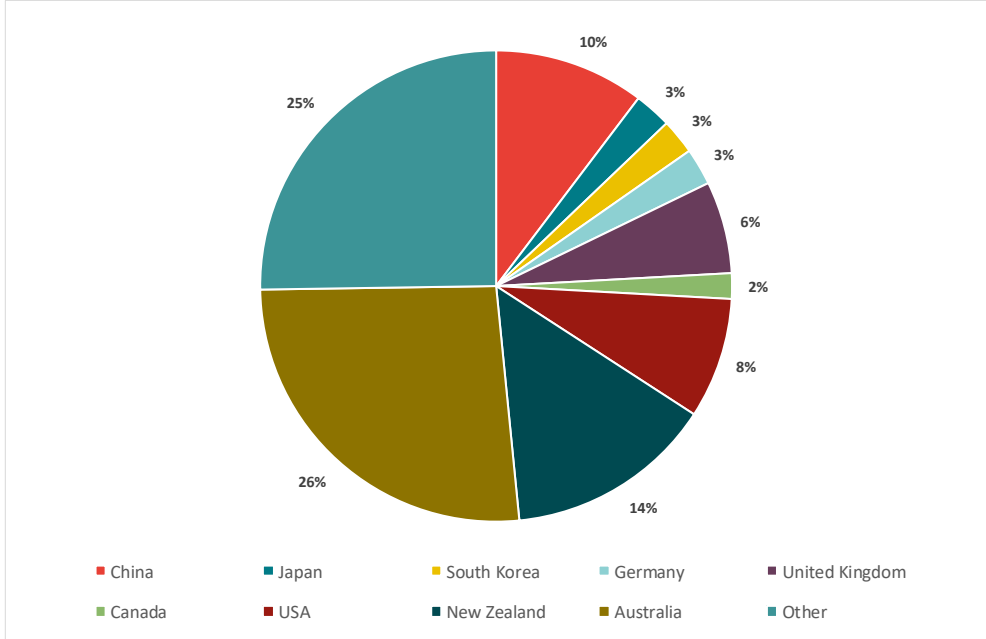
New Zealand tourism is reasonably diversified in its key markets. There are three key metrics when considering the key markets for international tourism to New Zealand:

- number of visitor arrivals by origin
- expenditure per visitor by origin
- total expenditure by origin.

Visitors arrivals by origin

In 2017, Australia accounted for 983,000 (26%) visitor arrivals. The next largest group was New Zealanders visiting New Zealand (532,000 or 14%), followed by China (385,000 or 10%) and the USA (309,000 or 8%).

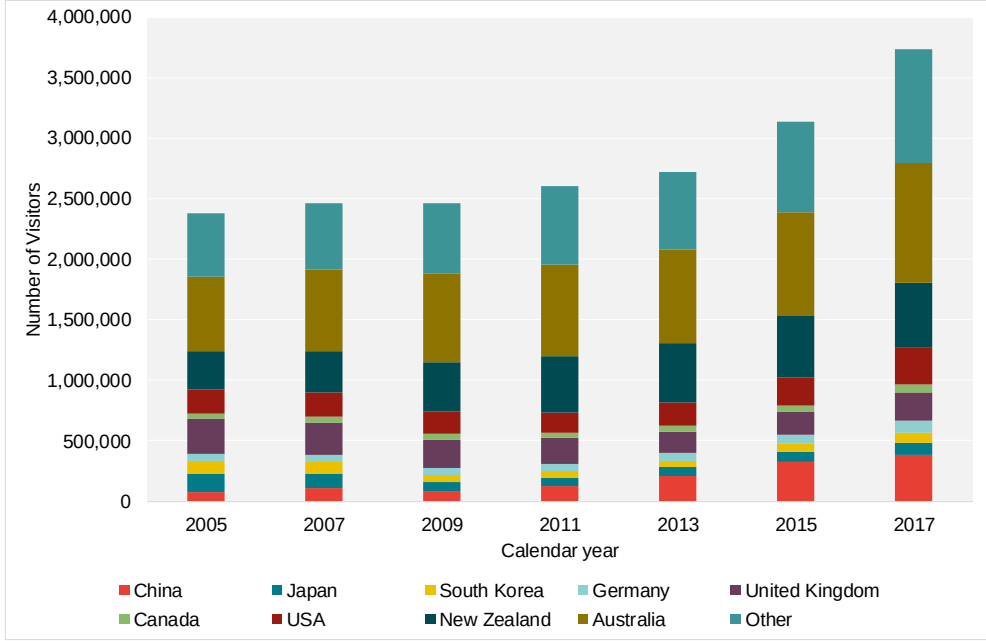
Figure 159: Proportion of visitor arrivals to New Zealand by citizenship 2017



Source: Frontier analysis of International Travel and Migration, Stats New Zealand data

Figure 160 shows visitor arrival by origin over time. The growth in visitors with Chinese passports has been very high in recent years, increasing by 394% from 2005 to 2017. Visitors with German, Canadian, American, NZ, and Australian citizenship have all risen by over 50% from 2005 to 2017. This growth has been offset to some extent by the decrease in visitors from the UK (18%), South Korea (20%) and Japan (35%) over the same time span.

Figure 160: Visitor arrivals to New Zealand by citizenship 2005-2017



Source: Frontier analysis of International Travel and Migration, Stats New Zealand dataExpenditure per visitor by origin

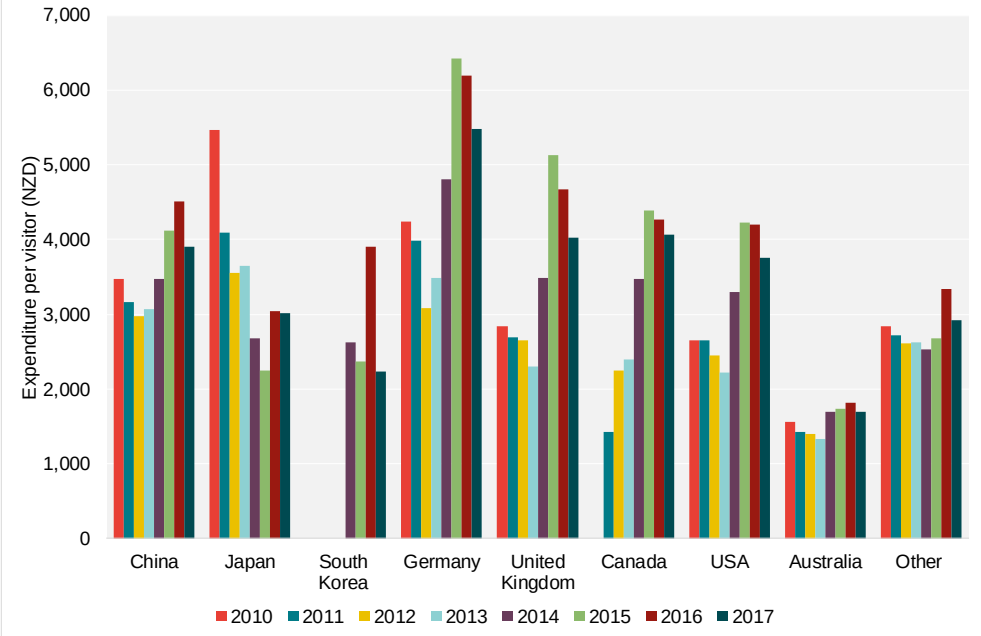
Figure 161 shows the expenditure per international visitor by country of origin over time. In a number of key markets there has been significant growth since 2010 in the expenditure by visitor. As discussed in the innovation section below, Tourism New Zealand has been explicitly targeting higher spending visitors, and this is reflected in the data. German visitors remain the highest spending, but the largest growth in visitor expenditure from 2011 to 2017 was in Canadian per visitor expenditure, growing by 185% over this six year period. In contrast, Japanese and South Korean visitor expenditure declined over time – Japan by 44% and South Korea by 14%.[188] In 2015 there was a substantial jump in expenditure per visitor for many of the countries from the previous years, which could be attributed to the depreciation of the New Zealand dollar over the first half of 2015.

The average spend from Australian visitors has remained steady, apart from the 2015 currency effect. Tourism New Zealand has followed a volume rather than

188 Information for South Korea was only available over the period 2014-2017.

value strategy with Australia, likely driven by the preferences of the Australian market.

Figure 161: Expenditure per international visitor by origin

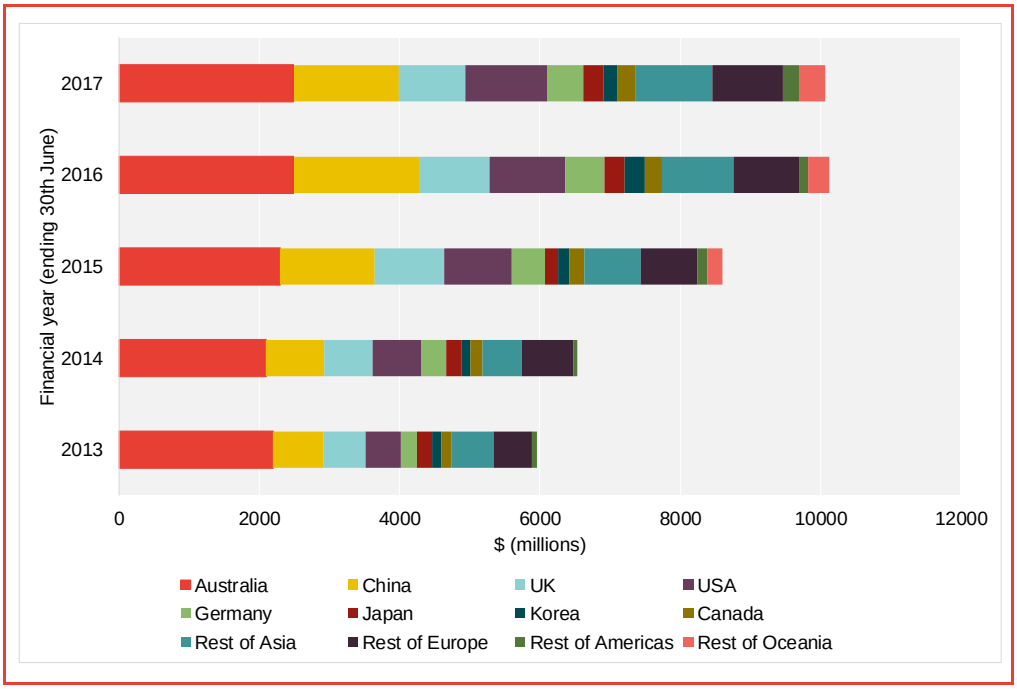


Source: Frontier analysis of Tourism Satellite Account, Stats New Zealand data

Total expenditure by origin

Australia remains the largest market by visitor expenditure, followed by China. The "Rest of Americas" category has had the largest increase in spending from 2013 to 2017 with a 175% growth in spending. Visitors from the USA, Germany, and China increased expenditures by 130%, 126%, and 108%, respectively, over the four year period.

Figure 162: Total international visitor expenditure by market (2013-2017)



Source: Frontier analysis of Tourism Satellite Account, Stats New Zealand data

9.2.3 Market structure

Tourism is made up by of a wide range of different industries and activities. Tourism Industry Aotearoa lists the primary tourism industries as:

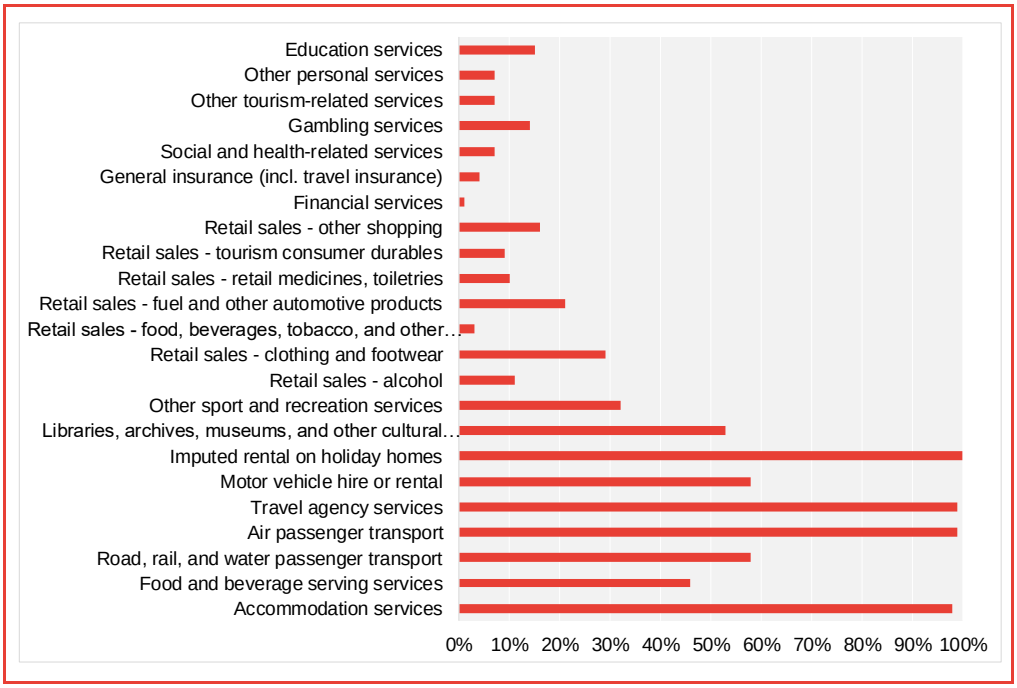
- Adventure & Outdoor;
- Air Transport;
- Attractions, Conferences and Events;
- Culture and Heritage;
- Hotels and Lodges;
- Land Transport;
- Motels, Other Accommodation and Hospitality;
- Regional Tourism Organisations;
- Tour Services; and
- Water Transport and Cruise.

The industries within tourism are typically very disaggregated – with the exception being some forms of transport (for example air, rail, water, etc.).

There are also other industries that generate substantial revenue from tourism, but less intensively, for example retail sales or food and beverage services. The intensity by which an industry generates revenue from tourism (compared to, for example,

domestic spending) is measured by "tourism product ratios" – which are calculated by dividing tourism consumption for each product by total product supply. As shown in Figure 163, industries such as accommodation, air passenger travel and travel agency services earn nearly all of their revenue from tourism. Other sectors, such as retail and food and beverage services earn a relatively lower, but still substantial, proportion of their revenue from tourism as shown in Figure 164. Retail trade has seen a large growth in direct value added since 2008 of NZ$4 billion, an almost 50% increase. The next largest sector, air and space transport, saw a much smaller growth over the same period, only growing about 20%.

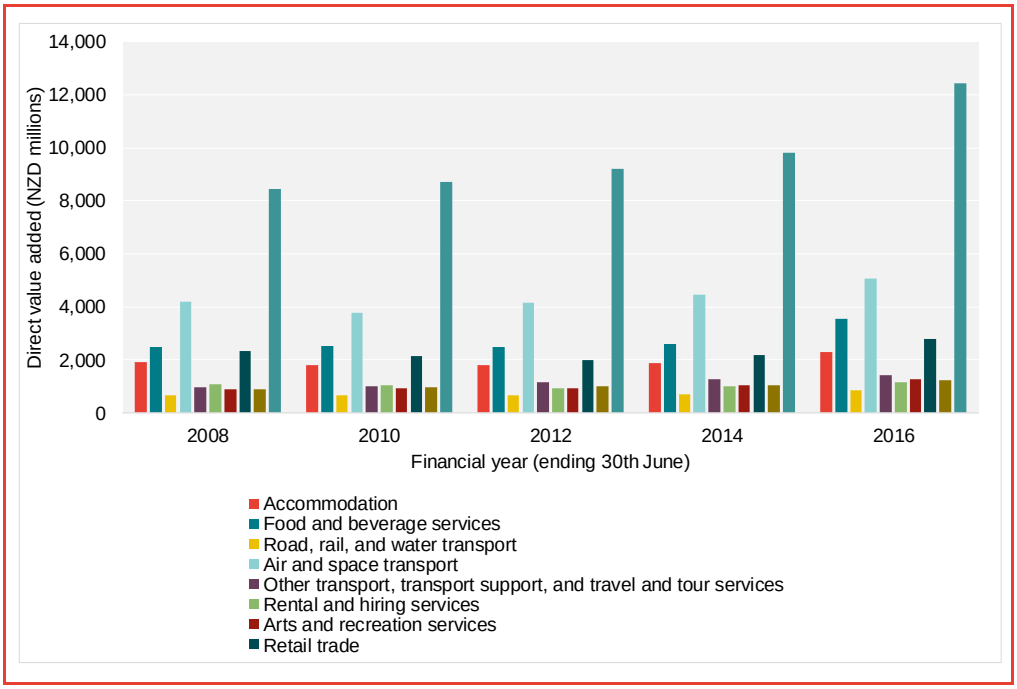
Figure 163: Tourism product ratios - 2016



Source: Frontier analysis of Tourism Satellite Account, Stats New Zealand data

Tourism's direct value added by industry is shown below in Figure 164. As can be seen, tourism value add is spread across a number of industries.

Figure 164: Derivation of Tourism's Direct Value Added by Industry – 2008-2016



Source: Frontier analysis of Tourism Satellite Account, Stats New Zealand data

Maori participation in the sector

Maori and Maori culture have traditionally been a significant part of New Zealand tourism. The International Visitor Survey provides information on the number of visits to Maori related tourist activities, as seen in Figure 165. This shows significant increases in the number of visits to activities specifically related to or associated with Maori. These increases are broadly in line with the increases seen for all activities, both Māori and non-Maori, indicating that the benefits from increases in the total number of tourists have been shared across all types of activities.

Figure 165 Growth in Maori tourism

Activities	Number of visits, year ended:			%change 2014-2016
	Dec. 2014	Dec. 2015	Dec. 2016	
Activities specifically related to Māori	3,144,934	3,466,142	3,896,658	23.9%
All activities related to, or associated with, Maori	4,955,039	5,435,463	6,181,927	24.8%

Activities	Number of visits, year ended:			%change 2014-2016
All activities (Maori and non-Māori)	30,796,791	33,442,939	39,276,179	27.5%

Source: NZ Maori Tourism, Maori Tourism Quarterly*, July 2017*

The government has also been active in promoting Maori participation in the sector. New Zealand Maori Tourism was established in 2004 to provide promote, facilitate and lead the Maori tourism sector.[189]

9.2.4 Innovation and value add

The types of innovation in the tourism sector differs substantially from the dairy sector, reflecting in part the nature of the goods and services being produced. In 2014, reported R&D spend in commercial services and tourism sectors was NZ$35 million; by 2016, this had grown threefold to NZ$112 million. The commercial services and tourism category now accounts for 7% of the total business expenditure on research and development – similar to its contribution to GDP.

An interesting parallel with the dairy industry is the focus of the tourism sector on branding and marketing, and the ability to use this to create additional value in the sector. Tourism New Zealand was established in 1991 to promote the New Zealand brand internationally and increase the value of tourism to the economy. It was argued that, given the disaggregated nature of the sector as discussed above, a centralised marketing authority could create economics of scale and overcome market failure issues, such as transaction costs and free riders.

In this context, the 100% Pure New Zealand campaign was launched in 1999 and has continued since this time. The available evidence suggests that this branding, and the associated campaigns, have been relatively successful. In 2017, Tourism New Zealand undertook a 12 month study with Facebook to determine the impact on the economy of the marketing spend undertaken. This study found that there was a direct correlation between advertising and actual arrivals into New Zealand, with NZ$ 22 of economic benefit generated for every NZ$ 1 spent by Tourism New Zealand on the marketing campaign.

As discussed earlier in this section, there has been significant recent growth in US tourism, both in terms of visitor numbers and total expenditure. We therefore consider Tourism New Zealand's US campaign below.

189 MBIE, website http://www.mbie.govt.nz/info-services/sectors-industries/tourism/supporting-maori-tourism

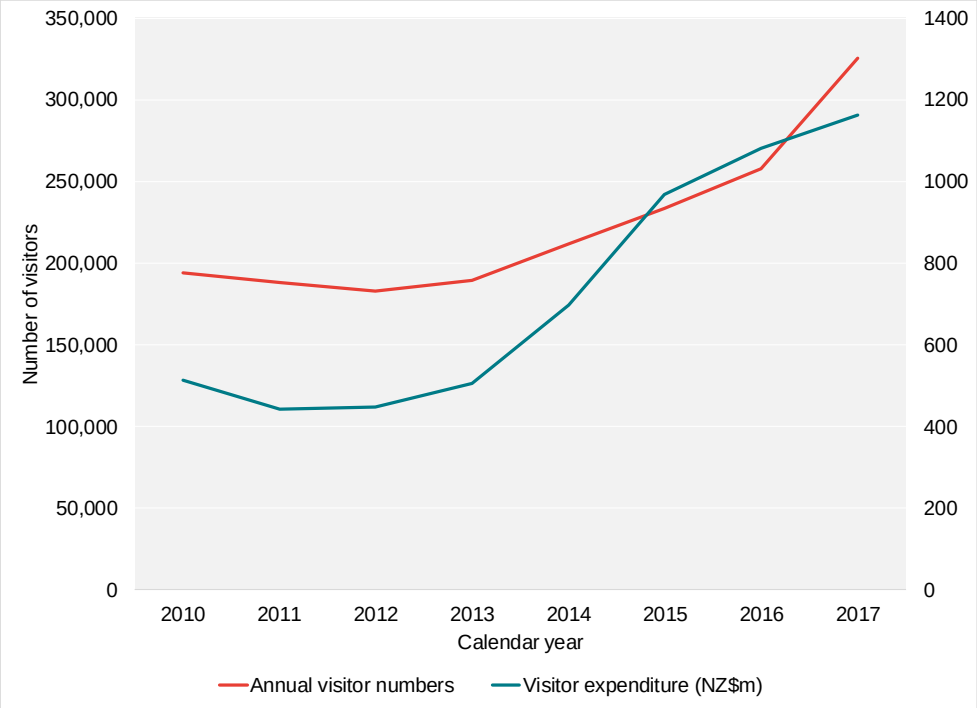
Box 7: US tourism campaign

Tourism New Zealand has recognised the US as one of its priority one core markets, along with Australia and China. US visitor expenditure of NZ$1,162m represented 11.3% of the NZ$10,250m total.

Figure 1 contains an illustration of two key performance indicators in the tourism sector – number of visitors (visitor volume) and total visitor spend – specific to visitors to New Zealand from the US. The flat performance of these two KPIs between 2010 and 2013 likely reflected a hangover from the recession experienced by the US consumer in the aftermath of the 2008 financial crisis. However, both US visitor volume and spend have been growing strongly since 2013.

Tourism New Zealand's explicit 3-year strategy outlined in 2013 was to target higher value visitors by targeting the messages that drive preference, and to leverage the increased media exposure afforded to the nation and its attractions by The Hobbit movie franchise. Coupled with the recovery of the US consumer over the 2013-2017 period, it appears that these strategies were successful.

Figure 166: KPI from Tourism New Zealand's US campaign



Source: Frontier analysis of Stats New Zealand data

Looking ahead, Tourism New Zealand continues to emphasise the importance of targeting preference drivers. Recognising that US tourists already associate New Zealand with cleanliness, landscapes, scenery and range of adventure, they have identified the three key messages as those that need to be improved upon in the eye of the US tourist, namely:

- range of experiences
- ease of travel within the country
- ability to see a lot without travelling far.

Moreover, they have incorporated the promotion of less travelled regions, and of the benefits of travelling to New Zealand during the off-peak seasons of spring and autumn (50% of visitors currently visit during the summer months), into their overall strategy.

The tourism authority hopes to achieve these goals via its ongoing marketing efforts. They have, for example, initiated a campaign with United Airlines and Air New Zealand to make promotional content available in six major US airports and in-flight with United. They have also prepared promotional presentations to be allocated to North America-based holiday promoters and salespeople.

The outlook for further growth of US tourism in New Zealand is, however, not as favourable as it was in 2013. The number of "active considerers" of potential New Zealand holidays, as measured by Tourism New Zealand, has remained flat at 15% of the 200 million person potential US market over the past year, after experiencing steady growth from 7% at the end of 2015. Moreover, the primary macroeconomic headwind that drove US-originated tourism – the recovery of the US consumer post-2008 – has by now largely played out.

The table below shows Tourism New Zealand's spend in 2013, 2015, and 2017 as a proportion of international tourism expenditure, which is just under 1%. There will be, of course, significant other investment in branding and marketing from private companies in international markets (for example, Air New Zealand). Nevertheless, the Tourism New Zealand spend metric gives a useful barometer of the scale of investment in creating a promoting the New Zealand tourism brand.

Table 17: Tourism New Zealand expenditure, NZ$ 2013-2017

	2013	2015	2017
Total TNZ expenses (NZ$m)	90	120	123
International tourism expenditure (NZ$m)	9960	12270	14536
TNZ expenses as a proportion of tourism expenditure	0.90%	0.98%	0.84%

Source: Frontier analysis of Tourism Satellite Account, Stats New Zealand data

9.3 Environmental performance

The environmental impact of the sector has been an issue of increasing public interest. The recent large increase in international tourism numbers has put significant strain on local infrastructure, particularly in areas unaccustomed to such large tourist numbers. In turn, this has led to concerns about degradation of public lands and waterways.[190]

190 MBIE, 2018, Consultation on International Visitor Conservation and Tourism Levy

9.3.1 Evidence of environmental impact

The Tourism Industry Aotearoa undertook a survey to determine the state of the tourism industry from an industry perspective in 2017. One of the main themes coming out of the survey results was the need for sustainability, with 87% of respondents agreeing that their business supports sustainability issues.[191] Additionally, most respondents did not think that the industry is doing enough to manage the impact of tourism growth. In particular, freedom campers were seen as a significant issue by industry respondents, with 81% of those surveyed feeling that 'freedom campers pose a risk to the public perception of the tourism industry'.[192]

The most recent 'Mood of the Nation' survey results from March 2018 also found that 39% of New Zealanders think that international tourism puts too much pressure on New Zealand.[193] This has increased from 15% in December 2015. The top two challenges identified from international tourism were:

- increased traffic congestion on holiday routes; and
- increased littering.

9.3.2 Response from industry and government

Tourism New Zealand and the Department of Conservation began working together in 2017 to promote sustainability in the tourism sector. The first joint initiative in 2017 was to promote nineteen short and single-day walks to domestic and international tourists.[194] These walks were specifically selected to encourage tourists into less visited regions, to spread the economic benefits and manage the environmental impact of tourism.

In November 2017, Tourism Industry Aotearoa launched the New Zealand Tourism Sustainability Commitment in order to encourage New Zealand tourism businesses to commit to environmental, social and economic sustainability. This Commitment is made up of 8 industry goals and 14 business commitments, including that tourism businesses measure and minimise their environmental footprint and commit to ecological restoration initiatives.[195]

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191 https://tia.org.nz/assets/Uploads/State-of-the-Tourism-Industry-2017-final.pdf

192 https://tia.org.nz/assets/Uploads/State-of-the-Tourism-Industry-2017-final.pdf

193 Kantar, 2018, Mood of the Nation, tourism survey

194 https://www.tourismnewzealand.com/news/partnership-delivers-consumer-voice-to-walk-selection/

195 http://sustainabletourism.nz/about-us/about-sustainable-tourism-commitment/components/

The New Zealand government has also put in place a number of other initiatives to address the environmental and infrastructure concerns arising from the growth in tourism, including:[196]

- **Tourism Infrastructure Fund**: The establishment of a NZ$ 100 million fund over four years to co-funding local communities in providing public visitor-related infrastructure.
- **Department of Conservation**: Further work is underway to consider pricing options for DOC facilities and other revenue generation opportunities within the portfolio.
- **Government Policy Statement on land transport**: Currently under development, this policy statement will recognise the importance of transport connections that enable tourists to access destinations throughout New Zealand safely.

The latest initiative by government is a proposal to introduce an International Visitor Conservation and Tourism Levy. The funds generated from this levy – estimated to be between NZ$57 million and NZ$80 million per annum - would be used to fund local infrastructure projects to alleviate some of the increased pressures from tourism.

9.4 Consumer outcomes

As discussed, the New Zealand tourism industry has grown significantly since 2001, fuelled by both domestic and overseas consumers. This growth in international tourism has had positive spill over benefits for domestic consumers, as this has resulted in an increase in the number and types of tourism services being offered. However, New Zealand consumers may also face negative spill overs from the growth in international tourism. The Ministry of Business, Innovation and Employment's consultation paper on the potential introduction of the International Visitor Conservation and Tourism Levy cites potential crowding out of domestic visitors as one consequence of the increase in international arrivals.

Given the recent growth in tourism, it is conceivable that this may be putting pressure on domestic prices. Tourism NZ has spoken about introducing dynamic pricing, where prices for activities could change dependent on demand, making things more affordable for domestic travellers.[197]

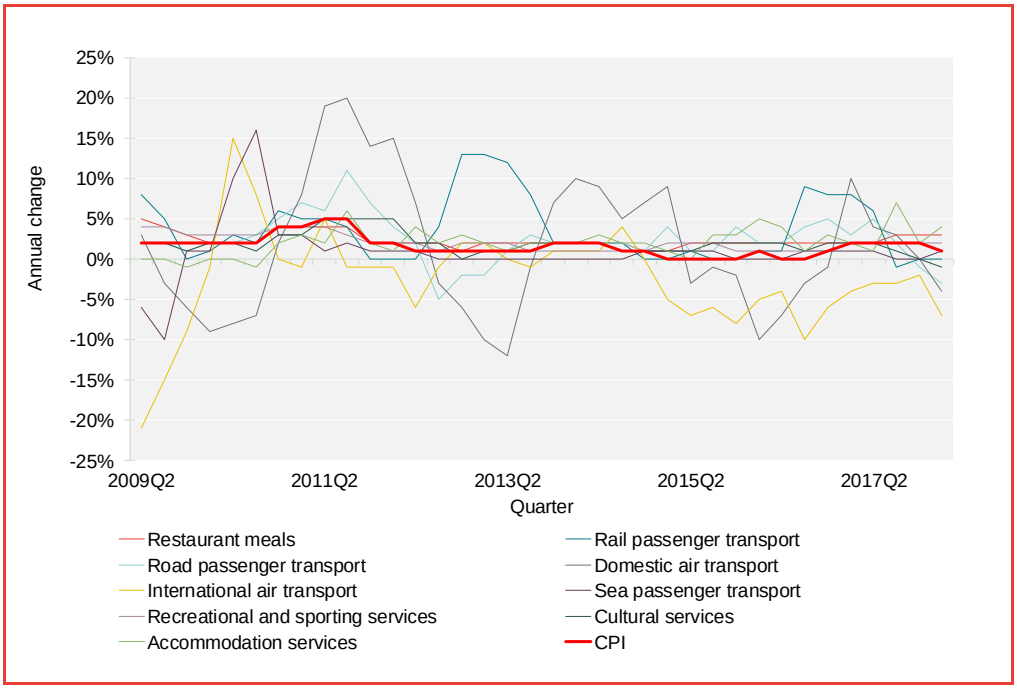
Comparing the change in prices for key tourist products for which data is available, we observe that:

196 MBEI, 2018, Consultation on International Visitor Conservation and Tourism Levy

197 https://www.stuff.co.nz/business/better-business/101045153/how-tourists-see-new-zealand--beautiful-but-expensive

- prices of tourists' products are more volatile than CPI over the last 10 years; and
- excluding international air travel, the average sub-set of tourist prices considered increased by 24%, while CPI increased by 17%.

Figure 167: Annual change in prices for tourist products and CPI (seasonally adjusted)



Source: Stats NZ

9.5 Social performance

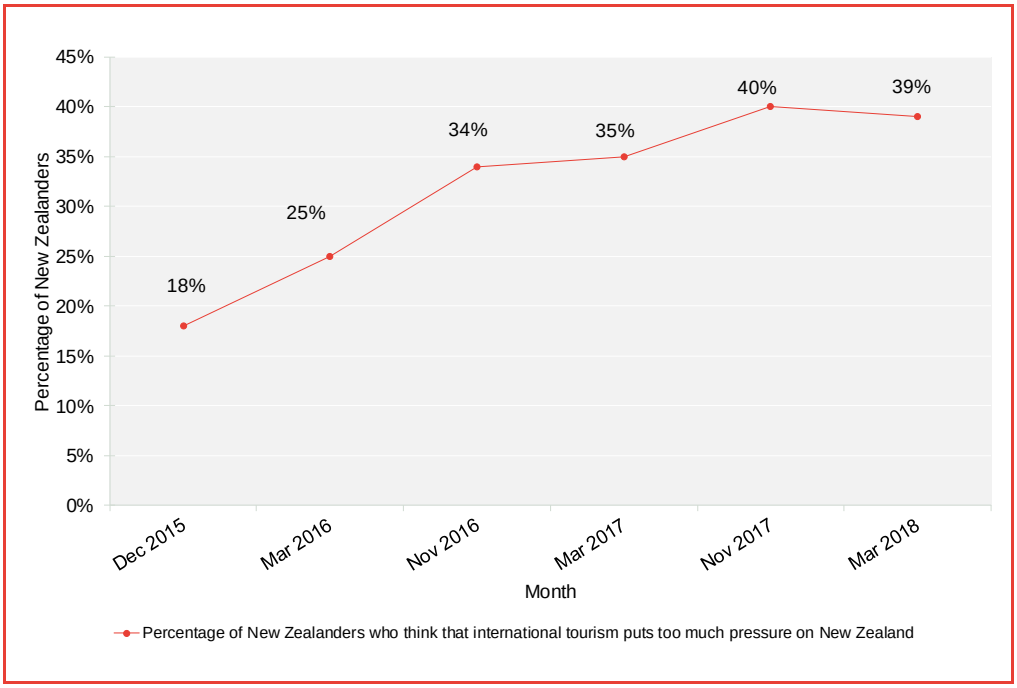
Overall, the New Zealand tourism industry has broad support from the public, which is generally happy to welcome international visitors and takes pride in making them feel welcome.[198]

Since December 2015, Tourism New Zealand has commissioned a nationally-representative survey every six months to understand the public perceptions of the value of international tourism and the benefits and challenges associated with the sector. The most recent 'Mood of the Nation' survey results from March 2018 indicate that 96% of New Zealanders believe that tourism is good for New Zealand. Despite this, 39% of New Zealanders think that international tourism

198 Survey results indicate that: i) 92% of New Zealanders agree or strongly agree that they want international visitors to have an enjoyable New Zealand experience; ii) 91% agree or strongly agree that they are proud that New Zealand is an attractive visitor destination; iii) 90% agree or strongly agree that they are open to international visitors coming to New Zealand; and iv) 88% agree or strongly agree that they take pride in making international visitors feel welcome in New Zealand.

puts too much pressure on New Zealand. As shown in Figure 168 below, this number has increased significantly since December 2015, in line with the increasing number of tourists, though it appears to have stabilised over the past year.

Figure 168: Percentage of New Zealanders who think that international tourism puts too much pressure on New Zealand



Source: Tourism New Zealand

Broadly, the survey finds that there are five main ways in which tourism applies pressure in New Zealand:

- pressure on infrastructure;
- accommodation shortage;
- environmental damage;
- freedom camping; and
- increased traffic congestion.

More specifically, the survey finds that tourism related concerns are primarily road traffic related, with the three most commonly perceived negative impacts, and the associated percentage of New Zealander's who think that they are a concern, being:

- international tourism has increased traffic congestion (41%);
- international tourism increases the risk of serious road accidents (39%); and
- international tourism results in a higher number of road accidents (35%).

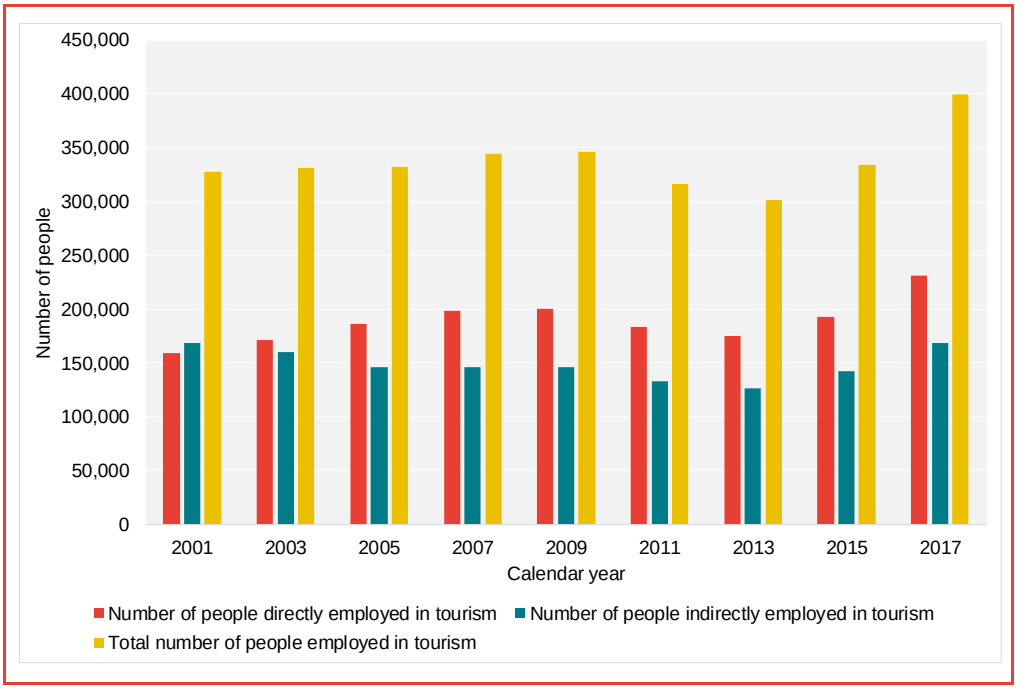
In addition to the perceived negative impacts, the survey identified the top three perceived benefits of international tourism. These benefits were more commonly

recognised than the negative impacts and are all related to the economic impact of tourism. Specifically, international tourism is seen to:

- create economic growth for the regions (60%)
- create growth opportunities for businesses (59%)
- create employment opportunities for residents (52%).

The employment opportunities can be evidenced by employment statistics over time. The number of people directly employed in tourism has risen by 45% since 2001. The number of people indirectly employed in tourism has decreased by approximately 0.07%, bringing the growth in total number of people employed in tourism at about 22%.

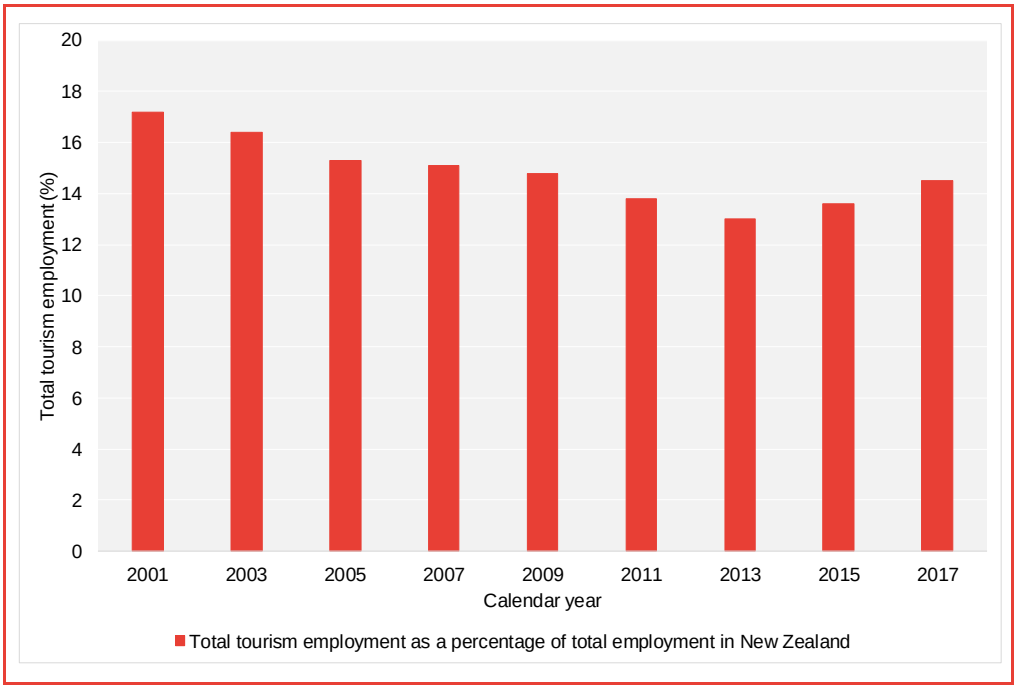
Figure 169: Employment in tourism over time



Source: Tourism New Zealand

As a percentage of total employment in NZ, total tourism employment has remained quite stagnant, but overall has fallen by 15% from 2001 to 2017.

Figure 170: Total tourism employment as % of total employment in New Zealand



Source: Tourism New Zealand

Overall, while broad support for tourism remains due the significant economic and social benefits it brings, there has been growing concerns about the environmental and infrastructure pressure such growth brings on New Zealand. If unaddressed, these pressures would likely impact on the tourist sectors social licence to operate. However, many initiatives are currently in place to address this including:

- targeting higher spending visitors, thereby prioritising value over volume; and
- environmental and infrastructure initiatives that seek to minimise negative externalities from tourism growth.

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